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THERMO-MICROSCOPY IN PHARMACY.

BY W. H. SYMONS, F.R.M.S., F.C.S.

The effects of heat upon a body are often some of the most important data in the examination of that body; this is especially so in the case of organic compounds. To propose a method of studying a few of these effects is the object of the present paper.

Some months ago, I exhibited at the Royal Microscopical Society "a hot or cold stage for the microscope," and was subsequently asked to bring it further under the notice of the Fellows of that Society at one of their evening meetings.

This was done on December 14, of last year; the paper, with an illustration, was given in the Journal published in February of this year. The apparatus has since received the approval of eminent scientific men, and possibly some of its applications in pharmacy may not be uninteresting to the readers of this Journal.

The stage first described was intended for comparatively low temperatures, being furnished with a special form of thermometer graduated to 150° C.; it was, moreover, somewhat expensive and liable to get out of order. The form here figured can be obtained for a nominal sum, is capable of being used with an ordinary thermometer, and is available for all temperatures within the range of that instrument.

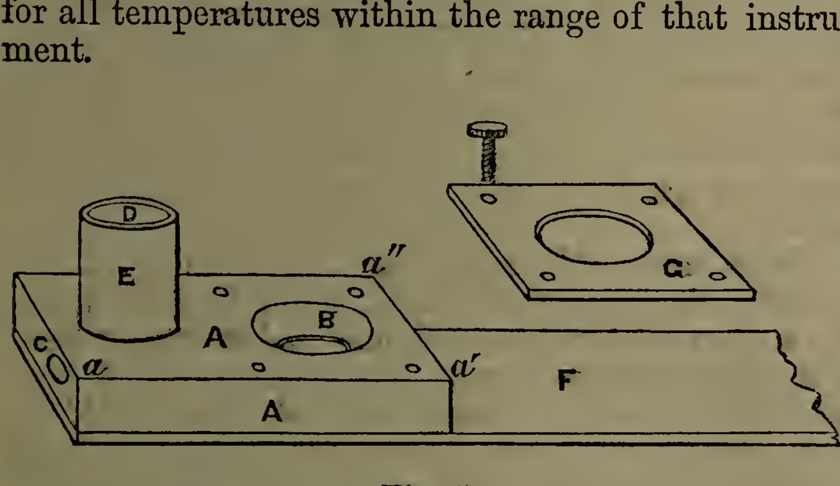


Fig. 1.

It is made principally of one piece of copper, A, and measures from a to a' 6 cm., from a' to a'' 4 cm., and is 2 cm. thick. A hole, B, 2·5 cm. in diameter, passes right through it, but is closed on both sides by thin glass or mica held between thin rings of cork by means of plates, as G, which are screwed down sufficiently tight to prevent leakage. A slightly tapering hole, C, is drilled lengthways, on one side, through the copper; it meets and extends a little beyond the hole, B, and is sufficiently large to take a cork carrying a thermomete.r The tube, E, is in one piece with the rest, and its bore, D, meets the canal, C. A piece of copper, F, some 3 mm. thick, extends about 15 cm. beyond one end, and should be brazed on to the body before the hole, B, is drilled. The whole arrangement may advantageously be plated with platinum, silver, or nickel, care being taken to insure the complete coating of the inner surfaces. The part placed on the stage of the microscope is mounted on some non-conducting body, such as a piece of well-seasoned mahogany. An aperture corresponding with B is of course left.

The thin glasses or mica having been firmly packed in their places, and the thermometer put in position, taking care that it does not come into contact with any portion of the metal, perfumed oil is carefully poured into the open aperture, D, until, when in a horizontal position, it completely fills the space B; the whole arrangement is then placed on the stage of a microscope, so that B shall correspond with its optic axis. The object to be examined is placed on the upper thin glass.

Melting Points.—For example, suppose we wish to take the melting point of wax. A small piece of that substance, about the size of a pin's head, is so placed, covered with a piece of thin glass and surrounded by a cardboard shade (a bottomless pill box answers well) to protect from currents of cold air; heat is now applied to the projecting copper plate until the wax melts; the temperature being observed, the source of heat is removed, and, when the wax has congealed, the crystals in it are focussed. Heat is again cautiously applied so that when the temperature approaches that at which the wax was observed to melt it shall rise very slowly, the crystals at the same time are carefully watched; the moment they disappear the temperature is noted and is considered "the melting point." The heat being removed, the field is watched for the reappearance of the crystals; as a rule this occurs very near the same temperature as their disappearance, cacao butter being a notable exception to this.

The following are some results by this method:—

Beeswax	61° C.
White wax, genuine	61° C.
White wax, commercial	51° to 55° C.
Paraffin wax, of low melting point	50° C.
Spermaceti	43° C.

Attention is particularly directed to the samples of white wax. Several lots were examined with fairly constant results, and, therefore, the above are not to be considered exceptional; they undoubtedly contain paraffin or spermaceti. The almost constant presence of an adulterant, of low melting point, in commercial white wax, may, to some extent, account for the difficulty experienced in obtaining spermaceti ointment of suitable consistence if made according to the official formula. The adulterators might at all events use a paraffin wax of suitable melting point, if indeed they cannot supply a pure article.

This mode of taking the melting point possesses in the case of fats no advantage over that usually followed; it is merely noticed in passing. In the case of resins and alkaloids, to be spoken of hereafter, it is, however, exceedingly useful.

Starches.—The tumefaction of granules of starch may be observed in much the same way. The starch is rubbed down with water, and a drop of the mixture placed on the stage and covered with a thin glass and shade as in the case of wax; the bursting of individual granules can then be observed, taking care that the temperature rises very slowly.

The following are some results by this process:—

Starch.	A few swollen.	Majority swollen.	All swollen.
Tous-les-mois	65° C.	68° C.	74° C.
Potato	55° C.	60° C.	65° C.
Sago	64° C.	68° C.	74° C.
Maranta, var. Bermuda .	62° C.	69° C.	73° C.
Maranta, var. Natal . .	58° C.	65° C.	70° C.
Maranta, var. St. Vincent	66° C.	73° C.	77° C.
Wheat	60° C.	65° C.	70° C.
Maize	65° C.	70° C.	77° C.
Cassava	58° C.	63° C.	68° C.
Oat	65° C.	70° C.	77° C.
Rice	70° C.	75° C.	80° C.

As a control to the above method the respective starches were mixed with ten times their weight of water and the mixtures placed in thin test tubes, of equal size, in a double water-bath, and gradually heated; the water in the inner bath was at no time allowed to exceed the temperature of the mixtures by more than 2° C., and the water in the outer bath not more than 5° C. Every few degrees the mixtures were stirred with a thermometer and (having been kept at a constant temperature for one minute) a drop removed and examined under the microscope. Approximately the same results were obtained.

From this list it will be seen that potato starch is very readily affected by heat; in point of fact, its granules are freely acted upon when action has scarcely begun in those of the others. Bakers seem to be aware of this, and hence use mashed potatoes to make their ferment, and they say wheaten flour would not answer alone. The more tumefied potato starch is more susceptible to the yeast than the less tumefied wheat starch.

The next point to be noticed is that although starches as a rule seem to vary but slightly in their behaviour to hot water, the three principal varieties of Maranta show marked differences. At first it was thought this might be accidental to the special specimens under examination, so samples from various museums, wholesale houses and private sources were treated in the same manner with almost constant results.* Subsequently, my attention was directed to a paper, by that veteran pharmaceutical microscopist, Mr. Greenish, published in the 'Year-Book of Pharmacy' for 1875, page 534, in which comparatively the same results were chronicled. The samples of starches which I examined, obtained from such various sources, were probably representative of the crops of different years, and, this added to the fact that my results were approximately the same as those obtained by Mr. Greenish seven years previously, doubtless also from many samples representing different years' growth, seems to show that this difference in the tumefying points of these varieties of Maranta arrowroot is a constant characteristic.

It is quite possible the cause may be found in the temperature under which the plants bearing them are grown. The higher that temperature, the higher the point of tumefaction. A glance at the following table will suffice to support this view:—

District.	Latitude.	Longitude.	Rain fall per annum	Temperature. Max.	Min.	Mean.	Tumefying points
Natal	30°·40′ S.	29°·55′ E.		27° C.	13° C.	20° C.	70° C.
Bermuda ..	32°·20′ N.	64°·50′ W.		30° ,,	10° ,,	22° ,,	73° ,,
St. Vincent.	13°·15′ N.	61°·15′ W.	76ins	31° ,,	21° ,,	26° ,,	77° ,,
British Guiana	4°·40′ N.	59° W.	74ins	33° ,,	24° ,,	28 ,,	78° ,,

Furthermore, potato starch, from plants grown in England, where the mean temperature is under 9° C., tumefies at 65°. Tous-les-mois (which has larger granules, and, therefore, other circumstances being equal, might be expected to be more easily tumefiable), grown at St. Kitts, lat. 17° 22′ N., long. 62° 48′ W., mean temperature about 24° C., tumefies at 74° C. Maize starch may likewise be compared with wheat in the same way. But cassava and oat starch are exceptions; these, however, occur as compound granules, whereas all those previously mentioned are simple.

It is proposed to grow potatoes, and other starch-bearing plants, under various conditions of temperature and to ascertain from their examination the results.

Following the example of Lippman and Greenish, the temperature is noted at three distinct stages of tumefaction, viz., when the first few granules swell, when the majority have swollen, and when all have done so. This latter point is synonymous with the formation of a jelly, if the granules are present in sufficient quantity, and is alone given in the above table.

To ascertain if by a prolonged exposure to a lower temperature the same results could be obtained as by a short exposure to a slightly higher temperature, a sample of potato starch was taken (this had been previously found to reach the first stage at 55° C.; the second at 60°; the third at 65°), mixed with ten times its weight of water, placed in a thin test-tube with a thermometer as a stirrer, in a double water-bath; the inner, which consisted of an earthenware vessel, being furnished with a thermometer; the outer, with a simple form of thermostat, so arranged as to keep the inner bath at 60° C.

As I am not aware that so simple an arrangement has yet been published, a description of the Thermostat may not be out of place. It is a modification of Kemp's regulator, and is thus made:—

Two test tubes are selected, one of which is capable of sliding loosely inside the other: the smaller one is heated near its centre and slightly drawn out; it is then severed at the contracted part, the upper half being thrown away, the rough edges

* Except in the case of commercial Bermuda arrowroots, some specimens of which behaved in the same way as St. Vincent arrowroot; but as the same samples showed a marked deficiency in the number of granules with processes, so comparatively abundant in genuine Bermuda, the title Bermuda arrowroot was probably a misnomer.

of the lower half are rounded in the flame. The smaller tube is then inverted in the larger one and

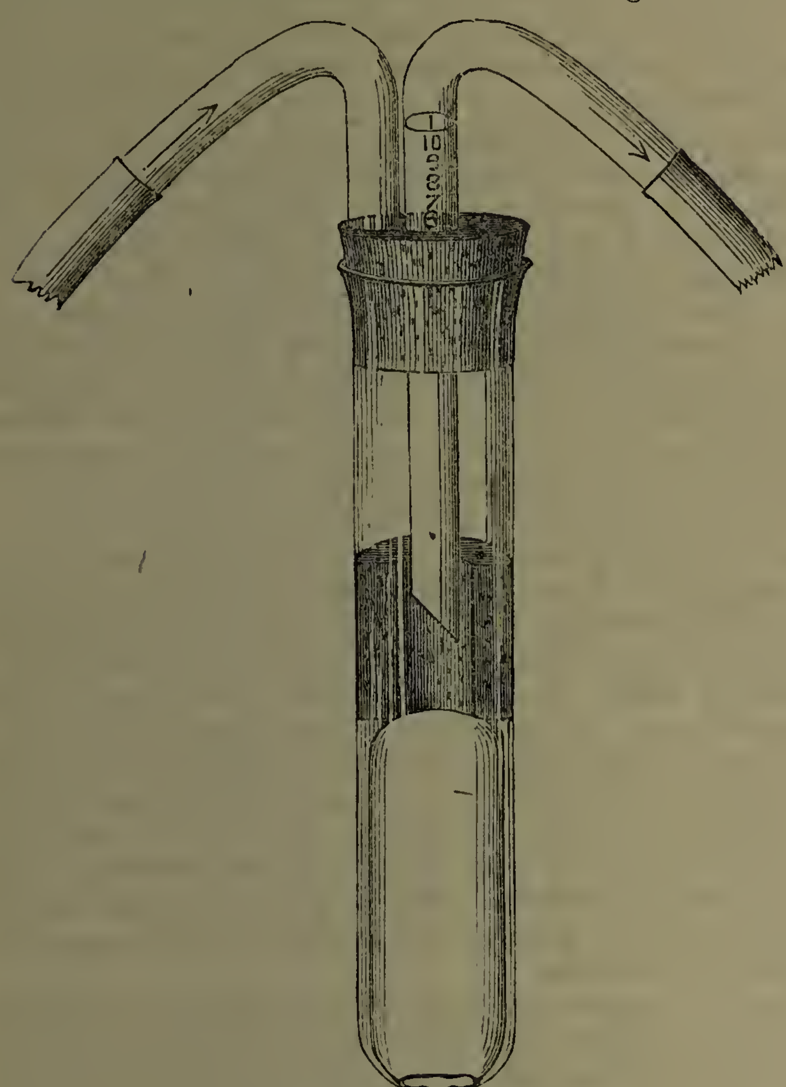


Fig. 2.—Thermostat.

kept in its place at the bottom by means of a cork, in which a fair sized groove has been made, on one side, by means of a rat's-tail file. The mouth of the larger tube is now fitted with a good cork which carries two glass tubes, as large as possible, both tubes being bent at an angle of 45° outside the cork; one terminates immediately inside, the other, which is capable of sliding through the cork, passes down to the bottom of the groove. It should terminate obliquely and have a pinhole, easily made by pressing a needle into it when red hot, about one cm. from its lower end. A mark is made on the tube outside the cork, the tube is then withdrawn until its termination is near the top of the groove, and another mark made; the space between the two marks is to be graduated into ten divisions, this can be done by a paper scale of suitable length, sliding it up the tube until it is between the two marks, where it is kept either by its own elasticity or by means of a minute quantity of sealing wax or gum.

To adjust the instrument, the cork carrying the two tubes is removed, and the test-tube heated to the highest temperature required in use; after about one minute's exposure, mercury is poured in until the groove is completely filled, the cork is again fitted to the test-tube, and the longer tube adjusted so that its mouth is just closed by the mercury; the open end is attached to a Bunsen's burner by means of a caoutchouc tube, the other tube is, in a similar manner, connected with the gas supply. The test-tube is then placed in an oil or water-bath over the Bunsen, and when the flame lowers the temperature is noted; the sliding tube is then withdrawn one division, the operation repeated, and so on, if necessary, for each division on the scale.

In using this thermostat it should be seen that the corks remain in the same position, and that the body heated is sufficiently voluminous, or at such a height above the flame as to allow of the temperature falling when the gas is supplied through the pin hole only. This simple arrangement is sufficiently delicate to keep a water, oil or air-bath within a few degrees of any required temperature, or if a double bath be used and the thermostat placed in the outer, the inner bath will remain constant within 1°.

The value of one division should be found each time of using, as alterations of the barometer may affect it slightly.

The mixture of potato starch and water by the arrangement above described was kept at a temperature within 1° of 60° C. for nine hours. Examination under the microscope during the first few minutes and after the nine hours showed that the starch had not been further altered by the prolonged exposure. The mixture was now diluted with four times its weight of water and a portion of it kept at 60° C. until it had been so heated for forty hours; still no further change. On the temperature being raised to 65° C. most of the unaltered granules tumefied, but it required a temperature of 70° C. to complete the alteration, whereas when a sample of the same starch which had not been so treated was mixed quickly with water of 65° C. the whole of the granules tumefied.

It, therefore, seems that prolonged exposure to a temperature a little below that of tumefaction, not only does not tumefy the granules but enables them to bear a slightly higher temperature than they otherwise would do.

Slow tumefaction might perhaps throw some light on the histology of starch granules; it is, however, quite possible that it may have already been thoroughly studied by some of the German writers to whom we are indebted for nearly all our knowledge on this subject. I notice that when the granules are gradually heated as described above the majority do not burst their integument, by splitting it from the nucleus in all directions, as when they are subjected to a sudden rise of temperature, but a small bladder-like process is thrown out near the nucleus, and if the temperature be kept constant, the swelling increases, although still confined to that portion of the granule, bursts, the granulose oozing out, and, if sufficient time be allowed, the integument, still retaining the original size and shape of the truncated granule, is all that is left.

At the same time other granules having thinner integuments will be acted upon to a greater extent, leaving nothing but a mere cap of cellulose, and in some cases the whole of the integument is completely acted upon, nothing eventually remaining but a mass of jelly.

The swelling of the granulose within the integument of a starch granule has the same effect as an ignited charge in a gun. Suppose a modern cannon, which increases in thickness by successive coils of metal towards its breech, were closed by a stopper of less strength than the barrel of the gun, a charge of suitable power, capable of acting with equal force on the whole surface, having been previously introduced. This being fired, the stopper would give way. If a more powerful charge were used, not only the stopper but the front part of the gun would be carried off; and so on as in the case of the starch granule in which the so-called nucleus represents the closed muzzle, the integument the cannon, and the granulose the greater or lesser charge, according as it is subjected to more or less heat.

Fig. 3.—Potato starch showing different granules at various stages of tumefaction. The upper four are supposed to be the same granule.

From the action of warm water on starches, that portion of the granule near what is called the nucleus or hilum is shown to be the softest and newest part, and possibly the granule may receive its nutriment through this point. Much opposition has been shown to both the above terms, and if what is surmised above be corroborated by others, then, the term *micropyle* (*Gr.* a little gate or orifice) would more suitably express its probable functions. It may be asked, if the granule is built up by the entrance of nutriment through this micropyle, how is it that, when the starch is used to furnish material for the growth of the plant, it does not send out the granulose through the micropyle, that being the softest part, and leave the celluloidal integuments as a skeleton of the granule? It must be remembered, however, that the protoplasm from which the starch is formed must be diffusible through the primordial integuments which are first "secreted on the inner surfaces of the cavities or vacuoles formed in the general protoplasm of the cell;" but when converted into granulose it is no longer diffusible.

How starch is utilized has not been satisfactorily explained; it was at one time thought that the immediate cause of its transformation into available substances was diastase, but it is now known that diastase exerts no influence on raw starch. Starch has been examined after having passed the alimentary canal of man and other mammals, and it has been observed that the whole surface of the granule is more or less corroded, the action being no more violent at the micropyle than at other parts. Whatever agent is employed in the plant probably acts on the integuments as much as on their contents, the action once begun being most likely very rapid, those granules first attacked disappearing before action has begun on others.

(*To be continued.*)

EXAMINATION OF POWDERED SENNA LEAVES *

BY DR. W. LENZ.

The pharmacist who is not in a position himself to prepare his vegetable powders, or who for other reasons purchases them, in proportion as he is in the habit of conscientiously examining his goods, must have often regretted the want of a suitable method for testing the powders of plants and parts of plants. For the examination of many commercial powders, but especially of condiments, masterly works by Wiesner, Vogl, Müller and others have been published, which in conjunction with characteristic figures, render the microscopic analysis and identification of the constituents of such vegetable powders possible to the expert. But many of the officinal powders most in use are not so well worked out, and some not at all, at least as regards the indispensable figures.

For the examination of a vegetable powder it is requisite to have an exact knowledge of all, or at least of the characteristic cell and tissue forms of the plant or parts of the plant from which it is derived. Such a knowledge can only be attained by a thorough previous examination of authentic entire specimens. Before proceeding to the examination of an undoubtedly pure powder, preferably prepared by the experimenter, it is therefore necessary to acquire by means of sections, a clear idea of the anatomical relations. When the student can recognize and define each cell from the powder, and refer it to the part of the unpowdered drug in which it occurs, he will have attained a general preparation for the testing of commercial powders.

The microscopic examination and discovery of special characters in powdered leaves is rendered more difficult by the fact that leaves in general present a great similarity in structure. The epidermal cells covered by the cuticle are always rounded off parallel to the surface of the leaf, single cells or entire groups being developed into papillæ, hairs, glands and scales; when fresh they contain colourless or coloured cell-juice, which in dried leaves naturally disappears, though it may colour the cell-walls. The peculiar fundamental tissue of the leaf (mesophyll), permeated by vascular bundles, which is enclosed by the epidermis, is formed, as a rule, of two layers; the upper of which consists of cylindrical cells elongated vertically to the epidermis (palisade tissue), and the lower of parenchyma tissue enclosing large intercellular air-spaces. The cells of the fundamental tissue are mostly thin-walled, presenting however, in many leaves, as for instance in tea, especially in the neighbourhood of the vascular bundles, stone cells that may be very characteristic. Moreover in the mesophyll there occur crystals, mucilage, and receptacles containing essential oil, etc. The vascular bundles, the course of which (venation) is so important in the recognition of the entire leaf, afford fewer points for the characterizing of leaf powders than the epidermis and mesophyll.

I. *Folia Sennæ Alexandrinæ.*

This drug consists of the dried pinnate leaflets of *Cassia lenitiva*, Bischoff, free from argol leaves. The leaflets are somewhat leathery, oval, oblong or oblong lanceolate, unequal at the base, broadest in the middle, shortly accuminate, pale greenish with a bluish lustre on both the upper and under surfaces, covered with fine hairs on the under side, especially in neighbourhood of the midrib. The epidermis (fig. 1) of the upper surface resembles that of the under surface in structure, except that thick-walled one-celled hairs (H), inserted in the midst of a group of four to six epidermal cells, occur more plentifully on the under than the upper surface. These hairs are straight or curved, simple, with the canal nearly as thick as the wall; they are brittle and consequently easily detached at the base, so that only the basal portion, forming a characteristic scar (R), remains in

* Abstract of a paper in the *Archiv der Pharmacie*, [3], xx., 106.

the epidermis. Along the midrib occur single thin-walled hairs, which are in some instances five times as long as those represented in the figure. The stomata,

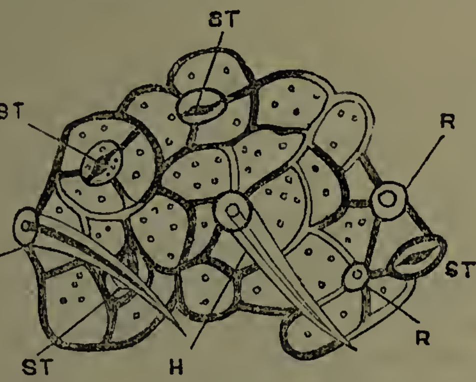


Fig. 1. *Cassia lenitiva*, Bisch.: Epidermis of leaf.—H, hairs; ST, stomata; R, point of insertion of detached hair. 144/1.

which are usually surrounded by a circle of 2 to 4 epidermis cells, occur with equal frequency on the upper and the under surfaces. The epidermis consists of a single cell layer, which, however, is developed somewhat more thickly on the upper surface of the leaf than the under, and occupies (the two layers together) one-third of the diameter of the leaf. Beneath the epidermis, and contrary to the usual rule, near both the upper and lower surfaces of the leaf, lies the palisade tissue, some cells of which, strongly magnified, are represented in fig. 2. This also consists of only one layer of cells, which, however, are notably larger in the layer near the upper surface of the leaf than in that near the under. The thickness of the two layers of palisade tissue taken together amounts to more than one-third of the diameter of the leaf. The contents (fig. 2, B) forming large cylindrical cells standing with their long diameter vertical to the surface of the leaf, are peculiarly shrivelled up, so that they themselves may be taken for thickened cells.

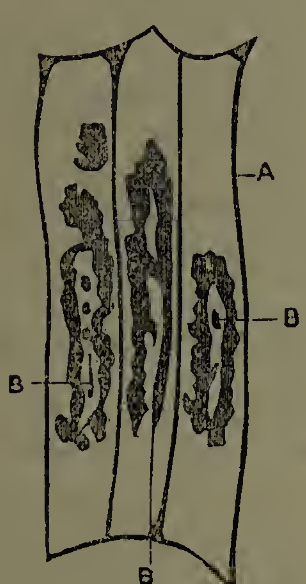


Fig. 2. *Cassia lenitiva*, Bisch.: Palisade tissue of leaf.—A, cell-wall; B, dried up cell contents. 420/1

Fig. 3. *Cassia lenitiva*, Bisch.: Palisade tissue of leaf, seen from above. 144/1

Upon a superficial view, therefore, the palisade tissue presents the appearance of a layer of stone-cells (fig. 3). The middle of the leaf is permeated by an abundant network of vessels, the elements of which, consisting of smooth fibres, spiral and scalariform vessels, as well as parenchymatous tissue, are not specially characteristic. As little characteristic are the large roundish cells of the fundamental tissue, the shrivelled h•rny contents of which catch the eye whilst the delicate cell-walls are only perceived with difficulty.

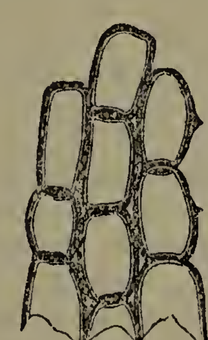
For examination, the powder is best boiled with 90 per cent. alcohol, and being thus freed from resin, is brought under the microscope in glycerine. The elements of the vascular bundles stand out prominently; the palisade tissue is characteristic, but so especially are the fragments of the epidermis.] True Alexandria senna is distinguished by the relative abundance of the hairs; the powder should contain, therefore, a corresponding number; if the hairs have been broken off, the fragments of epidermis will exhibit plentifully the unmistakable points of insertion. Frequently a strong preponderance of vascular bundles consisting of large spiral vessels points to a powder containing much leaf-stalk.

II. *Folia Sennæ Tinnevelly.*

This drug, derived from *Cassia angustifolia*, *γ Royleana*, Bischoff, differs from the preceding in the leaves being less leathery, lanceolate, and with fewer hairs. The upper surface of the leaf is yellowish green, the under surface being of a somewhat darker shade. The anatomical structure does not differ essentially from that of Alexandria senna. The epidermis, however, is far less hairy and the hairs do not break off so readily as from the Alexandria variety. In the powder of Tinnevelly senna, therefore, there occur proportionally a much smaller number of the hairs characteristic of the official leaves, and the fragments of epidermis seldom show the corresponding points of insertion of the hairs, represented in fig. 1, R. Further the elements of the vascular bundles are not so prominent in the powder of Tinnevelly as in that of Alexandria senna, and they appear to be richer in spiral vessels.

Whilst Tinnevelly leaves occur very pure in commerce, the Alexandrian leaves mostly contain more or less leaf-stalks and fruit (husks), from which only the "picked" quality (which is probably not used for powdering) is free. These admixtures naturally occur, therefore, in the powder, so that a knowledge of their peculiar elementary forms—which may be looked upon as characteristic of Alexandria leaves—is indispensable in the examination of commercial senna powder.

The epidermal cells of the stalk (fig. 4) are considerably smaller (elongated in the direction of the stalk) than those of the leaf epidermis, and have fewer hairs and stomata. The parenchyma tissue specially distinguishing the stalk shows nearly the cell-form of ordinary cork (fig. 5).



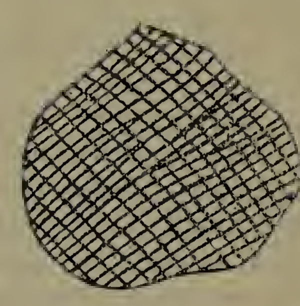


Fig. 4 *Cassia lenitiva*, Bisch. Epidermis of leaf-stalk. 144/1.

Fig. 5. *C. lenitiva*, Bisch. Parenchyma tissue of leaf-stalk. 144/1.

Fig. 6. *C. lenitiva*, Bisch. Middle layer of the fleshy portion of the husk, seen from above. 144/1.

The epidermis of the husk is remarkably similar to that of the leaf, only the epidermal cells, seen from the surface, appear somewhat more elongated than those of the leaf. Most characteristic of the husk, however, is a tissue traversing about the centre of the fleshy portion and parallel to the walls. This consists of several layers of unthickened, acuminate, tube-shaped fibres, lying one upon another, which in each layer are arranged close together in the same direction, whilst those of the different layers (of which with only a moderate enlargement two can be seen) cross one another at an angle. If the powder contains husk, this tissue (fig. 6) always occurs, and is unmistakable by the most unskilled observer. Frequency of pieces of husk tissue can be taken as indicating a powder prepared from Fol. Sennæ Alex. parv. The fleshy portion lying under the epidermis, outside the fibre layer above described, is not unlike the large-celled parenchyma tissue of the stalk, the inner portion consisting of larger cells, and therefore possessing more the type of a true fruit flesh. There is nothing characteristic in the cellular layer constituting the inner wall of the fruit. The elementary tissue of the small seeds has never been observed by the author in a powder.

At a first glance the Alexandria leaves appear to contain more woody fibre than the Tinnevelly. A chemical examination made by Dr. Popp of senna powders, prepared by himself, gave the following results:—

1. *Folia Sennæ Alex.*

1·85325 g. lost at 100°–110° C. 0·20925 = 11·29 per cent. of water.

2·1297 g. (air-dried) exhausted with absolute alcohol gave 0·3995 g. = 18·76 per cent. of resinous residue, dried at 100°.

1·1304 g. (air-dried) gave 0·1189 = 10·52 per cent. of woody fibre.

2. *Folia Sennæ Tinnev.*

1·8740 g. lost at 100°–110° C. 0·1800 = 9·6 per cent. of water.

2·2426 g. (air-dried) exhausted with absolute alcohol, gave 0·4280 g. = 19·09 per cent. of resinous residue, dried at 100° C.

1·2073 g. (air-dried) gave 0·1400 g. = 11·59 per cent. of woody fibre.

The opinion that Alexandria leaves contain more woody fibre than Tinnevelly, was consequently not confirmed; the evidence was rather that upon the basis of a determination of moisture, resin and woody fibre, the two kinds of senna leaves cannot be distinguished.

QUININE IODATE AND BROMATE, AND THE PHYSIOLOGICAL ACTIVITY OF SUPEROXIDIZED MOLECULES.*

BY CHARLES A. CAMERON, M.D.

The researches of Arthur Gamgee, Priestly, and Larmuth have shown that the three forms of phosphoric acid and of vanadic acid have very different degrees of physiological activity. The salts of orthophosphoric acid are almost inert when their bases are inactive, whilst the pyrophosphates and metaphosphates are poisonous. The orthovanadic acid is poisonous, but pyrovanadic acid and metavanadic acid are still more poisonous.

The high physiological activity of the pyro and metaphosphates has been attributed to the unsaturated condition of their nuclei. These salts are not statical, for they can take up additional basic material. For example, calcium metaphosphate can combine with two molecules of lime to produce a molecule of calcium orthophosphate—

$$Ca(PO_3)_2 + 2CaO = Ca_3(PO_4)_2.$$

Carbon dioxide and carbon monoxide are poisonous, but the latter is by far the more poisonous. According to the modern doctrine of atomicity carbon atoms have four "bonds"—that is, a carbon atom has an atom-fixing power equal to that of four atoms of hydrogen or other monad elements. In carbon dioxide the four bonds of the carbon atom are fully satisfied by the four bonds of the two oxygen atoms—

$$O=C=O$$

In carbon monoxide only two of the carbon atom bonds are in combination with oxygen, and the remaining bonds combine with each other—

$$\langle C=O.$$

Such a molecule is said to be unsaturated.

High Molecular Weights a cause of Physiological Activity.—High atomic weight and complex molecular structure are stated to be causes of high physiological activity. The poisonous elements have as a rule higher atomic weights than elements belonging to the same groups which are comparatively physiologically inert. There are, however, exceptions to these rules. Lithium with an atomic weight of 7 is more active than sodium with an atomic weight of 23. Arsenic with a lower atomic weight than antimony is more poisonous than the latter. Chlorine in the free state is more active than iodine, though on the whole the iodine compounds used in medicine have somewhat smaller doses than the corresponding chlorine compounds.

Rabuteau found that with one exception (that of methyl alcohol) the toxic power of the alcohols increased with their molecular weight. Amyl alcohol, which has a molecule composed of 18 atoms, is eight times more poisonous than ethyl alcohol, the molecule of which contains 9 atoms. On the other hand, oxalic acid has a molecular weight of 90, and is poisonous, whilst malic acid, with a molecular weight of 134, is a constituent of wholesome fruits. Albumin has a very high molecular weight.

Superoxidized Bodies.—Physiological activity seems to be more influenced by an unsaturated condition of molecules than by their molecular weight or degree of complexity. It is also, I am disposed to believe, influenced by a condition of molecules which I venture to describe as *superoxidized.* In potassium iodide we have according to the doctrine of quantivalency a saturated molecule. The salt is composed of two monad elements, and the unit of equivalence of each of its two atoms is fully satisfied. According to the graphic or pictorial method of representation the molecule is constituted as follows—

$$K—I.$$

Although potassium iodide is a saturated and stable body, three or four atoms of oxygen may be combined with it so as to form potassium iodate (KIO_3) or potassium periodate (KIO_4). In the latter salt only two of the atoms of oxygen are in union with the potassium and iodine, six oxygen bonds satisfying each other—

$$K—O—O—O—O—I.$$

In this compound there are three atoms of oxygen in excess of the number requisite to saturate the iodine and potassium; hence we may term potassium periodate a superoxidized compound.

Periodic anhydride is a more striking example of a superoxidized body. It is composed of two atoms of iodine combined with seven of oxygen—

$$I—O—O—O—O—O—O—O—I.$$

In this compound only two of the fourteen oxygen bonds are in combination with the iodine.

It may of course be said that iodine is a septivalent element, but in atom-fixing power it acts in general like other monads.

If we hold that iodine and bromine are monads, then the higher terms of their oxygen series may be regarded as in reality unsaturated molecules. They contain oxygen atoms combined only with other oxygen atoms. Such compounds are unstable. They are all decomposed by simple heat at comparatively low temperatures.

When superoxygenated compounds are introduced into the system, it might be expected that their oxygen being loosely combined would unite readily with elements of the blood. It is, however, stated that potassium chlorate passes through the body unchanged. It is open to doubt whether or not the whole of the chlorate taken appears subsequently in the urine. It has been alleged that quinine passes unchanged through the body, but it is now known that only two-thirds of the quinine taken into the stomach can be detected subsequently in the urine. Even if all the potassium chlorate taken were found afterwards in the urine, that would not be positive proof that the potassium chlorate had not been partially deoxidized and reoxidized in its passage through the system. Besides drugs produce powerful catalytic effects without undergoing themselves any chemical changes.

Potassium iodate appears to act more powerfully upon the system than potassium iodide. I know a person,

* Read before the Medical Society of the King and Queen's College of Physicians, Wednesday, May 3, 1882. Reprinted from *The Dublin Journal of Medical Science,* June, 1882.

accustomed to take ten grain doses of potassium iodide without experiencing any unpleasant symptoms, who cannot take even five grains of the iodate without being attacked by coryza.

I am disposed to believe that the chlorates, bromates, and iodates are more active physiological agents than the corresponding chlorides, bromides, and iodides. They are all composed of superoxidized molecules. It is certain that chlorate of sodium is more powerful than chloride of sodium, or common salt. We may from analogy infer that iodate of potassium is a more active physiological agent than the iodide of potassium.

Ferric Iodate.—Some years ago I suggested the use of ferric iodate ($Fe_2(IO_3)_6$) as a substitute for the unstable ferrous iodide.* It was largely prescribed in Dublin, and although a nearly insoluble salt it was found in large doses to produce iodism. It was favourably noticed by Dr. Anstie in *The Practitioner* for June, 1869, page 366.

Quinine Iodate.—Last year I gave a formula for the preparation of iodate of quinine, in combination with an effervescing preparation, to Messrs. J. J. Graham and Co., of Westmoreland Street, Dublin, and since last May they have, as they inform me, disposed of nearly 1 cwt. of the compound. It has been prescribed largely by Mr. Porter, Surgeon to her Majesty; Dr. Samuel Gordon, Professor Moore, Dr. Smyly, Professor Macnamara, and many other leading practitioners. These gentlemen inform me that they have found it a very useful remedy in the treatment of neuralgia, severe articular pains which had resisted the employment of the usual remedies, sluggish forms of pulmonary congestion, secondary syphilitic disease, and malarial enlargement of the spleen.

Iodate of quinine is a salt which appears to have been scarcely studied. Only two references to its existence are to be found in the books and journals relating to chemistry and pharmacy. Sérullas states (*Annales de Chimie et de Physique*, t. xlv., 282) that it may be prepared by dissolving quinine in a hot solution of iodic acid, and that on cooling the solution the salt crystallizes out in a form resembling sulphate of quinine. Sérullas does not appear to have analysed the salt. According to Pelletier and Caventou (*Annales de Chimie et de Physique*) both iodate and hydriodate of quinine are formed by digesting quinine and iodine by the aid of heat.

Quinine iodate may be prepared by digesting freshly precipitated and still moist quinine with a warm solution of iodic acid in the proportion of a molecule of each (the iodic acid should be dissolved in 8 or 10 parts of water). The resulting mass cannot be dried at the water-bath heat, as it causes some decomposition of the salt. Dried at a temperature of 60° F., and then placed *in vacuo* over sulphuric acid, it undergoes no further loss of weight. The salt has a white-pearly appearance, and consists of extremely minute needle-shaped crystals, which contain no water. Boiling water does not decompose it. It is very slightly affected by strong sulphuric acid. Hydrochloric acid and dilute sulphuric acid dissolve it readily; it is not quite so soluble in acetic acid. Spirit of wine effects its solution readily, but in ether and chloroform it is sparingly soluble. Seven hundred parts of cold water dissolve 1 part of the iodate; in warm water it dissolves much more readily.

The mean of several determinations of the amount of iodine in the dried iodate of quinine gave 21·8 per cent. The salt has therefore the following formula:—

$$C_{20}H_{24}O_2N_2,HIO_3.$$

The theoretical amount of iodine for such a formula is 22·92, but the small deficiency in the salt was due to the presence of a little free quinine; the iodate was found to be faintly alkaline from this cause.

The granulated effervescing iodate of quinine is composed of a mixture of the pharmacopœia compound of sodium bicarbonate and citric and tartaric acids with the iodate. Each drachm of the compound contains 2 grains, or 1 dose of the iodate.

I have not made many examinations of the urine of persons under administration of quinine iodate. In the case of a patient of Dr. Elliott, who was using the iodate for about a fortnight, the urine contained so much free hydriodic acid or iodides that it gave a yellow precipitate with nitrate of lead. In another case iodic acid and hydriodic acid were detected in the urine within half an hour after the iodate had been taken, but no trace of quinine could be found in it. In the urine of the same person, passed three hours later, quinine was found.

Bromate of Quinine ($C_{20}H_{24}N_2O_2,HBrO_3$).—I can find no account of this salt in the chemical books or journals. So far as I am aware it has not been described up to the present. It may be prepared by precipitating barium bromate by sulphate of quinine, or by neutralizing quinine with bromic acid. It occurs when air-dried in small asbestos-like masses, which, under the microscope, are seen to consist of very long needles.

Quinine bromate has the same constitution as the iodate of quinine, but it is more soluble in water—namely, 1 part in 250. Warm water dissolves it freely. The dry salt may be heated on the water-bath without discoloration, but its solution, when evaporated to dryness, leaves a residue more or less decomposed. The salt dissolves readily in hydrochloric and dilute sulphuric acids, and in spirit of wine. Acetic acid acts less readily upon it. Touched with a drop of strong sulphuric acid it detonates, emits a puff of dark smoke, and almost wholly disappears. On iodate of quinine, sulphuric acid produces only a slight yellow coloration, which vanishes on the addition of water, the salt dissolving and forming a colourless solution.

The original paper is supplemented by the medical opinions of a number of physicians who state that they have found the quinine iodate and bromate valuable remedial agents.

HYDROBROMIC ACID.*

BY G. R. TUCKER, PH.G.

The credit of having introduced hydrobromic acid as a medicine is generally given to Dr. J. Milner Fothergill, who extolled its virtues in the *British Medical Journal*, and gave a process for its preparation, viz.: by the decomposition of potassium bromide by tartaric acid.

Dr. De Witt C. Wade has also written much of value on the subject, and in the *Peninsular Journal* for February, 1875, gave an account of its action, and a formula for its preparation, correcting certain inaccuracies in that of Dr. Fothergill. This acid is now quite extensively used, and is considered of sufficient importance to merit a place in our next Pharmacopœia. It is certainly desirable to have a process that will not be too difficult of execution, and one yielding uniform results, of such purity as we expect to find in pharmacopœial products.

In regard to the formula of Dr. Wade, all that can be said in its favour is simplicity. If correctly proportioned, we can perhaps avoid either excess of bromide or of tartaric acid, but we always get a not inconsiderable amount of potassium bitartrate along with it.

Methods have been proposed to obviate this objection, the most successful being that proposed by Dr. Charles Rice, which consists in precipitating the cream of tartar by alcohol. This yields a reasonably pure product, but detracts from the simplicity for which the process has been recommended, making it tedious and expensive. Dr. Rice's formula is as follows:

* *Dublin Quarterly Journal of Medical Science*, May, 1869, vol. xlvii., p. 354.

* Abstract of a thesis presented to the Massachusetts College of Pharmacy. Reprinted from *New Remedies*, April, 1882.

Dissolve 1191 grains of potassium bromide in 15 fluid ounces of water, add 1500 grains of powdered tartaric acid, heat, and set aside in a cool place for twenty-four hours. Thirty-two ounces of alcohol is then added, and the mixture again allowed to rest for twenty-four hours, after which it is filtered, and the alcohol evaporated or recovered by distillation. The product should measure 16 fluid ounces. Sp. gr. about 1·075, containing 10 per cent. of HBr.

Dr. Wade claims that the slight amount of cream of tartar taken up is of no consequence, as it in no way interferes with its medicinal qualities. However true this may have been at the time of Dr. Wade's article, it cannot apply now, in view of the uses to which the acid may be applied, as, for example, in the preparation of hydrobromates of organic bases, which are coming somewhat into use, as hydrobromates of quinia, cinchona, morphia, strychnia, etc.

For the extemporaneous preparations of bromides, there is no process more satisfactory than the saturation of a strong aqueous hydrobromic acid with an oxide or carbonate of the base required. The pharmacist can in this way prepare bromides or hydrobromates, which he may be called upon to dispense, and for which the demand is so slight that it is not an object to purchase.

Various modes of preparation have supplied the market, up to the present time, with acid of various and commonly unknown strengths; hence, as might reasonably be expected, the experiences in regard to its utility are confused and often conflicting. Physicians prescribe such articles and pharmacists buy and dispense them, too often as if there could be but one thing supplied; for example, physicians prescribe hydrobromic acid, not knowing that it may be of any strength from one to fifty per cent., although substituting it for bromide (KBr). It is true that the dose cannot be determined by the quantity of bromine present in the acid, yet there is doubtless some relation which, when studied, forms the basis for its use. It being now generally established that it is the bromine element which is effective in all the bromides, hydrobromic acid should be adjusted in strength, so as to bear some easily remembered relation of its bromine constituent to the potassium salt, this being the one most commonly used.

Potassium bromide contains 67·22 per cent. of bromine; sodium bromide, 71·4; and ammonium bromide, 81·6; that is, 20 grains of the potassium is equal to a dose of 18·8 grains of the sodium, or 16·5 grains of the ammonium salts. Potassium bromide containing in round numbers sixty-seven per cent. of bromine, a solution of hydrobromic acid containing also sixty-seven per cent. of bromine would have the same bromine value.

The most convenient and simple relation is to have an acid of 33·5 per cent. of bromine, or 34 per cent. of hydrobromic acid, or half the strength of the potassium salt; such an acid can be made and dispensed without difficulty, while an acid of 67 per cent. would be inconvenient to dispense, being strongly corrosive, and fuming in the air even more than hydrochloric acid.

This strength is a convenient one to remember, as compared with potassium bromide, being in proportion of two to one. Hydrobromic acid is a sedative neurotic, and its principal use appears to be as a substitute for potassium, sodium and ammonium bromides. It is well known that salts of the alkalies, when given for a long time, are apt to produce undue alkalinity. To correct this, and to forestall against it when likely to occur, this acid finds its principal use. It also acts like other mineral acids in being tonic, refrigerant, solvent, alterative, etc.; combined with quinia, it is said to be very satisfactory in intermittent fever, and has been highly spoken of as a corrective and preventive remedy for headache and ringing in the ears, which often follows upon the use of salts of quinia, called "quinism." Various combinations have been recommended from to time with drugs, such as mercury, stramonium, digitalis, bismuth, pepsin, tartar emetic, etc., but the advantages claimed for these combinations have not been satisfactorily established.

Hydrobromic acid is not, like hydrochloric acid, readily formed by direct union of its elements; mixtures of bromine vapour and hydrogen do not unite by direct exposure to sunlight, nor do they explode when brought into contact with flame, but combination does take place in the immediate neighbourhood of a red-hot wire, when introduced into it, and more quickly when the mixture is passed through a red-hot tube, or by platinum wire, if kept hot by the galvanic current. It is rapidly and copiously absorbed by water, which, when saturated, has a density of 1·29, and fumes strongly in air; this saturated solution boils at a temperature below 100° C., giving off the gas and becoming weaker; a more dilute acid boils at a temperature above 100° C., and a very dilute acid becomes stronger by boiling. The gas is not decomposed by heat alone; potassium introduced into it decomposes it completely, forming potassium bromide, and leaving a volume of pure hydrogen equal to half that of the original gas. Tin produces the same effect when aided by a gentle heat. This reaction can be used to determine the composition of the gas, for the weight of one volume of the gas (the observed sp. gr.), diminished by the weight of one-half the volume of hydrogen, gives a number which is very nearly half the sp. gr. of bromine, 5·54; hence the gas is composed of equal volumes of hydrogen and bromine, united without condensation. The gas or its aqueous solution is immediately decomposed by chlorine, hydrochloric acid being formed and bromine separated, which is recognized by its red colour. Iodine, on the contrary, does not decompose it, hence the affinity of bromine for hydrogen is, under similar circumstances, less than that of chlorine, and greater than that of iodine. The acid is also decomposed by oxygen and by highly oxydized bodies.

Nitric acid separates bromine on heating the liquid, and a mixture of these acids has the power of dissolving gold. Sulphuric acid decomposes it, yielding sulphurous acid, bromine and water

$$2HBr + H_2SO_4 = SO_2 + 2H_2O + Br_2,$$

with bromic acid it yields water and free bromine.

Many formulæ have been proposed for making this acid for medicinal use, but all so inaccurate, or inconvenient, or difficult, as to be impracticable for ordinary use. The process usually noticed in the older works on chemistry is that of Balard, and as modified by Professor J. M. Maisch, and still farther by Professor G. F. H. Markoe, is on many accounts to be preferred to any that have been proposed. Goebel's process* consists in decomposing a solution of barium bromide by sulphuric acid, but this process, although a good one, is inconvenient, as it renders necessary the previous preparation of barium bromide. Loewig tells us to distil potassium bromide with sulphuric acid; a purer product can be obtained by using phosphoric acid in a concentrated form. If calcium hypophosphite be placed in a retort with water, and bromine added through a funnel-tube, hydrobromic acid will be formed immediately, without the aid of heat; the water, being decomposed, furnishes the hydrogen necessary to convert the bromine into HBr, while the oxygen changes the calcium salt to a neutral phosphate. The proportions are: water, 1 part; bromine, 5 parts; and calcium hypophosphite, 4 parts. Sodium sulphite could be substituted to good advantage, but will require a slight heat. The salt in this case becomes a sulphate, and the proportion would be: water, 1 part; bromine, 3 parts; sodium sulphite, 6 parts, yielding 10 parts of acid. In making monobromated camphor, one-half the bromine is converted into HBr, and may be readily obtained as such by passing the gas into water.

A new method has been developed from the known fact that bromine associates itself with certain organic bodies at ordinary temperatures, and is again liberated

* *New Rem.*, 1880, 262.

on heating in form of hydracids; essential oil of copaiba and lemon have been used as a medium for this purpose.

A very interesting and instructive process is that by which hydriodic acid is prepared, and with a modification noticed in *New Remedies*, 1880, page 5, answers admirably for hydrobromic acid. When hydrosulphuric acid is passed into iodine or bromine, hydriodic or hydrobromic acid is formed and sulphur precipitated; when iodine is used, the sulphur persistently envelopes it, preventing further action; but if carbon disulphide be used, this difficulty is entirely obviated, it being a solvent for iodine, bromine, and sulphur. The most suitable proportions are: carbon disulphide, 3 parts; bromine, 2 parts; distilled water, 8 parts; yielding an acid of about the sp. gr. 1·090.

Dissolve the bromine in the carbon disulphide, pour this solution into a tall glass cylinder, cover it with the water, and then by means of a delivery tube, reaching to the bottom of the cylinder, pass a stream of sulphuretted hydrogen to the liquid, till the bromine is all converted into hydrobromic acid, which will dissolve without loss in the water. The reaction is known to be finished when the liquid loses its deep red colour. Then separate the aqueous solution of HBr; boil to expel sulphuretted hydrogen and filter. The rationale is extremely simple, the reaction takes place when sulphuretted hydrogen comes in contact with bromine; one equivalent of hydrogen unites with one of bromine to form hydrobromic acid, while the sulphur with which it was combined is isolated, and remains dissolved in the carbon disulphide. In the report compiled by Dr. Charles Rice, on the Revision of the United States Pharmacopœia, a place is given to the process of Dr. Squibb, but it is yet to be decided whether that or the excellent process of Professor Markoe will be adopted. In 1875, Professor Markoe introduced his process, which has been extensively used, as it is by far the most economical and especially adapted to manufacture on a large scale. The mode of procedure is as follows: One pound of phosphorus is placed in a one-gallon jar (stoneware), covered with water, and the jar half filled with ice, a large funnel is then inserted into the throat of the jar, and a funnel tube adjusted so as to reach a short distance above the phosphorus, the funnel is filled with ice, and the apparatus placed in a vessel, that the jar may be surrounded with ice; three or four pounds of bromine may now be very slowly added through the funnel tube, waiting after each addition until the reaction has ceased; large quantities would give rise to an explosion. The two elements unite to form pentabromide of phosphorus, PBr_5, and this reacting with water, forms phosphoric and hydrobromic acids:

$$PBr_5 + 4H_2O = H_3PO_4 + 5HBr.$$

After the reaction is completed, the excess of phosphorus is removed, and the aqueous liquid distilled until hydrobromic acid ceases to come over. The syrupy residue left in the retort, when properly diluted, is utilized as phosphoric acid. It usually happens that this residue is coloured from impurities, but it can easily be rendered perfectly colourless by heating for a short time with nitric acid, being careful to expel all the excess of acid before diluting. As a practical point in the manufacture of phosphoric acid, Professor Markoe has recommended to add to the mixture of phosphoric and nitric acids small quantities of oxalic acid; on coming in contact with hot nitric acid, oxalic acid splits up into carbonic acid and carbonic oxide. By this means we can get rid of all excess of nitric acid at a comparatively low temperature and avoid the danger of converting a portion of the product into metaphosphoric acid.

To successfully manufacture hydrobromic acid by this process is a matter of the greatest ease when one is familiar with it. The most that can be said against it is that the addition of large quantities of bromine is tedious; this is obviated in a measure by using a stoppered glass globe in place of a funnel tube.

Professor Markoe has lately modified the process as here given, and is at the present time conducting a series of experiments, to adapt it to the pharmacopœia. From remarks by Professor Markoe I gather the following information: Bromine, although insoluble in water, readily dissolves in hydrobromic acid, in proportion as the acid is weaker or stronger; if we start with water, it will be necessary to first form a small quantity of hydrobromic acid by slowly dropping bromine upon phosphorus covered with a little water, after which we can convert any quantity of bromine into hydrobromic acid with great rapidity and perfect safety, no more apparatus being required than a glass flask.

There is, of course, a limit to the quantity of bromine that can be added, but only by the liquid becoming saturated with the gas. To determine this limit I placed two ounces of phosphorus and 500 c.c. of water in a glass flask, then added drop by drop two or three grams of bromine, after which it was a matter of the greatest ease to introduce the remainder of the bromine, by pouring off the acid liquid and shaking with fresh portions of bromine after each addition. The quantities dissolved by the acid liquid showing a gradual increase, until finally I could add 150 grains of bromine at each time, the reaction proceeding quietly, with an increase of temperature. It required 732 grams of bromine to saturate the liquid, resulting in a highly corrosive and fuming acid.

By heating in a flask connected with a delivery tube, the excess of gas is driven off and absorbed by distilled water. The remaining acid is then transferred to a retort and can be distilled unchanged. Specific gravity 1·4832, containing about 48 per cent. of HBr.

Dr. Squibb has overcome the difficulty of distilling hydrobromic acid made from potassium bromide by sulphuric acid, by allowing the potassium sulphate to crystallize out. This is more readily accomplished if an excess of sulphuric acid is used. However carefully the distillation may be conducted, the product always contains noticeable quantities of sulphurous and sulphuric acids. In my opinion, the process is far more difficult and tedious than that of Professor Markoe's, and certainly yields no better results.

If a large quantity of concentrated hydrobromic acid is to be distilled at one time, I have found it advantageous to use a small retort, arranging the bulk of acid in such a manner that it will flow into the retort only as fast as it distils over. In this way I have been able to distil from a quart retort two or three gallons of strong hydrobromic acid, with only the heat of a Bunsen's burner.

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Continued from Vol. XII., page* 827.)

INFUSUM CINCHONÆ RUBRÆ (*Infusion of Red Cinchona*).

Red cinchona, containing at least 6 per cent. of alkaloids, in fine powder	15
Normal hydrochloric acid	5
Water to make 200.	

Macerate the cinchona with the acid and a little water for several hours, occasionally stirring, until the froth has disappeared. Pour the mixture into a percolator closed with a linen pellet at the bottom. As soon as the liquid begins to run clear, pour water on top until 200 parts of filtered liquid are obtained.

The infusion is clear, of a reddish-yellow colour, and should yield a copious precipitate both with solution of soda and with strong hydrochloric acid. (De Vrij.)

MAGNESII METATARTRAS (*Metatartrate of Magnesium*).

Metatartaric acid (see next)	10
Distilled water	40
Magnesium carbonate, about	7
Alcohol	q.s.

Dissolve the acid in the water, and add, under stirring,

* From *New Remedies*, April, 1882.

so much carbonate of magnesium as may be required to be in slight excess. Filter the solution immediately, and add to the filtrate double its volume of alcohol. When the precipitate has settled, pour off the alcohol, spread the magma upon a plate of glass or porcelain, and let it dry in a cool place.

Metatartrate of magnesium is an amorphous, not hygroscopic salt, which may easily be converted into a white powder and is soluble in four parts of water. When dissolved in water it soon is converted into ordinary tartrate of magnesium, and, therefore, it should not be kept in stock in solution.

ACIDUM METATARTARICUM (*Metatartaric Acid*).

Tartaric acid, in powder	q.s.

Heat it in a porcelain capsule, upon a sand-bath, to 180° C. (356° F.); pour the melted mass, by means of a warmed glass-rod, in drops, upon a glazed plate, and transfer the pieces immediately, when cold, in a well-closed bottle.

Metatartaric acid appears in form of transparent, yellowish pieces, having an agreeable acidulous taste, and being hygroscopic.

When dissolved in water, the acid is soon converted into normal tartaric acid, particularly if the solution be warmed.

MISTURA ANTICARRHALIS (Hufeland's) (*Hufeland's Catarrh Mixture*).

Extract of carduus benedictus	3
Extract of dulcamara	1
Fennel water	24
Cherry-laurel water	3

Mix them.

N.B.—Extract of carduus benedictus and extract of dulcamara are prepared thus: pour as much boiling water upon the finely-cut plants (dry or fresh) as is required to make a pulp, set aside for twenty-four hours, occasionally stirring, then express. Again pour on a somewhat smaller quantity of boiling water, let stand twelve hours and express. Evaporate the united liquids to a thick extract.

Cherry-laurel water (*Pharm. Neerlandica*) is prepared by distilling six parts of cherry-laurel leaves with enough water to obtain *at first* five parts, a portion of which is to be assayed for the amount of hydrocyanic acid present, after which the remainder is to be diluted with distilled water, so that 1000 parts of the finished preparation may contain 0·839 parts of hydrocyanic acid, or so that one part of hydrocyanic acid is contained in 1191 parts of the liquid.

MISTURA ANTICHOLERICA (Bleeker's) (*Bleeker's Mixture*).

Aromatic wine of opium	2
Oil of peppermint	1
Spirit of ether	4
Water	750

Mix then.

N.B.—Vinum opii aromaticum corresponds to the vinum opii of the U.S. Ph.

Spirit of ether is the continental modern form of Hoffmann's anodyne, prepared by mixing equal parts (by weight) of ether and alcohol (*Pharm. Neerlandica* and *Codex*) or one of ether and three of alcohol (*Pharm. Germ.*), etc.

MISTURA BALSAMICA (Choppart's) (*Choppart's Balsamic Mixture*).

Spirit of nitrous ether	1
Balsam of copaiva	8
Alcohol (stronger)	8
Spear-mint water	8
Orange-flower water	8
Syrup of orange peel	8

Mix them.

The original prescribes aqua menthæ crispæ, for which spear-mint water is the nearest substitute.

OLEUM BETULÆ RECTIFICATUM. OLEUM RUSCI. (*Rectified Oil of Birch. Oil of Birch Tar.*)

Oil of birch tar is a red-brown, volatile oil, of a specific gravity of 0·800–0·987, soluble in an equal weight of alcohol, and imparting an acid reaction to water, after being shaken with it. It has the odour of so-called Russia leather, which is, in fact, due to it.

OLEUM CADINUM (*Oil of Cade*).

Oil of cade is a brownish or dark-brown, clear, viscid oil, obtained by the dry distillation of the wood of *Juniperus Oxycedrus*, L.

The oil has a peculiar tarry odour, and an empyreumatic, bitter taste. It is readily inflammable and has an acid reaction. It is insoluble in water, but soluble in ether, chloroform, bisulphide of carbon, and amylic alcohol.

OLEUM MORRHUÆ IODOFERRATUM (*Cod Liver Oil with Iodide of Iron*).

[Oleum jecoris aselli cum iodeto ferrico.]

Iodine, in powder	5
Iron, in powder	10

Pour the cod liver oil into a dry flask, which must be completely filled thereby, close it well, and dissolve in it the iodine, frequently shaking. After the solution has stood at rest for some time, and has acquired a specific gravity of 0·932 to 0·937, add the iron, and shake the mixture, until it has assumed a purple-violet colour and no longer imparts a blue tint to a dilute solution of iodide of potassium with gelatinized starch. Agitate the mixture occasionally, during twenty-four hours, then repeat the reaction for free iodine, and, if this appears to be absent, let the oil become clear by standing and transfer it to small amber-coloured vials, which must be completely filled and well stoppered.

The product has a purple-violet colour, a specific gravity of 0·937 to 0·940, and contains about 1·23 per cent. of iodine and 0·27 per cent. of iron.

By shaking with a solution of starch containing some iodide of potassium, the oil should be readily converted into a bright-yellow liquid, free from blue tint or colour.

Twenty grams of the oil, incinerated in a porcelain or platinum crucible, should leave 0·077 gm. of ferric oxide.

If 5 gm. of the oil be saponified with an alcoholic solution of caustic potassa, the soap incinerated, and the residuary carbonaceous matter extracted with water, the aqueous solution, strongly acidulated with hydrochloric acid, should yield, with palladium chloride, a precipitate which, when washed and dried, weighs about 0·087 gm.

OLEUM MORRHUÆ FERRATUM (*Ferrated Cod Liver Oil*).

Benzoate of iron (ferric) (see next)	1
Cod liver oil	100

Dissolve the benzoate of iron, with the aid of a gentle heat, and by frequent agitation, in the oil.

The solution is reddish-brown, clear liquid.

FERRI BENZOAS (*Benzoate of Iron*).

Benzoic acid	10
Water of ammonia	14
Solution of chloride of iron (ferric) specific gravity, 1·480	11
Distilled water	q.s.

Rub the benzoic acid with three parts of distilled water, and add the water of ammonia, or so much of it as is required to produce a neutral solution. Dilute this with seven parts of warm distilled water and filter, if necessary. Precipitate the liquid by means of the solution of chloride of iron previously diluted with 200 parts of warmed distilled water. When the precipitate has subsided, pour off the supernatant liquid, collect the precipitate on a strainer, and wash it with distilled water until the washings are no longer rendered cloudy by nitrate of silver. Finally dry the salt at a temperature of about 30° C. (86° F.).

The resulting salt is a flesh-coloured powder, odourless and tasteless, insoluble in water, losing 4·5 per cent. in weight by drying at 100° C. (212° F.), and containing about 15·5 per cent. of iron.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, JULY 1, 1882.

THE ROYAL COMMISSION ON THE MEDICAL ACTS.

The Report of the Commissioners appointed last year under Her Majesty's Royal Sign Manual to inquire into the grant of Medical Degrees has just been presented to Parliament and published. From it we learn that the Commission has held forty meetings, at which all the subjects committed to it for consideration have been inquired into. Witnesses have been examined; written communications have been obtained from various persons, and from the Universities, Medical Colleges and other bodies in the United Kingdom which grant medical degrees, memberships, fellowships, licences and other diplomas; books, documents, papers, records and Acts of Parliament have been examined, as well as the several Bills relating to medical reform which have been from time to time presented to Parliament with a view to legislation on this subject, and the evidence given before the Select Committee of the House of Commons appointed in 1879 and 1880 to consider certain of those Bills. The Report itself is signed by all the eleven members of the Commission, and it is divided into nine sections, which severally deal with the Grant of Medical Licences; The General Medical Council; Courses of Education; Courses of Examination; Grant of Medical Degrees, etc., by Universities and other bodies; Privileges of Registered Practitioners and Restrictions imposed upon Practitioners not Registered; Positions of Medical Practitioners holding Foreign and Colonial Diplomas; Conditions of Registration and Removal from the Register; and lastly, the Medical Act, 1858, and the Acts amending it.

Starting with the assumption that the Act of 1858 was passed rather in the interests of the general public than with a view to protecting the separate interests of the medical profession, the first section of the Report refers to the defects of the present licensing system resulting from the number of licensing bodies and from the differences in the character of their examinations, especially drawing attention to the circumstance that nearly all of them grant diplomas in medicine alone or surgery alone, although there is no point of medical reform on which there is such a general agreement as that the holding of a medical licence ought to imply the possession of a complete qualification for practice in all the three essential branches of medicine, surgery and midwifery. It is considered that the majority of the licensing authorities have shown a praiseworthy readiness to introduce improvements and that in most cases their examinations have been improved, but that in regard to some the possession of a diploma affords no such guarantee that its holder has a competent knowledge of medicine, surgery and midwifery as the Commission considers to be indispensable. In regard to this point it is considered that the only mode of duly ensuring such a standard of proficiency is by reducing the number of licensing authorities. It is therefore proposed that there shall be in each of the three divisions of the United Kingdom a Board, representing all the medical authorities of the division, for the purpose of conducting examinations for licence, subject to the general control of the Medical Council. It is proposed that each divisional board should contain one or more delegates of each chartered university or medical corporation, either existing or hereafter created, and the certificate of that board is to be necessary for admission to the Medical Register. Each divisional board is also to appoint members of the Medical Council and examiners; to regulate and supervise the courses of professional study and examinations; to keep a register of medical students in the division, and to report to the Medical Council, annually, on their general proceedings, as well as on the results of the examinations.

In speaking of the Medical Council the Report states that it is clearly proved to have rendered valuable services to the profession and to the public, notably in having brought about the universal adoption of a preliminary examination for intending medical students, and in the belief that there ought to be a supreme controlling authority in regard to medical licensing, the Commission proposes to entrust to the Medical Council larger powers than it has hitherto possessed. It is suggested that this Council shall be the sole licensing authority, and that it shall consist of eighteen members chosen for five years and eligible for re-election, six to be nominated by the Crown, two elected by registered members of the medical profession resident in England, one by the members in Scotland and Ireland, respectively, four by the English Divisional Board and two by the Scotch and Irish Boards respectively.

As regards the direct representation of the profession upon the Medical Council, the Commission recognizes the vital interest of the whole medical profession in the constitution of that body, while it insists that the interest of the public is the reason of its existence, and for the sake of better securing the full and complete confidence of the profession in the Council, it is deemed advisable to give the general practitioners an effective voice in it instead of only the governing bodies of the Medical Corporations, which can hardly be said to represent the great majority of practitioners. But while the Medical Council would thus be the supreme medical authority, exercising a general control over everything relating to medical licensing, it is not intended that the Council should be the executive or even the initiating body in questions relating to medical education and examination. The regulation of these matters would originate with the divisional boards, which would also be the executive bodies for administration. At the same time it would be in the power of the Council to inform the divisional board as to such conditions of educational examination as in its opinion ought to be of universal obligation throughout the United Kingdom, and when proposals of the Board are submitted for approval the Council should have power to vary them. It is not proposed to interfere with the administrative functions hitherto discharged by the Medical Council in connection with the Medical Register and the Pharmacopœia.

In regard to courses of education the Commission considers it would be a mistake to introduce absolute uniformity. Being anxious not in any way to diminish the interest which teaching bodies now take in medical education, or to lessen their responsibility in that respect, the Commission desires to leave them as much initiative as possible, and it holds the opinion that nothing should be done to weaken the individuality of the universities and corporations or to check emulation between the teaching institutions of the country.

As the details of courses of examinations are in a great measure dependent upon the adoption of the Commission's recommendations, they do not receive much notice in the Report, but it is especially mentioned that every intending medical student ought to pass an examination in general education before entering upon his medical studies, the purpose of this examination being to test the candidate as to the possession of a reasonable amount of general culture. Its subjects should not be of a technical or professional nature, and while care should be taken to prevent its standard being unduly raised or lowered by individual examiners, a sufficient variety of subjects should be included in it to allow of candidates making a selection from them according to their previous education and mental qualifications. According to the recommendations of the Medical Council, every student of medicine is now required to be registered on passing his preliminary examination. The Commission considers that this system should be continued and that the full period of medical study should be passed after the date of registration. It is proposed that this registration of medical students should be placed under the charge of the divisional boards and that it should be obtainable by forwarding a certificate of having passed a preliminary examination as required by the Medical Council. It is considered that there should be power to hold the examinations of the divisional boards at more than one place in each division if that be found desirable, and that while all candidates who pass are placed in one class, the examiners should have power to state that any individuals had passed with distinction. The fees should be such as to cover the cost of the examinations and the other expenses of the divisional boards, and also to provide the sum required to compensate such of the medical authorities as may be entitled to compensation for any pecuniary loss they may sustain by reason of the abolition of their privilege of conferring a licence to practise.

In regard to diplomas and degrees granted by medical authorities in virtue of powers conferred by Royal Charter or Act of Parliament the Commission recommends that the statutory privilege of conferring a medical licence should no longer be attached to them as was provided by the Medical Act, 1858; but it does not propose to interfere with the present powers of universities or corporations to confer these titles, and it deprecates any interference with the examinations of the medical authorities for their higher titles, to which the Commission attaches the greatest value as being the means of encouraging the acquisition of knowledge and skill in the medical profession.

On the subject of the assumption of medical titles by unregistered persons, the Commission is of opinion that the failure of the attempt to deal with the offence by clause forty of the Medical Act of 1858 was chiefly due to the difficulty of defining the offence in words, and not to any neglect of the Medical Council. The Commission also considers it undesirable to attempt preventing unregistered persons from practising, though it holds that they should be prevented from representing themselves as being registered or from assuming titles which would lead the public to believe they are regular medical men. In connection with this subject, it is held that prosecutions for offences under the Medical Act should be undertaken in England by the Public Prosecutor, in Scotland by the Procurator Fiscal, and in Ireland by the Crown Prosecutor, the moneys arising from conviction and recovery of penalties being paid to the Medical Council.

The difficulties arising from the position of registered medical practitioners in the colonies and that of the holders of colonial and foreign medical diplomas in the United Kingdom, and from the necessity of discriminating between the diplomas given by different foreign and colonial universities, are in the opinion of the Commission best dealt with by the Medical Council as proposed in the Government Bill of 1880.

As regards registration under the system proposed by the Commission, it is considered to be unnecessary to maintain more than one Registrar and one office of registration, as heretofore; but the correctness of the register being very important to the public, as well as to the medical profession, it is suggested that every registered practitioner should send annually to the Registrar his address and correct designation, in order to secure retention on the register; the power of erasure from the register for misconduct to rest, as now, with the Medical Council.

As a supplement to the Report and to a very great extent limiting its effect, if not entirely neutralizing it, there are appended a number of memoranda, in which six members of the Commission express their dissent from certain portions of the Report; but we must defer until a future occasion any futher reference to these memoranda.

We are pleased to be able to state that Mr. J. C. Thresh, Pharmaceutical Chemist, of Buxton, was a successful candidate in the recent examination for the degree of Doctor of Science in the University of London.

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The ordinary monthly meeting of this Society was held in the Society's rooms, on Wednesday evening, June 14. Mr. Preston, the President, in the chair.

The minutes of the previous meeting having been read and other business transacted, the President called upon Mr. Dunnil to read a paper on "Dispensing in Sheffield."

Mr. Dunnil commenced by referring to the small amount of dispensing done by the pharmacists of Sheffield, due to the medical men doing their own dispensing. He argued that the explanation sometimes put forward, —namely, that chemists prescribed and that their charges for dispensing are too high,—was insufficient, and that dispensing should be in the hands of the class specially trained to the work and that it should be paid for in accordance with the skill and care involved. Regret was also expressed that there is not greater uniformity in chemists' charges. The author, in conclusion, said he hoped the time was not far distant when all the dispensing would be done by pharmacists, and he was of opinion if it were compulsory that medical practitioners should dispense only in cases of emergency that body would be glad.

In the discussion which followed, which was joined in by most present, the feeling prevailed that better and more uniform prices ought to be obtained, and that dispensing ought to be in the hands of the chemist entirely.

Mr. Ellinor said that the members of the Society had, on several occasions, tried to increase the prices for dispensing, and most certainly the chemist ought to be paid for his labour and his skill; it is not the cost of the articles, but the skill and care required that have to be considered. A query presented itself to his mind in connection with errors in prescriptions, Whose is the responsibility, the writer's or the chemist's? Certainly not the chemist's. The fact of there having been certain prescriptions sent out to chemists, with large doses of medicines ordered, to test if chemists used the full quantity of drugs ordered,—this being done by and with the consent of borough officials, in order to prosecute them, if necessary, under the Adulteration Act,—might be said to prove this? If so, the Adulteration Act relieved the chemist of the responsibility, and he must carry out the directions of the prescription, in order to comply with the Adulteration Act, regardless of the patient being poisoned or injured thereby.

A vote of thanks was awarded to Mr. Dunnil, on the motion of Mr. Furness, for his valuable paper.

Mr. J. P. Hewitt was elected a member of the Society.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, W.C., on Wednesday, June 21, 1882. Present:—Professor Attfield, F.R.S., President, in the chair; Messrs. H. B. Brady, F.R.S., Benger (Honorary Secretary), Carteighe (Honorary Secretary), Chipperfield, Ekin (Treasurer), Groves, Plowman, Southall, Squire, Taylor and Thresh.

The minutes of the previous meeting were read and confirmed.

Letters of apology for non-attendance were read from Messrs. O. R. Dawson (Southampton), Kinninmont (Glasgow), Payne (Belfast) and Randall (Southampton).

A grant of £10 to Mr. A. H. Jackson, of Strangeways, to purchase material for an investigation on the Oils of Cinnamon and Cassia was confirmed.

Mr. Chipperfield (Southampton), reported that the preparations of the Local Committee at Southampton were now complete. They had obtained for the meetings of the Conference the use of rooms admirably adapted to the purpose in the Watts Memorial Hall. Twenty-five beds had been secured at Radley's Hotel.

Mr. Chipperfield was thanked for his kindness in attending, and requested to secure, if possible, a larger number of beds at the same hotel.

Letters of thanks for copies of the 'Year-Book of Pharmacy for 1881' were read, from the Royal Society of London, the Pharmaceutical Society of Great Britain, the Hull Chemists' Association and the Sheffield Pharmaceutical and Chemical Society.

The Honorary Secretaries reported that papers had been already promised for the Southampton Meeting, by Messrs. Bransom, Dott, T. B. Groves, R. H. Parker, L. Siebold, Thresh and Dr. Quinlan.

The following eight gentlemen were elected members of the Conference:—Mr. H. B. Blayney, Liverpool; Mr. R. A. Fairclough, London; Mr. J. D. Hazard, Bournemouth; Mr. E. Jones, Hanley; Mr. W. A. McKeown, Belfast; Mr. H. E. Parkes, Hornsey; Mr. J. G. Sangster, London; and Mr. K. Senior, Sydney.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, June 22. Mr. R. H. Parker, Vice-President, in the chair.

Mr. R. A. Cripps read a paper on the "History of Citrine Ointment," in which he traced the entire history of this preparation up to recent times, giving a full account of the different processes and modifications which have been from time to time proposed.

A discussion followed the reading of the paper, in which the Chairman, Secretary, Messrs. Alcock, Braithwaite, and Taylor took part.

The Reporter on Botany. Mr. J. O. Braithwaite, then made a Report upon "Plant Movement." The author intends to bring the subject of "Plant Movement" before the Association in two Reports, the first dealing with the researches of Darwin, the second with those of Wiesner. The present paper dealt exclusively with the work of Darwin, of which a full and interesting account was given. The author had himself made experiments upon the circumnutation of certain parts of the plant. Diagrams showing the result of these experiments upon germinating peas, and also upon the shamrock, were exhibited, as were also the plants themselves.

A discussion followed the reading of the paper, in which the Chairman, Secretary, Messrs. Alcock, Haward, Short, Thompson and Yeatman took part.

The meeting then adjourned.

ROYAL INSTITUTION OF GREAT BRITAIN.

Some of the Dangerous Properties of Dusts.*

BY F. A. ABEL, C.B., F.R.S.

(*Continued from Vol. XII., page* 1066).

The report of Faraday and Lyell was published in the *Philosophical Magazine* for January, 1845, and was followed by a letter from Faraday in the February number of the same publication, in which he referred to the lecture just delivered at the Royal Institution, and made further suggestions with respect to the method of ventilating the mines suggested in the report. But it appears that these publications remained long unknown in France, for in 1855 M. du Souich, Chief Government Mining Engineer of the Saint Étienne arrondissement, when referring to an explosion which had occurred at Firminy, advanced, as new, the view that the deposition of crusts of a light coke upon the props was due to dust which was

* Read at the Weekly Evening Meeting, Friday, April, 28, 1882.

swept up and transported to a distance by the violent current produced by the explosion, and which, being in part inflamed, would carry on and prolong the effects of the fire-damp. The fact that men near the pit's mouth received burns and other injuries, while others who were in workings near the seat of the explosion, but out of the main air current, escaped unhurt, was ascribed by him to this ignition and carriage of flame by dust. Had the results of the explosion been entirely due to the mine being highly charged with gas, the explosion must, he considered, have extended to those portions. On the occasion of two explosions in 1861, M. du Souich again dwelt upon his views regarding the part played by coal dust in increasing the disastrous effects of fire-damp explosions. In 1864–67, M. Verpilleux instituted experiments which led him to the conclusion that coal dust plays an important part in coal mine explosions; the subject was also pursued by several other French mining engineers at about the same time, and especially by M. Vital, who made some experiments on a small scale, in 1875, in connection with an inquiry into the nature and cause of an explosion which had occurred the year before at the Campagnac Colliery, and in a part where no fire-damp had ever been detected. An examination for gas had been made by the overman with a Mueselcr lamp just before a shot was fired, and after the first shot, a second shot was prepared, and the fuse having been ignited, the men retreated, when, after a short interval, an explosion took place, and the men stated that they saw a body of reddish flame advancing upon them. After examining the nature of dust collected in the mine, and instituting some special experiments upon a very small scale for the purpose of ascertaining whether, and to what extent, the flame from a small charge of powder was lengthened, when projected, like the flame from a blown-out shot, into air containing fine coal dust in suspension, M. Vital concluded that very fine coal dust, very rich in volatile (inflammable) constituents, will take fire when raised by an explosion, and that portions of the coal are successively decomposed, yielding explosive mixtures with the air, whereby the fire is carried along; the intensity or violence of the burning being much influenced by the physical characters (fineness, etc.) of the dust. He also pointed out that an explosion of fire-damp, while taking place almost instantaneously, inflames or decomposes a small quantity of coal dust raised thereby; explosive action being thus propagated after the fire-damp explosion has ceased. Soon after M. Vital's investigation of the subject, Mr. W. Galloway commenced a series of valuable experiments upon a larger scale, with the view of investigating the influence of coal dust in colliery explosions, and the results were communicated by him to the Royal Society in two papers in 1876 and 1879. The conclusions to which Mr. Galloway was led by the experiments described in his first paper, were to the effect that a mixture of air and a particular coal dust which had been made the subject of chemical examination and practical experiment was not inflammable at the ordinary pressure and temperature, but that the presence of a very small proportion of fire-damp in the air, the existence of which could not be detected with the Davy lamp by the most experienced observer, rendered this dust inflammable, and caused it to burn freely with a red, smoky flame. From this it was inferred that an explosion, when originated in any way whatever in a dry and dusty mine, may extend itself to remote parts of the workings, where the presence of fire-damp was quite unsuspected.

In his second paper, Mr. Galloway shows that the return air of a fiery mine which, though furnishing no indication of the presence of gas when examined in the usual way (by means of a Davy safety lamp), might in his opinion contain from 2 to 2·5 per cent., may be rendered inflammable by suspending coal dust in it. He also described experiments by which it appeared to be demonstrated that the flame produced by the explosion of fire-damp in a particular part of a mine might be propagated, at any rate to some extent, by coal dust raised by the explosion and suspended in the air travelling through the mine, even in the *complete absence* of fire-damp in the air. The apparatus used by Mr. Galloway was constructed on a somewhat extensive scale. In connection with the channel or gallery through which a current of air, with or without coal dust in suspension, was passed, was a receptacle in which a mixture of pit gas (from Llwynpia Colliery) and of air was prepared and exploded. The direct communication between the gas vessel and the gallery (representing a mine way) was only interrupted by a diaphragm composed of from two to six leaves of newspaper; this separator being burst through by the explosion of a mixture of nearly two cubic feet of fire-damp with the requisite proportion of air. The coal dust was placed on the floor of the gallery and upon certain shelves fixed in it. It appeared open to question whether, with the employment of this apparatus, there was not a possibility of very small quantities of fire-damp penetrating, before the explosion, into the gallery from the explosive chamber, through the closing arrangement above alluded to, and whether the results obtained in the gallery might, consequently, be accepted as produced solely by the effect of the concussion produced and flame promoted by the gas explosion in the separate chamber.

In a paper just communicated to the Royal Society, Mr. Galloway argues that any amount of gas which may thus escape into the gallery must be altogether insignificant as regards any possible influence upon the results obtained.

The conclusion now arrived at by Mr. Galloway, as the result of continued experiments with this apparatus, of which he has just given a further account, and of his examination into the effects produced by the Penygraig explosion in December, 1880, and the Risca and Seaham explosions of that year, is confirmatory of that published by him last year, namely, that the very decided view which he first held, "that a mixture of air and coal dust is not inflammable at ordinary pressure and temperature without the presence of a small proportion of fire-damp," has not been borne out by his further experiments, as he considers that he has now shown "conclusively that fire-damp is altogether unnecessary for the propagation of flame with explosive effects by a mixture of coal dust and air," when the scale on which the experiments are made is large enough, and when the fineness and dryness of the dust are "unquestionable."

This conclusion coincides in the main with that arrived at in 1878, as the results of experiments by Professor Freire Marreco, conducted in connection with the North of England Institute of Mining and Mechanical Engineers, which Society, as well as the Chesterfield and Derbyshire Institute of Engineers, has laboured very usefully in this direction cotemporaneously with Mr. Galloway. The most recent conclusions of the latter in respect to coal dust were in fact forestalled by those which the late lamented Professor Marreco in association with Mr. P. D. Morison communicated to the first named Institute in November, 1878, and which were published in its 'Transactions' of that date.

Messrs. Marreco and Morison's experiments were carried out in galleries or long boxes, representing mine workings, though on a smaller scale than Mr. Galloway's later apparatus, and constructed somewhat differently in their details. The apparatus used by them at Harton Colliery (and with which experiments have since been continued by Messrs. Lindsay Wood and G. May) was in fact a double gallery, so arranged that the air current which passed into one gallery made its exit at the end of the second, alongside the point of its first entrance. The mode of proceeding was to fire successively two powder shots, in different positions in the gallery box, from small cannon, so as to represent blown-out shots in the effects produced; coal dust was placed upon the floor of the box, and one shot was first fired against the air current which was passing at a known velocity. The dust cloud thereby raised was carried along by the current and a second shot was fired into it, and, in a large number of experiments made with many different descriptions of dust, the flame produced by the second shot was increased by that of inflamed dust, a comparatively clear flame being sometimes produced, while in other instances it was accompanied by a shower of sparks. The view taken by Vital, Marreco, and others, regarding the action of coal dust in propagating flame in air free from fire-damp, is to the effect that the first portions of dust acted upon by the inflamed gases of the shot liberate inflammable gas which mixes with the air, and is fired, the non-volatile part of the coal being in part consumed and in part deposited as a feeble coke. Some examination of coked deposits of dust, sent to Marreco subsequently by Mr. Galloway, confirmed the observations originally made by Faraday and Lyell, that the coal dust is in part submitted to destructive distillation during the progress of the flame through the dust-laden air. Marreco considers that, although a proportion of the heat developed by the burning dust is absorbed by the gasification of the coal-constituents, the heat of combustion of these suffices to leave a margin for the carrying on of the action from one particle of dust to another, provided these be in sufficiently close proximity to each other.

In the experiments made by the Chesterfield and Derbyshire Institute of Engineers, in a very long gallery, results were obtained very similar to those of Marreco and Morison, and it was also found that a lengthening of a gas flame, which was placed in the gallery, could be obtained by causing the current of air to carry with it thick clouds of some descriptions of coal dust.

Many instances are on record in this country and others of the firing, with semi-explosive violence, of clouds of coal dust, produced either in the open air, or in localities where no fire-damp could exist, some portions of the mixture of dust and air having come into contact with a flame or fire. Thus Marreco and Morison mention a case of a considerable quantity of coal dust, which had been accidentally thrown over some screens at a pit's mouth, flashing into flame as the dust cloud came into contact with a neighbouring fire, and burning a man very severely; and another accident, which occurred in a stone-drift, where it was believed that no gas could possibly be present. A considerable body of rock was dislodged and coal dust raised by the firing of a shot, the flame of which fired the air-and-dust mixture, with very mischievous results. From 50,000 to 60,000 cubic feet of fresh air were said to be passing through the drift per minute when this accident occurred.

There appear good grounds for believing that, provided coal dust be sufficiently fine and thickly suspended in the air, and of a readily inflammable nature, fire may travel to a considerable distance in the working of a mine, through its agency, in the complete absence of fire-damp. The effects of transmission of flame in this way would be decidedly different, and much inferior in violence, to those produced by an explosion of fire-damp and air, or of a mixture of these with coal dust; the comparative suddenness of the gas explosion would produce greater destruction and less burning effects than the comparatively gradual explosion, or the rapid burning of a dust-and-air mixture. In the latter case, the coal dust will generally be considerably in excess of the air needed for its combustion, so that, however finely divided, much will escape being burned, and may be only very partially coked, and it is conceivable that, as suggested by Mr. Galloway, a second rapid burning or semi-explosion may be caused by the inrush of air, following the first explosion, into the workings which may be thick with heated and only partially burned dust, some of which may still be incandescent.

Considering that, since first Faraday and Lyell directed attention to the dangers of coal dust in mines, its behaviour has been made the subject of many series of experiments and published reports here and abroad, it is remarkable that in most instances of coal-mine explosions, until quite recently, the probable effect of coal dust in increasing their magnitude does not appear to have received the serious attention which it merits at the hands of mine owners and of those in authority connected with coal mines. When the Royal Commission on Accidents in Mines was appointed it collected evidence from H.M. inspectors of mines, from experienced colliery owners and mining engineers, and from selected pitmen, with respect to the causes of accidents, and that evidence included several statements regarding the possible influence of coal dust in aggravating explosions, but the preponderance of opinion of H.M. inspectors was against the view that explosions could originate with, or be to any great extent propagated by coal dust *in the absence* of fire-damp. The only experiment on a practical scale bearing upon the subject which appears to have been made until quite recently is that of Mr. H. Hall, Mine Inspector of the N. Wales, etc., District, who, in firing charges of 4 lbs. of powder from a cannon in an adit driven about 50 yards from the surface in a coal seam on the dip, coal dust being sprinkled upon the floor, obtained flame extending to distances of 30 to 60 yards, while without the dust the flame of the shot did not extend more than 6 or 7 yards.* Some decided opinions were expressed that the supposed influence of coal dust in aggravating explosions was over-rated, and that it would certainly not lead to explosions in the absence of gas. On the other hand, Mr. Galloway expressed a strong opinion that some of the most extensive of recent explosions, such as those at Llan and Abercarne, were at any rate largely contributed to by coal dust, and more recently, on the occasion of the inquiry into the Penygraig explosion, he gave evidence to the effect that the disastrous results of this explosion were mainly if not entirely ascribable to the action of coal dust, supporting this opinion by the results of a minute examination into the condition of the pit, of the sufferers, etc., after the accident.

When the terrible calamity which occurred at Seaham Colliery in September, 1880, was officially inquired into the suggestion was very decidedly put forward by the miners' representatives that the coal dust which existed in large quantities in some parts of the mine, and especially near the spot where it was surmised that the explosion had originated, might have had much to do with the accident. Indeed the opinion was strongly entertained by some that it was entirely due to the ignition of coal dust, in the absence of gas, by the flame from a blown-out shot. The lecturer was consequently requested by the Home Secretary to make experiments with samples of dust collected in different parts of the mine, and the results obtained with them led to an extension of experiments with dust from other collieries in different parts of the kingdom. These experiments, carried to a certain point for the immediate purpose of the Seaham inquiry, have been interrupted for some time, but the Royal Commission has now resumed them with the object of obtaining more precise data in connection with certain results which were elicited by the first part of the investigation.

The earlier experiments were carried on at the Garswood Hall Colliery, where a constant and abundant supply of pit-gas (a so-called blower) is brought to the surface, and was kindly placed at the service of the Commission by Messrs. Smethurst and Co., together with many conveniences, for the purposes of these and other important experiments upon which they have been engaged. The apparatus used at Garswood for the experiments with the Seaham and other dusts, was similar in character to those employed by Freire Marreco, Galloway, and others, great pains being taken to secure accuracy

* Mr. Hall stated that the air in this adit was "practically" free from gas, but did not maintain its *absolute* freedom.

and uniformity in the velocity of the air currents passing through the gallery, in the proportion of pit-gas, or fire-damp, used with the air, and in the intimacy of the mixture. In order to raise the air current in the gallery to a temperature similar to that of the atmosphere in colliery workings, the air supply was drawn through a system of heated pipes, so that, when passing at as high a velocity as 1000 feet per minute its temperature would be raised up to 80° or 85° F., even in the very severe weather during which some of these experiments were made.

The samples of coal dust experimented with were examined with respect to fineness, proportions of volatile matter and ash, and one or two other points, and they were all carefully dried before use.

Experiments were made in the first instance with a view of ascertaining the smallest proportion of fire-damp which, when mixed with the air passing through the apparatus, would furnish an atmosphere capable of firing at a naked flame of a particular size, placed in the gallery. It was next ascertained what quantity of gas below that proportion was needed to impart to the mixture of air with a large quantity of each particular coal dust the property of exploding throughout the gallery. By these experiments the samples were classed in the order of their sensitiveness to explosion, and it was found that those which were very rich in pure coal and which contained the highest proportion of very fine dust were the most sensitive, *i.e.* required the lowest proportions of fire-damp in air to bring them to explode readily when suspended in a dense cloud. But with the samples containing larger proportions of non-combustible matter the order of sensitiveness did not necessarily harmonize with the comparative richness of a sample in pure coal, nor with its comparative fineness, and this was strikingly illustrated by a sample of dust from one of the roads in Seaham Colliery, which contained more than half its weight of non-combustible matter, yet ranked only third in order of sensitiveness, while another sample, containing considerably more coal and a somewhat larger proportion of the finer dust, ranked fifth.

Another point clearly established, and confirming by more accurate data the observations of earlier experiments, was, that the proportion of fire-damp required in a mine to bring dust into operation as a readily exploding material when thickly suspended in the air is bordering upon and even below the smallest amount which can be detected in the atmosphere of a mine by the most practical observer with the use of the Davy lamp, the only means of searching for gas which has until quite recently been employed in mines. The highest proportion which can be thus detected by an experienced operator is stated to be about 2 per cent. Explosions were produced by dusts suspended in air travelling at a velocity of 600 feet per minute, when fire-damp was present in proportions ranging from 2 to 2·75 per cent.; in currents of low velocity the same result was produced with a sensitive dust in the presence of only 1·5 per cent. of fire-damp, and ignitions which approached explosions in their nature and extended to considerable distances were obtained with this dust in air containing still smaller proportions of gas. Mixtures of fire-damp and air bordering upon those which will ignite upon the approach of flame were found to be instantaneously fired by a lamp if they contain only a few particles of dust in suspension, and in connection with this fact the interesting observation was made that such dust particles need not be inflammable nor combustible to produce the result named. Mixtures of air and gas which passed a naked flame without any symptom of ignition were inflamed when particles of a fine light powder such as calcined magnesia were suspended in them. The action of certain of the pit dusts which contain comparatively little coal, in determining the ignition of mixtures of air and small proportions of fire-damp, is possibly of the same character as the behaviour of such a dust as calcined magnesia. The power of favouring the ignition of mixtures of fire-damp and air was not exhibited by some other powders similar in fineness to the latter, but differing in structure and density from this and one or two other non-combustible dusts which may be called active; even different samples of magnesia, differing somewhat in lightness from each other, appeared to possess the activity in different degrees. These facts seem to favour the view that a dust possessing particular physical characteristics exerts a contact- or catalytic action upon gas mixtures, similar to that known to be possessed by platinum and some other substances under particular conditions. Thus, when finely divided platinum, or even a clean recently heated surface of the compact metal, is brought into contact with mixtures of hydrogen, or of a hydrocarbon gas or vapour, with oxygen or air, oxidation of the hydrogen or hydrocarbon is at once established, accompanied by the development of heat, whereby the temperature of the metal is raised and chemical activity promoted, so that heat speedily accumulates, raising the metal to a temperature sufficiently high to bring the surrounding gas-mixture to the exploding point. If the metal presents a very large surface, or is in a specially porous condition, as in the form of sponge or very fine powder (*platinum black*), the explosion of the gas-mixture may follow very rapidly, or almost instantly, upon the first contact of some portion with it.*

In many of the experiments with calcined magnesia just referred to, it was distinctly noticed that a dark space intervened between the gas flame used as the source of heat and the flare produced by the ignition of the gas mixture through the influence of the dust cloud suspended in it, which would seem to indicate that the dust particles immediately upon passing through the flame established some amount of oxidation of the fire-damp, which proceeded with increased rapidity as the dust became more highly heated through the chemical action developed, so that within a short distance from the point where the heating commenced the dust became incandescent, and the ignition of the gas-mixture followed. Further experiments which are contemplated may elucidate the precise nature of this action of non-combustible dust in promoting the ignition of gas-mixtures which, in the absence of dust, are not inflammable; there appears little doubt, however, that it constitutes one element in the dangers arising from the presence of dust in the air of a mine which contains a small proportion of fire-damp, and in which a large body of flame is accidentally produced, either by a blown-out shot, or by a fire-damp explosion of local character.

Numerous experiments similar to those of Marreco and Morison were made by the lecturer at Wigan with mixtures of air and coal dust from Seaham and other collieries, in the complete absence of fire-damp, which were passed through the apparatus at different velocities up to 1000 feet per minute. Small cannon, specially constructed to ensure uniformity in the volume of flame produced at different times, were fired in them, either singly or in pairs in rapid succession; and exposed heaps of guncotton and of slow and quick burning gunpowder were exploded in the dust-laden air. The results occasionally confirmed to some extent those of Marreco and Morison and the Chesterfield experiments. At velocities of 400 feet per minute the dust, which was either passing at the time or was raised by the concussion of a first shot, did not appear to produce any increase in the volume of

* This action of platinum (or palladium) has recently received applications bearing special reference to the existence of explosive gas mixtures in coal mines. The one consists in an apparatus proposed by Mr. Körner for removing, by slow combustion, local accumulations of fire-damp; the other is a very simple and portable photometric apparatus devised by Mr. G. H. Liveing, by which proportions of fire-damp much lower than the smallest amount discoverable by the Davy lamp in the hands of the most expert, can be readily and quickly detected, and the amount estimated with considerable accuracy.

flame furnished by the cannon, but a decided though inconsiderable lengthening of the flame was several times observed at higher velocities and with the employment of the most inflammable dusts. Some of these, when thickly suspended in air travelling at velocities of 500 to 1000 feet per minute, and exposed to the action of a large flash of flame (as produced by the loose heaps of guncotton and *blasting* powder) exhibited a tendency not only to burn explosively in and close around the flame but also to propagate flame, or cause it to travel along some distance; but the most decisive results of these experiments were not of a nature to warrant the conclusion that flame could be carried along indefinitely, or even to a very considerable distance, by coal dust in the complete absence of fire-damp, as now maintained by Mr. Galloway. There can be no question that the scale of magnitude upon which the first ignition in the dust-laden atmosphere is produced must greatly influence the extent to which the propagation of flame in this way will extend, and Mr. Galloway's experiments at Llwynpia, therefore, were likely to develope conditions more nearly approaching those of the real state of things in a mine than experiments in galleries of smaller dimensions, and with small initiating volumes of flame. But the necessity for caution in deducing very decided conclusions from even large-scale experiments appears to be illustrated by some of Mr. Galloway's results, inasmuch as some of the great distances to which the flame extended were observed under conditions decidedly favourable to the projection of the flame by causes which would not come into play in the same way in a mine-working. The experiments made some years ago by Mr. Hall in an adit (which have already been referred to) appear to have a more direct bearing upon results likely to be actually produced underground in a dust-laden atmosphere. In those experiments the extreme distance to which flame was carried by dust first ignited by the flame from a very excessive charge of powder (4 lb.) was 180 feet. It is of course possible that the coal used was not of the most inflammable description, and that its fineness and density were not most favourable to its becoming very thickly suspended in air. On the other hand, Mr. Hall stated, in his evidence before the Royal Commission, that the atmosphere in the adit was only "practically" free from gas.

The volume of flame from a blown-out shot in a mine-working is generally considerable, but it appears that exaggerated estimates are entertained of the distance to which, *in the absence of dust*, the flame will be projected, and it is probable that the large volumes of flame, extending occasionally to many yards from the spot where the shot was fired, are in a great measure due to the ignition of dust raised by the concussion and rush of air at the instant of firing. Mr. Hall, in his experiments in the adit, found that the flame from the shot of 4 lb. of powder reached to a distance of only 18 to 21 feet when no dust was present. A few months ago that official directed the attention of the lecturer to the occurrence of two accidents in the Liverpool district, each one occasioned by a shot of 1 lb. of powder blowing out its stemming without shaking or bringing down any coal. In both instances the shot lighter and two pitmen had retired about 100 feet from the seat of the shot, that is, about 30 feet in a straight line with it, and 60 to 80 feet along both directions of a working running at right angles to the drift in the face of which the charge was fired. In the case of one accident a man was killed, and serious injuries were sustained by the other men in both instances. There were signs of charring upon the props up to, and 5 or 6 feet beyond, where the men were standing, but they did not extend farther. The drift and the level in which these accidents occurred were 5 feet high and 12 feet wide. Mr. Hall informed the lecturer that a strong impression existed among mining men on the spot that the flame of the shot, quite unaided by gas or coal dust (the latter was known to be present), would have extended so as to produce the effects described. This appeared so at variance with Mr. Hall's experiments in an underground working, and with Mr. Abel's own experience in other directions, that the latter has endeavoured to obtain some precise experimental data with regard to the distance to which any burning effect from a blown-out charge of 1 lb. or 1½ lb. of powder would extend in a mine working, in the absence of dust. With this object he availed himself of the friendly assistance of Major Durford, R.E., Instructor in Field Fortifications at the School of Military Engineering, Chatham, under whose direction Lieutenant Raban has carried out an instructive series of experiments in accordance with suggestions made by Mr. Abel as the work proceeded.

(*To be continued.*)

Parliamentary and Law Proceedings.

PROSECUTION UNDER THE 17TH SECTION OF THE PHARMACY ACT.

At the Hyde Petty Sessions, on Monday, June 19, before Messrs. John Wood (Chairman), and W. Sidebottom, Owen Stafford, of 51, Market Street, Hyde, was summoned by the Chemists and Druggists' Trade Association for selling a certain poison, to wit laudanum, the same being a preparation of opium, and not labelling the article properly.

Mr. Henry Glaisyer, Solicitor to the Association, appeared for the prosecution; Mr. T. Drinkwater appeared for the defence, and said he should plead guilty to the offence.

Mr. Glaisyer said Mr. Templeman was the Assistant-Secretary to the Chemists and Druggists' Trade Protection Association, whose head office was at Birmingham, and the prosecution was brought under the provisions of the Pharmacy Act of 1868, which required that certain formalities should accompany and precede the sale of poisons. They would be found in the 17th section of the Pharmacy Act of 1868. Defendant was not a registered chemist and druggist, and had no right to deal in poisons at all.

The Chairman supposed it was a question as to whether defendant was or was not a qualified man.

Mr. Glaisyer said it was more a question of using labels, so that there might be no mistake when the poisons came to be used. The 17th section of the Pharmacy Act provided that no person should undertake the sale of poisons by wholesale or retail unless the boxes or covers were distinctly labelled with the name of the article, and the word "poison," supplemented by the name of the particular poison sold. The poison in question was a preparation of opium, and was dealt with in the second part of the schedule. In this case, on the label in question appeared the word "poison," and the name of Mr. Stafford as the seller, but the name of the article did not appear, and the Bench would see that that was a very serious offence, because if the nature of the poison was not known, and supposing several bottles were standing together, a person would not know which to take.

The Chairman said he should think the word "poison" was sufficiently distinctive. Supposing the Latin word for the poison appeared on the label, how could that afford any security?

Mr. Glaisyer said a person might have several bottles labelled with the word "poison," and being ignorant of the specific contents of each bottle might very easily select the wrong one if laudanum was wanted. Laudanum was sufficiently well known in English, and was often used for the toothache.

The Chairman mentioned that there were vegetable poisons.

Mr. Glaisyer said if the bottles were properly labelled a person would know which of the bottles he had to take. On the 12th inst. Mr. Templeman visited Hyde, and proceeded to the shop occupied by Mr. Stafford. Amongst other things he purchased was a bottle of laudanum produced. The label on the bottle was marked "Poison, Owen Stafford, formerly with T. Standring and Son, Manchester, Medical Hall, 51, Market Street, Hyde." 9½*d.* was paid for the bottle. Mr. Templeman subsequently analysed the laudanum supplied, and had found it to be a preparation of opium, as he expected. All preparations of opium and poppies were poisons in the meaning of the Act.

The Chairman: You say it should be described as laudanum?

Mr. Glaisyer: Yes.

Mr. Sidebottom: Is Mr. Templeman one of the agents of the Association?

Mr. Glaisyer: He is the Assistant-Secretary.

The Chairman: He goes about to see that the articles sold are genuine?

Mr. Glaisyer: Yes, and for the protection of chemists and druggists generally.

Mr. Drinkwater said he was not going to dispute the facts, as the Act plainly stated that the word "laudanum" should have appeared on the paper. He wished, however, to state the circumstances under which the sale took place. Mr. Templeman went into his client's shop and asked for a 6*d.* feeding bottle, then for some linseed meal, and afterwards for 2*d.* of laudanum to mix with it, as he wanted to make a poultice for his wife. Defendant asked Mr. Templeman what quantity of ingredients should be put together, and knowing it was to be made into a poultice he did not take the same care he would have done in an ordinary individual, but to someone like Mr. Templeman, who appeared to have some faculties about him, the word poison would be sufficiently distinctive.

The Chairman said the Act was intended to apply to the general public. Mr. Templeman no doubt knew what the word poison meant, but caution must be used to protect the general public.

Mr. Drinkwater said that in the case of a gentleman like Mr. Templeman no harm could be done. Defendant was a very respectable gentleman, and held certificates from gentlemen in London that he had a good knowledge of his profession, therefore he submitted that as the word laudanum had merely been omitted from the label it was not a serious offence, and he thought the ends of justice would be met if the Bench imposed the smallest fine it was in their power to inflict. Mr. Stafford would take care that he should not again be wanting in due caution.

The Chairman said they were quite satisfied that the requirements of the Act had not been complied with. Because there might have been no fear that evil consequences would ensue in this case, yet if the public saw that the Bench were inclined to treat the present offence with laxity serious consequences might ensue from the future sale of poisons, and the Bench would be blamed. It was not a case calling for a heavy penalty, and as it seemed to have been an act of carelessness on the part of Mr. Stafford rather than with an intention to infringe the law, he would be fined 10*s.* and costs.

Mr. Glaisyer asked if any extra costs would by allowed.

The Chairman said they thought it was a prosecution which could not have been conducted without the aid of an advocate, and therefore they should allow one guinea for the advocate's fee in addition to the other costs.—*North Cheshire Herald.*

Adulterated Sweet Spirit of Nitre.

At the same court, Joseph Green, grocer, Hyde, was summoned for having sold to Sergeant Harrison, on May 24, a quantity of sweet spirit of nitre which was not of the nature, quality and substance demanded.

Defendant pleaded not guilty.

Sergeant Harrison stated that on May 24, he called at defendant's shop in Hyde Lane, Hyde. Defendant's wife was in charge of the shop, and he asked her for 2 oz. of sweet spirit of nitre. She supplied it, and witness paid her 6*d.* He afterwards told her he was buying it for the purpose of being analysed by the county analyst, Mr. Carter Bell, and offered to divide it into three parts, but she said it did not matter, she sold it the same as she got it from a firm in Ashton. Constable Ashford sealed the bottle, and witness put on a label in her presence to distinguish the bottle. The following day he delivered it to Mr. Bell. After he had paid her for the sweet nitre she drew his attention to a small label at the bottom of the bottle, which stated that the sweet nitre was not pure and would not stand the test.

Defendant produced a bottle containing sweet nitre, and asked witness if he could not see the label upon it through the shop window.

The sergeant said it was not the same bottle, but a much smaller one than that from which he was supplied, and the label was nothing near as large.

Defendant said he had no other bottle in the shop, and he was not aware that there was any other quality of sweet nitre.

Constable Ashford corroborated Sergeant Harrison.

Captain Lingard produced the analyst's certificate, which stated that the sample submitted to him was adulterated with 25 per cent. of water.

A fine of 10*s.* and costs or seven days was imposed.

James Buckley pleaded guilty to a similar offence.

Sergeant Harrison stated that on May 18, he called at defendant's shop at Micklehurst, and purchased 4 oz. of sweet spirit of nitre, for which he paid 1*s.* Defendant and his wife were present, and the defendant sold the article as they got it.

The sweet spirit of nitre, according to the analyst's certificate produced by Captain Lingard, was adulterated with the same percentage of water as in the last case.

Defendant, in reply to Captain Lingard, said he purchased the sweet nitre from Bickell's, of Ashton.

The Chairman said it was an extraordinary thing tradesmen did not protect themselves when they knew the regulations of the Act of Parliament, and defendant would be fined 10*s.* and costs.

Paregoric without Opium.

At the same court, Thomas Farrand, of Tintwistle, pleaded guilty to having sold to Sergeant Harrison a quantity of paregoric which was not of the nature, quality and substance demanded.

Sergeant Harrison stated that on May 18, he called at defendant's shop at Micklehurst, and purchased from his wife 2 oz. of paregoric, for which he paid 6*d.* He also bought 2 oz. of mustard, but that had been returned pure.

The analyst's certificate stated that the sample was adulterated with 17 per cent. of water, and it did not contain opium, which was one of the ingredients of paregoric, therefore it came under the 9th section of the Act.

Defendant said he bought it and sold it as pure paregoric.

The Chairman: Have you a written warranty from the seller?

Defendant: They will not give us a warranty.

The Chairman: Then you must take the consequences.

Defendant said he bought the paregoric from Bostock's, of Ashton.

Fined 10*s.* and costs or seven days.—*North Cheshire Herald.*

Reviews.

A Treatise on Chemistry. By H. E. Roscoe, F.R.S., and C. Schorlemmer, F.R.S. Volume III. The Chemistry of the Hydrocarbons and their Derivatives, or Organic Chemistry. Part I. London: Macmillan and Co.

This is a continuation of the treatise on chemistry upon which Professors Roscoe and Schorlemmer are engaged, which they have previously carried to the end of the metallic elements.

The volume before us commences with an historical introduction, giving an account of the gradual development of our knowledge of the carbon compounds up to 1844, when Gerhardt introduced the terms homologous and heterologous series. Then follows a description of the various methods of organic analysis, commencing with that employed by Lavoisier, in 1781, and ending with those at present in use. This section closes with a very complete account of the methods of determining vapour densities, which includes a full description of those recently introduced by Victor and Carl Meyer. These practical matters are followed by an explanation of the methods by which molecular formulæ are ascertained, and by a notice of the phenomena known as isomerism, metamerism, polymerism. The system upon which carbon compounds are classified is next entered upon, and then the authors pass to the consideration of the members of the chief groups. In this, as in the earlier part of the book, the treatment adopted is historical, systematic, and at the same time in the case of the more important substances, eminently practical, full details of the modes of production being given in these cases. The system of classification which Professors Roscoe and Schorlemmer have adopted is not unfamiliar. Commencing with the paraffins, methane and its derivatives are first studied, then ethane and its derivatives and so on. Thus methane, methyl alcohol, and the oxide, chloride, and cyanide of methyl are considered together with formic aldehyde and formic acid; an arrangement which has the advantage of impressing the relations of these bodies on the mind of the reader with great distinctness. The general nature of classes of compounds, such as the alcohols, acids, amines, etc., is to some extent discussed before the detailed study of the hydrocarbons and their derivatives is commenced.

From the foregoing sketch it will be seen that in this work the subject is treated in a somewhat different manner to that which has of late been most frequently adopted by writers on organic chemistry in this country. In the first place, there is generally more detailed information about important commercial operations, and rather a fuller account of analytical methods. In the second place, each substance is here considered in connection with a group of dissimilar bodies, all of which may be regarded as derived from the same hydrocarbon by substitution, instead of being taken with a group of similar bodies. Thus formic and acetic acids instead of being grouped together with the other fatty acids are apart, being placed with the methane and ethane groups respectively. As it is highly desirable that neither of these points of view should be lost sight of, this latter feature in Professors Roscoe and Schorlemmer's work is all the more welcome.

In the sections on organic analysis the student will find almost all that is necessary to enable him to attack work of this kind, and attention is drawn (p. 58) to the importance of certain precautions in employing the modern breechloading process for determining carbon and hydrogen. Our own experience with this process seems to show that very often the inaccurate results obtained are due to the employment of too greatly reduced pressure, which seems to result in air, highly charged with moisture and carbon dioxide from the neighbouring furnace, diffusing through the india-rubber connection between the drying tube and that employed for absorbing the carbon dioxide. This can be avoided by using a very short connection; but a more satisfactory plan is to so arrange the flow of water from the aspirator that the pressure inside the tubes is only just below that of the air. We are sorry not to see any mention of the method lately introduced by Mr. Perkin of absorbing nitrous fumes by means of a mixture of chromate of potassium and manganese dioxide heated to about 230° C. This plan requires a little care, it is true, but if properly carried out it offers considerable advantages.

The portions of the work which treat of such bodies as alcohol, ether, acetic acid, and methyl chloride, generally include a considerable body of information as to the manufacturers' modes of preparing them, and with the very complete account of the various methods which have been used for rectifying alcohol, and for determining the strength of solutions of it, would be specially valuable to our readers.

The part of organic chemistry included in so much of the work as is in our hands at present does not extend beyond the paraffins and their derivatives, and certain bodies allied to them, and it closes with an account of the chemistry of soap. This division of the subject is so comparatively well known that there is not so much room for controversy as in many others.

The numerous references to original papers which occur throughout the book and the historical details with which it abounds from beginning to end are features which add enormously to its value and to the interest with which it will be read. Here and there, however, there are blemishes due to imperfect revision, as, for instance, in the description of the preparation of zinc-methyl (p. 247), where it is stated that upon methyl chloride being added to zinc sulphate crystalline zinc-methyl iodide is formed. Nevertheless, we can strongly recommend the work to students of this branch of science who would know their subject in all its aspects, and to more than an elementary extent. Probably there never was a more thoroughly readable book on chemistry written.

On the Treatment of Cancer. By John Clay. London: J. and A. Churchill. 1882.

This pamphlet, although written principally for the medical practitioner, contains an unusually large proportion of matter that is of interest to the pharmacist. Rather more than two years have elapsed since the publication in the *Lancet* of a communication from Professor Clay upon the treatment of cancer with Chian turpentine directed considerable attention to that nearly obsolete drug. Such pharmacists or wholesale druggists as were fortunate enough to have any quantity of the drug then among their old stock were able to dispose of it profitably; those who had not were compelled to look about for a supply, and speculative calculations were even made as to whether the next year's production in the island of Scio would be equal to what would be required. No doubt the demand suddenly created for a comparatively unknown drug brought some spurious articles into the market, and Professor Clay has shown great readiness to attribute the non-success following the treatment that has been reported by different practitioners to the substitution of other substances for Chian turpentine by the dispenser. It may be useful to remark, therefore, that Professor Clay adopts the "excellent description" of the drug given in the 'Pharmacographia' as a means of diagnosing the genuine article. He also speaks of an unstrained or rough kind of Chian turpentine that he has received direct from Scio, which although "the most genuine form of the drug, as it has not been subjected to any artificial method of purification," presents external characters so different to those of the strained gum that it might be condemned by the uninitiated as impure. The passage is worth quoting:—

"The Pistacia terebinthus tree, from which the gum is procured, is a very hardy one, it lives to a great age, and in the island of Scio attains the size of an American elm—between 30 and 40 feet high. In June or July an incision is made into the bark, through which the gum flows and runs down the tree and soon solidifies on exposure to the atmosphere. The sticky nature of the gum causes various matters, such as sand, the fruit of the tree, straw, leaves, etc., to adhere to it. When the gum has ceased to ooze from the incision, it is scraped off the tree with a large dull knife, and this process necessarily brings off portions of the bark, thus constituting an additional impurity. When the rough turpentine is strained, the minute particles of the foreign substances above mentioned cannot be separated from it and form the impurities found in all strained Chian turpentine. The rough Chian turpentine after it has been exposed to the atmosphere is found on importation to be a rough dry substance, of a light brown colour, covered with a dirty white powder, and it appears to be one mass of seeds, bark, sand, etc. On taking a small piece of the mass and rubbing it for a few minutes between the thumb and finger the characteristic odour of the gum is at once strongly perceived. It is almost tasteless; the turpentine is readily dissolved out of the rough mass by ether, or it may be melted and strained. This rough turpentine is admirably suited for making an emulsion, as the whole of the properties of the gum are extracted by the ether without waste, and would probably add to its efficiency. Mr. Whinfield, the dispenser to the Queen's Hospital, informs me that from 3 pounds of the rough turpentine he obtained 1 pound and 11 ounces of the real gum, of excellent quality, the rest being impurities."

Professor Clay has also received a greyish-white variety, having an appearance similar to that of glazier's putty, which gives off the characteristic odour when rubbed between the thumb and fingers and is tasteless; it is said to be used by the natives for chewing, but he has not tried it in medicine.

Notwithstanding unfavourable opinions that have been expressed Professor Clay says there is now no doubt that Chian turpentine administered internally does prove very beneficial in most forms and situations of cancer, especially if it be used early. He still adheres to the form of pill containing 3 grains of turpentine and 2 of sulphur, with a caution against the use of magnesia as an excipient. The original form of emulsion, difficulty in dispensing which gave rise to some correspondence in this Journal, has been abandoned; the sulphur has been left out, being administered separately in a pill, and the powdered gum tragacanth is rubbed up with rectified spirit, as first suggested, we believe, by Mr. J. S. Palmer (*Pharm. Journ.*, [3], x., 1011). The following are the author's present directions:—

"It is necessary in the first place to provide an ethereal solution of Chian turpentine. This is made by dissolving ½ ounce of Chian turpentine in 1 ounce of pure ether, sp. gr. 720. Then take 1 drachm of powdered gum tragacanth and 1 drachm of rectified spirits of wine, rub together and add water gradually to make a mucilage up to 9 ounces; then add the solution of Chian turpentine to the mucilage in a bottle, and shake until the whole is properly mixed. A more elegant but more expensive essence is made by using powdered gum arabic instead of the powdered gum tragacanth. To make a 10-ounce mixture, take 1½ ounce of powdered gum arabic, and water to 9 ounces to make a mucilage. Then put this into a bottle and add the solution of Chian turpentine, and agitate until the whole is well mixed. One teaspoonful of the essence is equal to one Chian turpentine pill, the dose is therefore two or three teaspoonfuls three times a day."

It may be useful to mention that in some cases, in addition to the internal treatment, Professor Clay dusts the parts affected with a powder made in the following proportions:—Tannic acid, ½ ounce; powdered charcoal, 2 drachms; and powdered sulphate of copper, 10 grains.

Hot Water Heating on the Low Pressure System. By F. A. Fawkes, F.R.H.S. London: B. T. Batsford. 1882.

The author of this handy little book has been engaged for some years as a hot-water engineer, and for the convenience of inquirers has brought together some useful information upon the principles involved and the apparatus used in the heating of buildings by hot water. A brief but clear description, illustrated by diagrams, of the low pressure system, forms the principal portion of the book. Other systems of heating are also briefly alluded to, and there is also a list of the possible causes of failure. Advertisements are present in unusual force for so small a book, but their introduction may be excused on the ground that they will be useful to any person intending to carry the teaching of the text into practice without further consulting the author.

Notes and Queries.

[729]. I have not experienced the slightest difficulty in preparing this tincture. To the quinine in a bottle add the proof spirit, shake well, then add the liq. ammonia (either gradually or all at once, it makes no difference), and a perfect solution is instantly obtained. *No heat is required.* Quinine will dissolve in the mixed proof spirit and liq. ammonia, but this takes a little longer to prepare. The former process is the one I always adopt.

Leamington. Samuel A. Smith.

[731]. I think, with your querist "Specific Gravity," that Squire is slightly in error with the "colour description" of syr. ferri iodidi, and that "*nearly* colourless" would have been more accurate.

By using a pure sugar, exposing the solution of iodide to the air as short a time as possible, and filtering with the funnel dipping into the syrup, previously prepared, I obtain a syrup, the colour of which is scarcely perceptible in a filled 2-oz. white glass phial. After passing through the filter the solution should be of a beautiful sea-green tint.

Squire says, "it keeps colourless in well-filled bottles." It may not colour so rapidly in "well-filled bottles," but from actual experiment I find, that with a single air bell, decomposition takes place, which is indicated by the syrup nearest the contained air becoming of a decided straw colour in the course of four or five days.

Edinburgh. John.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

E. L. Riddell.—To be able to answer your question it is necessary in the first place to know what is the composition of the ink.

A Co-Executor.—There is no exemption in the Pharmacy Act under cover of which even the executors of a deceased medical practitioner can legally carry on the business of a chemist and druggist with or without the aid of a qualified man. In the case, therefore, that you put, where the executors of the deceased widow of a medical practitioner carry on such a business, there can be no doubt that they are breaking the law.

Pilocarpine.—"Cascara sagrada" is the name under which the bark of the Californian *Rhamnus Purshiana* has been introduced to the medical profession in the United States as a remedy in cases of obstinate constipation. The plant is closely allied to *Rhamnus Frangula*, and probably resembles it in its therapeutic value.

"*Cœsariensis.*"—Johnston's 'Elements of Agricultural Chemistry and Geology' (Blackwood, 1871).

A. H. H.—Either Ganot's or Deschanel's work would answer the purpose equally well.

H. Peet.—To a great extent it is a matter of individual discretion as to what coating is put upon pills, for prescriptions seldom give any instructions upon the point.

W. T. Phillips.—A solution of one of the aniline compounds is usually used, such as Hofmann's purple dissolved in 1 part of alcohol and 7 parts of water.

J. H., A.P.S. (who should have sent his name and address) is recommended to address his question to the Registrar.

Communications, Letters, etc., have been received from Messrs. Hayden, Smith, Philos Lex, H. C. H.

THERMO-MICROSCOPY IN PHARMACY.

BY W. H. SYMONS, F.R.M.S., F.C.S.

(*Concluded from page* 4.)

The Melting Point of Resins.—Time and mass have almost as much to do with the melting of a resin as temperature, as may be seen by the ease with which Burgundy and common pitch flow at normal temperatures, and accommodate themselves to their surroundings. To render mass a constant factor, the resin to be examined is coarsely powdered, the finest particles sifted off through fine muslin and the largest separated by means of the same material of fewer meshes. The particles of intermediate size being chosen, a few are placed on the warm stage, as in the case of wax, except that it is advisable to use a shallow cell to keep the thin glass cover from the resin. The focus having been adjusted, heat is applied so that the temperature shall rise a definite number of degrees per minute, say five. By so doing time is rendered a constant factor. The resin is kept continually in view until the sharp angles suddenly round off and a drop is formed. The following are some results:—

Resin from tolu	60° C.
Guaiacum resin	75° C.
Common resin	80° C.
Scammony resin from root	110° C.
Scammony resin from gum	125° C.
Tampico jalap resin	130° C.
Vera Cruz jalap resin	150° C.

It will be noticed that according to the above list the resin of scammony prepared from the root has a lower melting point than that prepared from the gum. The two resins are commonly asserted to be identical. Several specimens were examined, some prepared by myself, others guaranteed as genuine, and although by using various methods sundry melting points could be obtained, they invariably occupied the same order on a list. In one case thin glass tubes, about the size of a quill, were partially filled with the resins and plunged into mercury, so that the resin should be about 1 cm. below the surface of the metal, and heat applied; when the resin rose to view the temperature was noted. By the hot stage process as accurate results can be obtained as by any other, and it possesses the great advantage of requiring only a few milligrams of the resin for each determination.

The Melting and Subliming Points af Alkaloids.—These are now admitted data in their examination. Various methods have been suggested for taking them, perhaps the best being that of Mr. Wynter Blyth. He takes a porcelain crucible, nearly fills it with mercury or fusible metal; places a minute speck of the substance to be examined on a thin disc of microscopic covering glass and floats it on the metal; the cell is completed by a glass ring and upper disc. The crucible is supported on a hot plate, and is protected from the unequal cooling effects of currents of air by being covered with a flask from which the bottom has been removed. The neck of the flask conveniently supports a thermometer, which passes through a cork, its bulb being immersed in the bath of liquid metal. "In the first examination of a substance the temperature is raised somewhat rapidly, taking off the upper disc with the forceps at every 10°, and exchanging it for a fresh disc, until the substance is destroyed. The second examination is conducted much more slowly, and the discs exchanged at every 4° or 5°, whilst the final determination is effected by raising the temperature with great caution, and exchanging the discs at about the points of change (already partially determined) at every ½°. All the discs are examined microscopically."* This method is exceeding simple in application, but at the same time tedious; the chief objection seems to be that the apparatus has to be disturbed at every ½°, and this may interfere with the result.

Using the hot stage, above described, the process may be watched throughout, not once disturbing the parts, unless it be thought advisable to make a permanent slide for future reference, at any point. Moreover, the alkaloid and its sublimate can, in many cases, be alternately viewed by merely adjusting the focus.

The following results merely refer to a preliminary examination, and are not put forward as carried out to the tenth or even to half of a degree. The alkaloids examined were commercial specimens, and the presence of water, as water of crystallization and otherwise, may have considerably influenced the result. The subject is an exceedingly interesting one, and I hope to be able to pursue it much further. In no instance is it likely that the temperature mentioned is too low. Like evaporation in the case of liquids, sublimation in that of some solids appears to take place incessantly at all temperatures. The resultant sublimate, however, may not appear until after the lapse of some time.

The alkaloid to be examined is placed like the resin, the glass stage and cover being alternately focussed. The formation of a nebula will, in many cases, be apparent first to the unaided eye, magnification simply dispersing and making it less visible. As soon as the nebula is capable of resolution into dots or drops a high power may be used, but a ½ or 1 inch glass is quite powerful enough to resolve any sublimate worthy of the name, and these low power objectives can be focussed down to the glass stage without removing the cover.

Theine.—This body, which is asserted by various authors to yield a sublimate at points varying from 79·5° C. to 184·7° C., gave its characteristic sublimate in fair size crystals, at 65° C. It sublimed so quickly that it underwent no further change as the temperature increased.

Quinidine.—At a temperature of 75° C. melts (in its own water?), but soon after crystallizes again and does not further alter until 150° is reached, when droplets begin to condense on the cover glass; at 170° the mass again melts. No other change appears to take place until it darkens at 240° and further decomposes at 260°. The sublimate solidifies but does not crystallize.

Quinine.—At 150° C. a slight cloud, resolved by a high power into numberless droplets, forms on the cover glass, while the mass of the alkaloid on the stage throws out long acicular crystals, some of which are very curiously branched. As the melting point (about 170°) is neared, the particles heave and throb like living monsters and rapidly assume the fluid state. If the heating be continued for a short time the cover glass will be found coated with silky crystals, which hang in graceful festoons from its surface, a temperature of 200° giving the best results. Melted quinine solidifies if left undisturbed at about 125°.

Cinchonine.—Clouds at 160° C., and very slowly

* 'Practical Chemistry.' By A. W. Blyth, M.R.C.S., Griffin and Co. 1879. Page 285.

at 180° gives acicular crystals. The residue becomes a charred mass at 260°, but is completely enveloped in efflorescent crystals.

Cinchonidine.—Clouds at 160°, gradually forming a curious network of crystals. It melts at about 205° and remains liquid until cooled down to about 160°, when it suddenly becomes a mass of crystals. The solidification of this and other melted alkaloids can, however, be brought about at much higher temperatures by the introduction of a crystal or other nucleus.

Codeine.—Begins to sublime about 140° C. The sublimate appears as small drops, but, although the temperature be rising, these suddenly become massive irregular crystals. Codeine melts about 150°.

Morphine.—Begins to sublime about 150° C., forming but a slight cloud on the cover, and it is not until about 220° is reached that sublimation proceeds freely, and crystals form. At 240° the alkaloid melts and begins to brown.

Aconitine.—Melts at about 110° C., a slight cloud forming on the cover glass and gradually accumulating into drops, some of which eventually become crystals. The liquid alkaloid browns at about 180°. It cracks on cooling.

Veratrine.—Melts at about 140° C. Browns at 210°, only yielding a slight nebula on the cover, and this needs a high power to resolve it into dots.

Strychnine.—Sublimes slowly at 180° C. in short needle-like crystals; as the temperature rises to the melting point of the alkaloid, about 225°, sublimation proceeds more rapidly.

The sublimates of most of these alkaloids answer the same tests as the alkaloids themselves, but it would be interesting to make a more complete examination to ascertain if any constitutional change had been undergone, as it is well known that some of them, *e.g.*, morphine, are very much changed by being heated in closed tubes.

Sublimation of Inorganic Bodies.—Arsenious Anhydride.—By the hot stage I found that this substance sublimes slowly at 95° C. Beasley, in his 'Chemist and Druggist's Receipt Book,' 5th ed., p. 455, gives as the subliming point of arsenic 380° F. (=193° C.). A more recent writer gives it as 280° F. (=137·7° C.). But that both of these observations deviate more than 70° F. from the truth may be proved by anyone who cares to place a few milligrams of arsenic, enclosed between two watch glasses, over a water-bath; in time a distinct sublimate will condense on the upper glass, and, in point of fact, arsenic will be found to sublime slowly at 205° F.

Calomel.—Sublimes at 110° C. The sublimate consists of well defined crystals, belonging to the right rhombic prismatic system, not unlike those of Rochelle salts.

The following slides have been placed in the Library of the Pharmaceutical Society illustrative of this paper:—

Beeswax and other bodies showing fat crystals.

Potato starch, which has been subjected for forty hours to a temperature of 60°. This slide shows various stages of tumefaction in different granules.

Scammony resin, small particles before and after melting.

Sublimates of the following alkaloids:—Theine, quinine, cinchonine, cinchonidine, codeine, morphine, aconitine and strychnine. Also sublimates of calomel and arsenic.

These sublimates of the alkaloids must not be considered as wholly characteristic, but rather as forms into which most of them could be made to pass by suitable treatment. Polarized light affects them variously, and is sometimes useful for their early detection on the cover glass. Calomel crystals not only display brilliant colours under polarized light, but are themselves analytic, so that this effect can be obtained without the use of the upper Nicols prism.

NOTE ON ALUMEN, B.P.

BY W. WATSON WILL.

Ammonio-aluminic sulphate manufacture seems to have become a thing of the past and great difficulty is now experienced by pharmacists in obtaining it, the potassic salt having entirely taken its place. No doubt the consumption of alum from a pharmaceutical point of view is small in comparison to the enormous quantities used in the arts and manufactures of this country, but I think if there had been a persistent demand, however small, for ammonia alum, its manufacture would not have become obsolete. In a communication I had from Mr. R. King, of Glasgow, some time ago, he assured me there was no demand for ammonia alum, a statement fully endorsed by Mr. P. Spence, of Pendleton, in a note I had from him regarding this subject. Various have been the processes employed in the preparation of ammonia alum, some makers preparing the aluminum sulphate from aluminous schist or shale, others using clay or kaolin. The following is a brief *résumé* of one of the processes:—Shale of coal measures, previously calcined, is placed in iron vessels lined with lead, and sulphuric acid from an adjoining receiver is poured over it; the mass then allowed to digest at a temperature of 240° F., this degree of temperature being sustained by a fire underneath the vessels and also by steam and ammonia vapour being blown into the pan. The solution, after evaporating for some time, is poured into large coolers and strongly agitated to prevent formation of large crystals. The deposit of fine crystals, commonly called "flour alum" is now washed and redissolved by steam, and the solution run off into large vessels called "roaching casks" to crystallize. After seven or ten days the staves of these "casks" are taken off and a complete shape is left of crystallized alum. A few holes are made in the side of this mass, and the mother-liquors allowed to drain off; then it is broken and packed for sale. Other makers, instead of adding ammonia in a state of vapour, more generally used the chloride or sulphate made by neutralizing ammoniacal gas liquor with hydrochloric or sulphuric acid; the former of the two solutions was mostly used on account of the amount of iron contained in the crude aluminum sulphate. Following the latter of the two processes just mentioned, I would suggest a short mode for the preparation of ammonio-aluminic sulphate, easy in manipulation, adaptable to small laboratories, and satisfactory in result. Take of aluminum sulphate (cake alum) 14 lbs., ammonium sulphate 3½ lbs., warm water 4 gallons; dissolve the ammonium sulphate in half a gallon of water and the aluminum sulphate in the remainder, filter the solution to free it from the finely divided silica, and to the filtered liquid add the ammonia solution; then apply heat until the solution boils, pour off into a suitable vessel to crystallize. After a few days draw off the mother-liquor; then drain the crystals on a loosely stopped funnel. One hundred grains of ammonia aluminic sulphate made by this process, on being incinerated, left a residue which on cooling weighed 54 grains, corresponding to the requirements of the Pharmacopœia.

THE ACTIVE PRINCIPLES OF BUXUS SEMPERVIRENS.*

BY P. E. ALESSANDRI.

Box tree bark has already been the object of chemical research by Fauré, Pavia, and more recently Barbaglia of Pisa, who thought to extract from it an alkaloid which would be an efficient substitute for quinine. Pavia claimed the discovery of two alkaloids, which he named *buxine* and *parabuxine*. The supposed alkaloids, however, which the three above-named chemists believed they had extracted were really a mixture of resinous matters of a deep yellow colour. Thinking it necessary from these failures to change the method of extraction, the author used his oxalic acid process, which has already been described in the *Pharmaceutical Journal*, vol. xii., p. 993.

Dried and fresh leaves and bruised bark were macerated for twenty-four hours in a strong solution of oxalic acid. The clear yellow supernatant liquid was poured off and filtered, and gave the following reactions:—

Tests.	Precipitates.
Liquor ammoniæ	Greyish-yellow, copious.
Caustic soda	Greyish-yellow, moderate.
Sodic carbonate	Greyish-yellow, slight.
Liquor ammoniæ and tannic acid	Dirty-yellow, copious.
Platinum chloride	Yellowish-white.
Tincture of iodine	Brick-red.
Mercuric chloride	Yellowish-white.
Sodic phosphomolybdate	Dirty-yellow.
Fehling's liquid	Reduced by heat.

The solution was then fully precipitated by a slight excess of ammonia, the precipitate washed and dissolved in dilute acetic acid, a greenish substance remaining undissolved. The acetic solution was once more precipitated with ammonia and the precipitate dissolved in sulphuric acid, again precipitated and washed with dilute ammonia and dissolved in absolute alcohol, in which it dissolves without residue. The alcoholic solution obtained was evaporated, first in the air and then *in vacuo*, and left a residue analogous to that described by Fauré and Barbaglia.

The author found that by the same treatment the leaves and bark yielded different compounds; he consequently made two oxalic solutions, one with the pounded fresh leaves, the second with the pounded bark and small twigs. The first infusion in the cold was treated with sodic carbonate, and heated, and also with liquor ammoniæ.

In the first case the precipitate formed is but small, so the second process with ammonia was adopted. The precipitate being washed and filtered, it was dissolved in acetic acid and again precipitated and dissolved in alcohol, the alcohol evaporated and the residue treated with ether, which on being also evaporated gave a distinctly crystalline substance of a canary-yellow colour. The ether left behind it a soft, gummy, sticky substance, which, being allowed to remain exposed to the air, turned of a greyish-green colour and of a crystalline structure.

The canary-yellow crystalline principle extracted from the leaves dissolves pretty easily in water and ether, and freely in alcohol. It also dissolves readily in the mineral and vegetable dilute acids, giving well-marked crystalline compounds of a light-yellow colour, very bitter, and soluble in water. The sulphuric and hydrochloric solutions gave a precipitate with platinum chloride. The principle is precipitated of a light-yellow colour by phosphomolybdic acid, white with tannic acid, as a cloud with mercuric chloride, and brick-red with iodine. With the alcoholic and ethereal solutions these reactions are not so marked. With pure sulphuric acid it turns of a dark colour. With pure nitric acid it is transformed into a rose-coloured powder.

The oxalic solution made from the bark gave different results. The colour of the ammoniacal precipitate was greyish-yellow and dissolved entirely in dilute acetic acid. Precipitated by an excess of ammonia it gave a very light crystalline precipitate of a light flesh colour which dissolved completely in alcohol. By successive evaporations and treatment with ether a white substance is obtained which crystallizes in brilliant transparent scales.

This body is but little soluble in water and benzene, a little more so in chloroform and carbon disulphide and freely in alcohol and ether. It is also soluble in dilute acids, from which it is precipitable of white colour by ammonia. Tannic acid throws down a yellow precipitate, passing to deep orange; phosphomolybdic acid, white; tincture of iodine, brimstone; chloride of platinum, canary colour; potassic dichromate, canary, turning to orange; and mercuric chloride, white. Pure sulphuric acid turns it of a yellow colour, which disappears on the addition of water. Pure nitric acid gives immediately a reddish-purple colour, which passes into amaranth and then disappears. Treated with caustic potash ammonia is developed. With sulphuric acid and potassic dichromate, it gives a yellow precipitate, which becomes emerald green on heating.

The ethereal solution leaves behind another body formed of amber crystalline scales, very bitter and differing from the last-mentioned body in many particulars. It is soluble in cold dilute alcohol, slightly soluble in water, and insoluble in ether, benzene and chloroform. It is soluble in all the dilute acids and a precipitate is thrown down by ammonia when it is in great excess. Pure nitric acid turns it to a dirty brick-red; hydrochloric acid to a greenish hue, and sulphuric acid first to a dirty-red, and then to a dark-green.

The neutralized acid solution gives a white precipitate with tannic and phosphomolybdic acids and mercuric chloride, yellow with potassic dichromate and brick-red with tincture of iodine.

It is evident that we have to deal with three distinc principles which possess particular characters. The first the author has named *buxine*, the second, *buxeine*, and the third *parabuxine*.

The acetic solution, before referred to, from which the buxine has been precipitated by ammonia, will give a copious white precipitate with tannic acid which will also give a copious greyish-white precipitate with the residue of the oxalic solution remaining after its treatment with ammonia. After an excess of ammonia or potash has been added to the oxalic solution it is still precipitable by tannic acid; but the precipitate cannot be buxine, for with tannic acid this principle is thrown down of a yellowish-red colour.

The chemical and physical characters of the three principles, are as follows:—

	Buxine.	Buxeine.	Parabuxine.
Colour.	White.	Yellowish-white.	Purplish-red.
Structure.	Crystalline.	Crystalline.	Amorphous.
Solubility.	Slightly soluble in water; more so in alcohol; freely in ether.	Soluble in alcohol and ether; slightly so in water.	Freely soluble in water and alcohol, but insoluble in ether.
With HNO_3.	Turns reddish purple.	Turns greenish-yellow, and then brick-red.	Turns greenish-yellow, with no approach to red.
With H_2SO_4.	Turns brick red.	Turns blood-red.	Turns greenish-yellow, and then darkens.

* *Annali di Chimica*, April, 1882.

	Buxine.	Buxeine.	Parabuxine.
With H_2SO_4 and $K_2Cr_2O_7$.	Turns canary yellow in the cold. Gives a green cloud when hot that at once disappears.	An orange precipitate; when heated the precipitate dissolves and gives a green solution.	Gives no precipitate, but with heat gives a grass green cloud.

In the *Buxus sempervirens*, therefore, there are three special and distinct principles, viz., buxine in the bark, buxeine in the leaves, and parabuxine in both, but in the greatest quantity in the former. There appears to be comparatively little difference between buxine and buxeine, and it is just possible that further researches will prove them to be one and the same body; parabuxine, however, is sufficiently distinct from either in both its physical and chemical characters. On the exact nature of parabuxine the author declines for the present to give any decided opinion. It appears sometimes to have an acid reaction, but other experiments tend to prove the contrary. If it could be proved beyond a doubt that it was an organic acid it would explain why it clings so tenaciously to the buxine.

The last method adopted by the author for the extraction of buxine and parabuxine is as follows:—

1. Make a cold infusion of coarsely powdered box bark with a 2 per cent. solution of oxalic acid.
2. Filter and press after twenty-four hours, and exhaust the remaining bark with a fresh portion of oxalic solution, filtering, and press again.
3. Concentrate the infusion at a gentle heat, add ammonia in excess and allow the resulting precipitate to subside.
4. Collect the precipitate on a filter and treat with dilute acetic acid. Precipitate again with ammonia and wash with weak ammonia.
5. Treat the precipitate with hot alcohol and evaporate to one-third.
6. Shake up the residue with ether repeatedly.
7. Evaporate the ether and set aside the undissolved portion.
8. Dissolve again in acetic acid and precipitate. This process gives buxine in a nearly pure condition. This product is nearly white and may be entirely decolorized by animal charcoal, but a large quantity of the alkaloid is absorbed and lost in the process.
9. The portion undissolved by the ether is treated with acetic acid and mixed with the residual liquor of the first treatment.
10. Evaporate the acetic solution slowly down to one-half and treat with ammonia. Collect the yellowish magma on a filter. Evaporate the residual liquor down to one-half, precipitate, unite the two precipitates and wash with weak ammonia water.
11. Wash the magma with ether and dissolve the residue in pure alcohol. This alcoholic solution on evaporation yields nearly pure parabuxine.

Instead of acetic acid dilute sulphuric acid may be used for dissolving the first ammoniacal precipitate and the buxine thrown down with baryta water.

Analogous treatment of the pounded leaves gives buxeine.

The author denies that the alkaloid obtained by Fauré is buxine at all, but a mixture of heterogeneous substances.

Pavia worked with the leaves and twigs and obtained a mixture of buxine, buxeine and parabuxine, but in small quantities. Pavia's second process, in which sulphuric acid was used, did not give the pure alkaloid either, for the solvent dissolved out a number of products upon which a cold solution of oxalic acid has no action; besides which he only used the leaves and twigs and treated the precipitate he obtained with nothing but alcohol, which only gave him an impure mixture, which he took for true buxine.

Barbaglia followed an analogous process, but used sodic and calcic carbonate to precipitate the sulphuric acid solutions, the precipitate being dissolved in pure alcohol. This method of proceeding could not produce pure buxine, because sodic carbonate will not throw down the alkaloidal principles of box leaves or bark. Barbaglia by this means obtained a mixture, which he sought to purify by dissolving it in alcohol and pouring the resulting solution in a thin stream into distilled water. It is true that by this means a white glutinous deposit is formed; this is not pure buxine, however, but a mixture of that substance and parabuxine. This may be proved by a simple experiment which eluded Barbaglia's vigilance. The mixture containing the white precipitate is shaken up in a test-tube with absolute ether in excess. Part of the precipitate dissolves and the liquid divides into three layers. The top layer is ethereal, the middle layer contains a number of flocks, and the lowest is aqueous. The ethereal solution when evaporated yields pure white crystalline buxine, the aqueous solution contains impure buxine, and the red flocks are parabuxine.

The author claims to be the first to have obtained pure crystalline buxine, the so-called buxine obtained by Fauré, and others being a mixture of alkaloidal and glucosidal principles in proportion varying according to the source from which the substance was extracted, whether from the bark or leaves. Fauré and his successors all admit the existence of what they took to be a resin, in the alkaloidal mixture obtained by them, which could not be separated even by nitric acid, as recommended by Mayr. This supposed resin does not exist; what was taken for a resin is really the principle which the author has called parabuxine provisionally. This body is different in its physical and chemical characters to the parabuxine of Pavia, which was a mixture of buxine and true parabuxine.

The author concludes by remarking that now we have an easy method of obtaining buxine in a reasonable state of purity, the investigations of its value as a febrifuge may be carried on with more certainty than those made with Pavia's buxine, the efficacy of which as a substitute for quinine as an antiperiodic has been so often contested. The true chemical formula of buxine can now be established, and the question of its identity with bibirine, asserted by Walz and confirmed by Flückiger, who also states that it is identical with pareirine and paricine, definitively determined.*

The author promises to give us another paper detailing his researches into the chemical properties of a number of buxine salts and substitution compounds.

HOW BEESWAX IS MADE.†

BY W. Z. HUTCHINSON.

I presume that the majority of people who are not bee-keepers suppose that bees gather wax from some source, in the same way that they gather honey, pollen, and propolis. I once heard even a bee-keeper remark: "We had a nice spring day yesterday. My bees had a splendid 'fly,' and I noticed that some of them came in loaded with pollen and wax." That bees do not gather wax is easily proved by confining them in an empty hive or box, and feeding them on honey or a syrup made of sugar, when they will immediately commence the construction of combs. During the working season wax is secreted by the bees, and forms in thin white scales, or flakes, between the rings, or segments, of the abdomen. Such renowned scientists as Professors Agassiz and Tyndall have made some very amusing blunders (blunders which showed they had never seen bees building comb) in attempting to tell how honeycomb is built. The exact manner in which these little pellets of wax are formed into beautiful

* See *Pharm. Journ.*, [2], xi., 192.

† From the *Country Gentleman*. Reprinted from the *Oil and Drug News*, May 16, 1882.

white combs is well described in the 'A B C of Bee Culture':—

"If we examine the bees closely during the season of comb building and honey gathering, we shall find many of them with the wax scales protruding between the rings that form the body, and these scales are either picked from their bodies, or from the bottom of the hive or honey boxes in which they are building. If a bee is obliged to carry one of these wax scales only a short distance, he takes it in his mandibles, and looks as business-like with it thus as a carpenter with a board on his shoulder. If he has to carry it from the bottom of the honey box, he takes it in a way that I cannot explain any better than to say he slips it under his chin. When thus equipped, you would never know he was incumbered with anything, unless it chanced to slip out, when he will very dexterously tuck it back with one of his fore feet. The little plate of wax is so warm from being kept under his chin as to be quite soft when he gets back; and as he takes it out, and gives it a pinch against the comb where the building is going on, one would think he might stop awhile and put it into place; but not he, for off he scampers and twists around so many different ways, you might think he was not one of the working kind at all. Another follows him sooner or later, and gives the wax a pinch, or a little scraping and burnishing with his polishing mandibles, then another, and so on, and the sum total of all these manœuvres is that the comb seems almost to grow out of nothing; yet no bee ever makes a cell himself, and no comb building is ever done by any bee while standing in a cell. The finished comb is the result of the moving, restless mass, and the great mystery is that anything so wonderful can result at all from such a mixed-up, skipping-about way of working."

In every apiary should be a box or barrel in which to throw all waste comb, and the cappings that are shaved off the combs when extracting. When much transferring or extracting is done, considerable wax can in this manner be saved, and it is as easy to save it as it is to throw it away. During the hot weather these refuse combs and cappings should be melted up into wax quite often; otherwise they will become infested with the bee moth's larvæ, and thereby destroyed. There are several methods of melting up combs and cappings into wax, but I have tried none that is more simple, or better, than to make a bag out of some coarse sacking, fill it with pieces of comb, tie it up, and put it into a wash boiler. Set the boiler on the stove and fill it nearly full of water. When the water is almost hot enough to boil, take a stick and punch, poke and press the bag until the wax is all melted and risen to the top. Now lay a narrow strip of board across the top of the boiler, and tie it fast to the handles; then take two or three sticks that are nearly as long as the boiler is deep, press the bag down to the bottom of the boiler with these sticks, and keep it in this position by putting the upper end of the sticks under the strip of board that is fastened across the top of the boiler. Now set the boiler off the stove, and when its contents are cold, the wax can be taken off in one solid cake. In passing through the bag the wax is cleansed from all coarse impurities, while the fine particles of dirt that do escape will be found either upon the top or bottom of the cake of wax, from whence they can easily be removed.

When the combs and cappings have all been worked up, and the cakes of wax have been scraped free from all dirt or sediment, the cakes should all be put into the boiler, melted up together, and the wax run into neat cakes.

To clean utensils from beeswax, they should first be scraped with a knife as clean as possible, and then rubbed with a cloth saturated with kerosene oil. Beeswax is sometimes adulterated with paraffin, ceresin, or tallow. To detect these frauds, a piece of wax should be chewed; if adulterated, even slightly, with either, it will chew like gum, while if pure, it will crumble and break to pieces in the mouth, and will not make gum at all.

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Continued from page* 10.)

OLEUM LINI SULPHURATUM (*Sulphurated Linseed Oil*).

Linseed oil	1
Washed sulphur	6

Mix and heat them together, in a porcelain capsule, at a temperature between 120° and 130° C. (248° to 266° F.), under constant stirring, until the sulphur is dissolved.

A dark-brown liquid, having a yellow colour in thin layers, and completely soluble in oil of turpentine.

OLEUM TEREBINTHINÆ SULPHURATUM (*Sulphurated Oil of Turpentine*).

[Balsamum Sulphuris Terbinthinatum. Haarlem Oil.]

Sulphurated linseed oil	1
Rectified oil of turpentine	2

Mix and filter.

The product is a bright, red-brown oily liquid.

FERRUM DIALYSATUM IN LAMELLIS (*Dialysed Iron in Scales*).

Solution of dialysed iron	q.s.

Evaporate it to a syrupy consistence at a temperature of 40° to 60° C. (104 to 140° F.). Spread it upon glass and dry it by exposure to the air.

Red-brown scales, generally not entirely soluble in water, and containing 75 per cent of iron.

PASTA ESCHAROTICA (Canquoin's (*Canquoin's Caustic*)

	No. 1	2	3	4.
Chloride of zinc, parts	1	1	1	1
Wheat starch or linseed meal, parts	2	3	4	5

Mix them to a paste by means of water, roll it out, form it into suitable pieces, and deliver them in well-closed bottles.

The paste should be freshly made when wanted for use.

PEPSINUM (*Pepsin*).

Pepsin may be prepared from pigs' stomachs by washing the mucous coat, chopping it fine, and macerating it for two days with water acidulated with hydrochloric acid, or with a mixture of water and glycerin. The pepsin is precipitated from the solution either by a saturated solution of chloride of sodium or by alcohol; and precipitated pepsin is dried in a vacuum at a temperature below 40° C. (104° F.).

Pure pepsin is a brownish-yellow, amorphous, very hygroscopic mass, soluble in water and dilute acids. These solutions do not coagulate on boiling, and are scarcely precipitated by acetate of lead and chloride of platinum.

Commercial pepsin varies considerably in colour and hygroscopic property, according as it is mixed with different substances, as milk, sugar, etc. In general, good pepsin should respond to the following tests:—

Dissolve 0·1 gm. of pepsin in 100 gm. of distilled water, and 2 gm. of hydrochloric acid; then add 10 gm. of white of egg, coagulated at a temperature of 95° C. (203° F.). Let the mixture stand for forty-eight hours, occasionally shaking it, at a temperature of about 40° C. (104° F.). The white of egg should thereby be completely dissolved or the undissolved portion should not amount to more than 0·5 gm.

The more rapidly the white of egg is dissolved and the smaller a precipitate is produced in the solution by nitric acid, the better is the pepsin.

QUINIÆ CARBOLAS (*Carbolate of Quinine*).

[Quiniæ Phenylas.]

Carbolic acid	6
Quinine (alkaloid)	10
Alcohol (0·820)	30

Dissolve the carbolic acid in the alcohol, warm the

* From *New Remedies*, April, 1882.

solution, add to it the quinine, then filter, and evaporate the filtrate to dryness upon the water-bath.

The product is a white powder, soluble in 400 parts of water and in 80 parts of alcohol. It is rendered violet by solution of ferric chloride.

ZINCI PHOSPHIDUM (*Phosphide of Zinc*).

Phosphide of zinc occurs either in brittle lumps, having more or less a metallic lustre, or in form of a grey, metallic, fine powder, having an odour of phosphorus, permanent in the air, and of the specific gravity 4·7. When heated out of contact with air, it is completely volatilized; with access of air, it is converted into phosphate of zinc. Acids decompose it, setting free phosphoretted hydrogen, and forming the corresponding zinc salts. Alkalies leave it unaltered.

When examined by a lens, the salt should not show the presence of unaltered metallic zinc. *One* part of the finely-ground powder, covered with a solution of chloride of ammonium, and digested for one day, should yield a precipitate which, when collected on a filter and washed successively with water, strong alcohol, and ether, and dried in the air, should weigh at least 0·9 parts.

PHOSPHORUS PULVERATUS (*Powdered Phosphorus*).

Phosphorus, cut in pieces	q.s.

Drop the phosphorus into a flask half filled with a solution of chloride of sodium. Warm the mixture until the phosphorus melts. Then shake it until the liquid becomes cold. Pour off the solution of the salt and wash the powdered phosphorus thoroughly with water.

It should be preserved under water.

POMATUM DUPUYTREN (*Dupuytren's Pomade*).

Extract of cinchona fusca (cold prepared)	12
Lemon juice	6
Tincture of cantharides	6
Beef-tallow, fresh	96
Oil of bergamot	1

Dissolve the extract of cinchona in the lemon juice and tincture of cantharides, and add the other ingredients.

PULVIS CINCHONÆ SUCCIRUBRÆ (JAVANICÆ SEU INDICÆ). (*Powdered Red Cinchona* (*Javanese or East Indian*).)

The powder of any cultivated red cinchona bark, yielding at least 6 per cent. of total alkaloids. The quantity of the latter is to be ascertainded by the following process of assay:—

	Grams.
Bark of the stem of Javanese or East Indian red bark, in fine powder	10
Normal hydrochloric acid	10
Oxalate of potassium	0·15
Solution of soda (10 per cent.)	q.s.
Distilled water	q.s.
Acetic acid	q.s.

Macerate the powder with 30 gm. of distilled water and 10 gm. of normal hydrochloric acid during twelve hours, frequently stirring. When the froth is settled, transfer the mixture to a percolator, the lower orifice of which is closed by a linen pellet (or other contrivance), and percolate with distilled water, until a few drops of the liquid passing through are no longer rendered cloudy by solution of soda.

Mix the liquid carefully with dilute solution of soda until a slight cloudiness makes its appearance; then add just enough dilute acetic acid to cause the cloudiness to again disappear. Heat the clear liquid to near the boiling point, and add to it the oxalate of potassium dissolved in water. Filter off the resulting precipitate, wash it, and add to the filtrate an excess of soda solution.

Collect the resulting precipitate upon a double filter, wash it, first with dilute soda solution and afterwards with distilled water, until the washings are almost colourless. Dry the precipitate by exposure to air until it can be easily detached from the filter; then transfer it to a tared capsule, and dry it on the water-bath.

The weight of the precipitate multiplied by 0·041 gm. for every 100 cubic centimetres of mother-liquid and wash-water, indicates the quantity of total alkaloids in the 10 gm. of the powder.

N.B.—Normal hydrochloric acid is standardized upon normal solution of soda and this is standardized upon normal solution of oxalic acid.

Normal oxalic acid contains 63 gm. of the pure acid in 1000 c.c.

Normal soda solution contains 40 gm. of pure sodic hydrate in 1000 c.c.

Normal hydrochloric acid is made by mixing 120 gm. of hydrochloric acid (specific gravity 1·160) with about 750 cubic centimetres of distilled water, and trying how much normal soda solution is required to exactly neutralize 10 c.c. of this solution. From the figure obtained calculate the amount of distilled water which must be added so that it takes exactly 10 c.c. of the acid to neutralize 10 c.c. ol the alkaline solution.

FERRI SACCHARAS (*Saccharate of Iron*).

[Ferri Oxidum Saccharatum Solubile.]

Solution of chloride of iron (ferric) specific gravity 1·480	2
Syrup	2
Solution of soda (specific gravity 1·33), a sufficient quantity, or about	
Sugar	q.s.
Distilled water	q.s.

Mix the syrup with the solution of chloride of iron, and drop the mixture, while stirring, into so much solution of soda that the precipitate first formed is redissolved. Let the mixture stand for twenty-four hours; then pour the clear liquid into 30 parts of boiling distilled water, and let it deposit, after stirring it up.

Pour off the clear liquid from the precipitate, collect this upon a filter, and wash it with warm distilled water as long as it runs off colourless and has an alkaline reaction. Then let the precipitate drain, transfer it to a capsule, mix it with 9 parts of sugar, and dry the mixture, while stirring, on the water-bath, and finally add enough sugar to make the whole product weigh 10 parts.

Saccharate of iron is a brown-red powder, having a sweet, faintly metallic taste, and, when mixed with 5 parts of water, dissolving to faintly alkaline liquid. The reaction for iron compounds is not developed in this liquid until it has been acidulated by hydrochloric acid.

It contains 3 per cent. of iron, and should be preserved in well-closed vials.

SAL CARLSBADENSE FACTITIUM (*Artificial Carlsbad Salt*).

Sulphate of sodium, dried and powdered	46
Bicarbonate of sodium, powdered	42
Chloride of sodium, powdered	20
Sulphate of potassium, powdered	3

Mix and keep in a well-stoppered bottle.

QUINIÆ SALICYLAS (*Salicylate of Quinine*).

Hydrochlorate of quinine	15
Salicylate of sodium	6
Distilled water	q.s.

Dissolve the hydrochlorate of quinine in 600 parts of boiling distilled water, and add to it a solution of the salicylate of sodium in 20 parts of distilled water. Collect the precipitate, after cooling, on a filter, wash it until the washings are no longer rendered turbid by nitrate of silver, and dry it with a gentle heat.

The salt may be obtained in crystals by dissolving it in strong alcohol and concentrating.

When crystallized from alcohol, the salt appears in silky needles; when obtained as a precipitate, it is a white, amorphous powder, soluble in about 900 parts of cold water and in 20 parts of stro ng alcohol.

The aqueous solution has a fluorescence, which increases very much by adding dilute sulphuric acid. Addition of solution of ferric chloride renders the solution dark violet.

(*To be continued*).

The Pharmaceutical Journal.

SATURDAY, JULY 8, 1882.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

A MEDICAL VIEW OF THE LEGITIMATE RELATIONS BETWEEN MEDICINE AND PHARMACY.

Now that attention is being largely directed to the achievement of reforms in regard to the practice of medicine and of pharmacy, as well as to improvement of the systems of education by which students are trained for either career, it is with special interest that we have read a letter in a late number of the *Lancet*, in which the proper lines of distinction between the practice of medicine and the practice of pharmacy are sketched out by a writer who signs himself an M.D. of the University of Edinburgh. At the present time the improvement of the social status of medical practitioners is acknowledged to be a desideratum, and it is also acknowledged that the means by which such a result is most likely to be attained is suitable modification of the educational system. Precisely the same requirements are recognized in regard to those engaged in the practice of pharmacy, but it has not been sufficiently taken into consideration that for the success of either project it is necessary to bestow some care upon the regulation of medical and pharmaceutical practice, so as to do away with, or at least to diminish that confusion of the one with the other which is almost peculiar to this country and has been a source of much embarrassment.

It is to this point that the letter we have referred to is directed, and we are glad to take the opportunity of placing before our readers the views of a medical man upon the subject, feeling sure that they will in many respects meet with hearty concurrence from them as they do from ourselves. It is, in the opinion of our contemporary's correspondent, high time that some serious inquiry was made whether or no any laborious education and high-class degree are likely to reconcile the owners of such with their position as *confrères* of the majority of their profession who are at present engaged in the compounding and sale of drugs. According to his view of the case the time has arrived when the necessity for medical men dispensing their own drugs no longer exists, and in seeking to ascertain the causes for the maintenance of such a "miserable practice," he comes to the conclusion that the first and foremost of them is the fact that our English students look, as a rule, to the possession of a qualification to be obtained from a trading company as their highest ambition in medicine. Another reason that he assigns for the continuance of the practice of dispensing by medical men is the fact that those who carry it on are "catering for popularity by the sale of cheap physic." As regards those who cannot otherwise keep their patients, however, it is maintained that they have mistaken their vocation; they would have done better to take to trade, and they surely pay themselves but a poor compliment when they acknowledge that without their cheap physic their services would be in no request.

With this expression of opinion from a medical practitioner's point of view there will be, we are confident, a very general concurrence on the part of those engaged in the practice of pharmacy and from their point of view the separation of medical from pharmaceutical practice will be regarded as one of the most essential conditions for the advancement of pharmacy. In this respect there is a perfect harmony between pharmacists and the views enunciated by the Edinburgh physician. But it is very frequently asserted that there is some difficulty in the way of medical practitioners giving up the preparation of their medicine and on this point, therefore, it is desirable to hear what is said by the authority we have quoted. As a traveller over the greater part of the world he speaks from his own experience of the position that medical men occupy in different countries, and his conclusion is that nowhere is the social position higher than it is in Edinburgh. But in that city he adds that out of the very great number of medical men residing in it no such thing is known as a man sending out his own medicine. In regard to the alleged necessity for medical men dispensing their own drugs in some places, it is urged that this arises only from the fact that in such places there is an apothecary wishing to be considered a medical practitioner, but not too proud to cater for popularity by the sale of cheap physic; if the apothecary ceased to undersell the legitimate tradesman, a chemist and druggist would soon appear upon the scene for the supply of what was needed.

In thus tracing back some of the worst grievances of the pharmacists of modern times to the apothecaries of a past age the writer of this letter has taken the same view of the matter that we have frequently expressed in this Journal, not only in regard to medical dispensing, but also in regard to counter prescribing, and it is by the removal of those prejudicial legacies of their predecessors that the pharmacists of the present must seek to establish a more natural and mutually advantageous relation between themselves and medical men. But while expressing our satisfaction at finding an admission on the part of a medical man that dispensing is properly the business of the pharmacist, and that to him should be left everything that has to do with the preparation of medicine, we cannot but regret the evidently contemptuous feeling with which the writer of the letter referred to regards the pharmacist as compared with a member of the class to which he belongs himself. It may be that this state of mind is one of the consequences of that inharmonious relation between medical and pharmaceutical practitioners which is to a great extent prevalent in this country as well as peculiar to it. Therefore it is not surprising to find the pharmacist spoken of as a mere tradesman having no right to look for more than an ordinary trade profit any more than a grocer. But as this view of the position of the pharmacist in relation to the medical practitioner is not one common in other countries it might have been expected that the travelling experiences of the Edinburgh physician who writes in the *Lancet* would have enabled him to form a more liberal estimate of the pharmacist's claim to recognition as something different from a "petty tradesman." In this respect, however, much has to be learnt and to be established on both sides before we can congratulate ourselves upon the existence of such relations of mutual respect and intelligent recognition as are to be found in various other countries regulating the conduct of medical men and pharmacists towards each other.

THE PHARMACOPŒIA COMMITTEE OF THE MEDICAL COUNCIL.

At the late meeting of the Medical Council a Report was presented by the Pharmacopœia Committee. On a previous occasion the Council had passed a resolution to the effect that the Pharmacopœia Committee should report to the Council, year by year, as to addenda, and in the Report now presented it is stated that after due inquiry the Committee has not obtained sufficient information to enable it to report in accordance with the terms of that resolution. The Report further states that the present stock of the last edition of the Pharmacopœia amounts to 2550 copies, and that the average sale is about 1000 copies, from which data it is assumed that a fair estimate may be formed as to the period at which it will become necessary to supply a new edition. With a view to providing for the publication of such a future edition of the Pharmacopœia, the Committee recommends that the Pharmacopœia Committee be a Standing Committee until the issue of the work, and further that the Committee be authorized to appoint from amongst its own members a Sub-Committee, assigning to it such duties as may be thought fit, and to take such other steps as may be necessary for fulfilling the duties appertaining to the work; also that a sum not exceeding £100 per annum should be placed at the disposal of the Committee. The adoption of this Report was moved by Dr. Pitman and seconded by Dr. A. Smith, and agreed to. In reply to a request by Dr. Storrar for detailed information as to what the Committee proposed to do, Dr. Quain said it was proposed that the Sub-Committee should appoint editors, who would draw up a report to be submitted to the Council, pointing out what should be done with regard to the Pharmacopœia. Until such reports came before the Council no steps could be taken towards issuing the new edition of the work. Mr. Senior expressed a hope that at least one of the editors would be a person well acquainted with pharmacology abroad.

PERSONATION AT EXAMINATIONS.

At one of the sittings of the Medical Council last week, the subject of the possibility of personation at examinations was brought forward by Mr. Macnamara, who mentioned that some time ago it came to the knowledge of the Branch Council of Ireland that a sum of two hundred pounds had been offered to a practitioner by a student to pass some of the examinations for him that he might obtain registration. About the same time also information had reached the College of Surgeons that a certain student, whose name had figured at the top of the preliminary examination list, had been absent from Ireland at the time of the examination in which he had been supposed to have thus distinguished himself. Mr. Macnamara further spoke of a "successful grinder" who kept a student for the purpose of passing preliminary examinations, and adduced the deficiency in general education manifested in later examinations in support of his opinion that so long as the present plan of conducting the examinations was followed there would be no security against such personations. This view was to some extent adopted by Dr. Haughton and Mr. Teale, the latter saying that the deficiency in spelling and in Latin exhibited by many candidates was shocking. Eventually a resolution was passed to the effect that it is desirable that the Medical Council should know what provisions, if any, are taken to ensure the impossibility of personation at the examinations of the several bodies, the certificates of which are accepted by it as evidence of preliminary examination, and that the Executive Committee should be requested to inquire into and report upon the subject.

FRENCH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The eleventh meeting of the French Association for the Advancement of Science is to be held in La Rochelle, where it will commence on the 24th of August and terminate on the 31st. Persons wishing to read papers before the Congress should communicate either with Dr. Gariel, Secretary to the Council, 4, Rue Antoine-Dubois, Paris, or to M. Caillot, General Secretary to the Local Committee, La Rochelle.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, July 5, 1882.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Gostling, Greenish, Hampson, W. Hills, Radley, Robbins, Savage, Schacht, P. W. Squire, Symes, Williams and Young.

The minutes of the previous meeting were read and confirmed.

INAUGURAL ADDRESS.

The PRESIDENT announced that Mr. Joseph Ince had consented to deliver the inaugural address to the students in October next, in accordance with the unanimous request of the Council.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Shephard, William Arthur.
Short, Frederick William.

ELECTIONS.

MEMBER.

Pharmaceutical Chemist.

Frederick William Short, having passed the Major Examination and tendered his subscription for the current year, was elected a "Member" of the Society.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Darch, Alfred ....London.
Warburton, Walter ....Swinton.

Modified.

Nutt, Archbell James ....London.

ASSOCIATES.

The following, having passed their respective examination and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Minor.

Bird, Frederick Charles John...Bath.
Coates, Udolphus Aylmer ......Walsall.
Dangerfield, William Henry ...Devizes.
Hall, John Thomas ....Manchester.
Hill, Arthur ....Leicester.
Lowther, Thomas William ......Cardigan.
Mills, Anne Emily ....Herne Hill.
Spencer, George ....Hitchin.
Wilkins, Edward ....Reading.
Wilcocks, Arthur Squire.........Portsea.

Modified.

Twiss, William ....Hunstanton.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Ayre, Harry ....Darlington.
Cullwick, Herbert Ernest ......Knighton.
Oram, Frank.........................Totnes.
Pattison, Sydney ....London.
Reynolds, Richard Freshfield...Leeds.
Surman, Thomas William ......Bristol.
Taggart, Robert ....Glasgow.
Williams, John Owen ....Anglesey.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

RESTORATION TO THE REGISTER.

The names of the following persons, who had made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

David Davies, 44, Regent Street, Liverpool.
Joshua Hughes, Abercarn, Monmouthshire.

APPOINTMENT OF PROFESSORS.

Professor Redwood was reappointed Professor of Chemistry and Pharmacy for the ensuing year.

Professor Bentley was reappointed Professor of Botany and Materia Medica for the ensuing year.

Professor Attfield was reappointed Professor of Practical Chemistry for the ensuing year.

THE COUNCIL EXAMINATION PRIZES.

On the motion of the PRESIDENT, seconded by the VICE-PRESIDENT, Mr. Gibson (Leven) and Dr. W. Inglis Clark (Edinburgh) were appointed to conduct the examinations in the present month, for the Council examination prizes.

REPORTS OF COMMITTEES.

FINANCE.

The report of this Committee was received and adopted, and sundry accounts were ordered to be paid.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to a former associate in business.

£10 to a registered chemist and druggist, aged 63.

£5 to a registered chemist and druggist, who has had two previous grants of £10 each.

£5 towards the support of an orphan who was unsuccessful at a recent election to an orphan asylum, the Secretary not having expended the money voted for the purpose, as he did not think it would ensure the election.

One other application had been deferred for further consideration.

The report and recommendations were received and adopted.

The SECRETARY announced that Mr. Thomas Buck, of Stamford Hill, had given a further donation of five guineas to the Benevolent Fund, making a total of one hundred and five guineas (£110 5*s.*)

LIBRARY, MUSEUM, LABORATORY AND HOUSE.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
May	Day . . .	344	22	7	13
	Evening . .	131	14	2	6

	No. of Entries.		
Circulation of books.	Town.	Country.	Total.
May	175	169	344

Carriage paid, £2 8*s.* 0½*d.*

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Attfield (Professor), Pamphlet on the Relation to each other of Education and Examination, especially with regard to Pharmacy in Great Britain, 2nd ed., 1882. 2 *copies.* From the AUTHOR.

Squire's Companion to the British Pharmacopœia, 13th ed., 1882. 2 *copies.* From Mr. P. WYATT SQUIRE.

Thorowgood (J. C.), Student's Guide to Materia Medica and Therapeutics, in accordance with the British Pharmacopœia, 2nd ed., 1882. From the AUTHOR.

Pharmacopœia of the United States of America, 1820.

Pharmacopœia of the Massachusetts Medical Society, 1808.

Bigelow (J.), Treatise on the Materia Medica, 1822.

Thacher (J.), American New Dispensatory, 2nd ed., [1813]. From Dr. B. F. DAVENPORT.

Constable (H. S.), Our Medicine Men.

Constable (H. S.), Fashions of the day in Medicine and Science, 1879. From Mr. W. Young.

Méhu (C.), Nouvelle méthode d'extraction de la matière grasse des urines dites chyleuses, 1882. From the Author.

The Committee recommended the purchase of the undermentioned works:—

Babington (C. C.), Manual of British Botany, 8th ed., 1881.

Jackson (B. D.), Literature of Vegetable Technology, 1882.

Kilner (W. B.), Compendium of Modern Pharmacy and Druggists' Formulary, 2nd ed., 1881.

Linnean Society of London, Transactions.

Oldberg (O.), Unofficial Pharmacopœia, 1881.

Pharmacopœia of the London Hospital, 1882.

Whitla (W.), Elements of Pharmacy, Materia Medica and Therapeutics, 1882.

The Committee also recommended that the Library and Museum be closed in the evening during August, and entirely for repairs during September.

Curator's Report.

The Curator had reported the average attendance in the Museum to have been—

		Total.	Highest.	Lowest.	Average.
May	Morning	258	25	3	11
	Evening	76	9	0	4

The following donations to the Museum had been received and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

African "Quina" Bark. From Messrs. Evans, Lescher and Webb.

Crystals of Ammonio-Chloride of Iron. From Dr. Prosser James.

Herbarium Specimens of Balsamodendron Roxburghii, Artemisia Sieversiana, and Origanum Majorana, used by the Portuguese in India; Root of *Gloriosa superba*; Fruit of *Randia uliginosa*. From Dr. Dymock, of Bombay.

Fresh Bael Fruits. From Mr. P. W. Squire.

Leaves of the Deer Tongue (*Liatris odoratissima*); *Euphorbia pilulifera*, and tincture of the herb. From Messrs. Burgoyne, Burbidges, Cyriax and Farries.

The Curator had submitted estimates for printing the Catalogue of the Hanbury Collection in the Museum of the Society.

Application for specimens from the Museum for scientific investigations had been received from Professor Bayley Balfour and Mr. W. H. Symons, also an application for a few specimens for a local museum at Bolton, through Mr. Woolley. The requests had been acceded to.

The Professors had attended the Committee and reported satisfactorily of their respective classes.

The list of Local Secretaries had been revised.

The details of painting and cleaning to be done during the recess had been considered, and an estimate for a new Council table had been obtained.

The Council went into committee to consider the details of the proposed alterations in ventilation of the Council room, etc.

On resuming, the report and recommendations of the Committee were received and adopted.

Deputation to the Privy Council.

The Council then went into committee for the purpose of enabling the President to state in detail what had passed on the previous day between a deputation of the Council, consisting of the President, Vice-President, Messrs. Bottle, Greenish, Hampson, Schacht and Williams, and the Lords of the Privy Council on the subject of the sale of poisons.

Local Secretaries.

The following list of Local Secretaries, submitted by the Library, Museum and Laboratory Committee, which had been further revised by the President and Secretary, was submitted:—

List of Local Secretaries, 1882–83.*

Towns eligible.	Names of persons appointed.
Aberdare	Thomas, Watkin, J.
Aberdeen	Davidson, Charles.
Abergele	Hannah, John.
Aberystwith	Wynne, Edwin Price.
Abingdon	Smith, William.
Accrington	Sprake, David Lewis.
Altrincham	Hughes, Edward.
Andover	Gould, Robert George.
Ashbourne	Reckless, Arthur Henry.
Ashton-under-Lyne	Bostock, William.
Aylesbury	Turner, John.
Ayr	
Banbury	Ball, George Vincent.
Banff	Ellis, Bartlett.
Bangor	Baker, Henry Villars.
Barnsley	Badger, Alfred.
Barnstaple	Goss, Samuel.
Barrow-in-Furness	Steel, Thomas.
Bath	Commans, Robert Dyer.
Beaumaris	
Bedford	Anthony, John Lilley.
Belper	Calvert, James.
Berwick	Carr, Walter Paterson.
Bewdley	
Birkenhead	Nicholson, Henry.
Birmingham	Southall, William.
Bishop Auckland	Dobinson, Thomas.
Blackburn	Farnworth, William.
Bodmin	Williams, Joel Drew.
Bolton	Dutton, Francis.
Boston	Fowler, Wm. Ratcliffe.
Bournemouth	Duncan, Alexander.
Bradford (Yorkshire)	Rimmington, Felix M.
Brecon	Meredith, John.
Bridgnorth	Deighton, Thomas Milner.
Bridlington	Jackson, Henry John.
Bridport	Beach, James.
Brighton	Gwatkin, James Ross,
Bristol	Stroud, John.
Buckingham	
Burnley	Cowgill, Bryan H.
Burslem	Blackshaw, Thomas.
Bury	Bowker, Ellis.
Bury St. Edmunds	Summers, Frank.
Buxton	Thresh, John Clough.
Calne	
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Hollway, Albert Brown.
Cardigan	Jones, John Edward.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, Richard Morgan.
Carnarvon	Lloyd, William.
Chatham	Crofts, Holmes Cheney.
Chelmsford	Baker, Charles Patrick.
Cheltenham	Smith, Nathaniel.
Chester	Baxter, George.
Chesterfield	Windle, John T.
Chichester	Long, William Elliott.
Chippenham	Coles, John Coles.
Christchurch	Green, John.
Cirencester	Mason, Joseph Wright.
Clitheroe	
Cockermouth	Bowerbank, Joseph.
Colchester	Cordley, William Bains.
Congleton	Goode, Charles.
Coventry	Hinds, James.
Cricklade	
Croydon	Barritt, George.
Darlington	Robinson, James.

* Local Secretaries are appointed in all towns in Great Britain which return a Member or Members to Parliament, and in such other towns as contain not less than three Members of the Society or Associates in Business.

Towns eligible.	Names of persons appointed.
Deal	Green, John.
Denbigh	Edwards, William.
Derby	Goodall, Henry.
Devizes	Edwards, Thos. Roberts.
Devonport	Codd, Francis.
Dewsbury	Matterson, Edward H.
Diss	Gostling, Thomas Preston.
Doncaster	Howorth, James.
Dorchester	Evans, Alfred John.
Dorking	Clift, Joseph.
Dover	Bottle, Alexander.
Droitwich	Taylor, Edmund.
Dudley	Gare, Charles Hazard.
Dumfries	Allan, William.
Dundee	Hardie, James.
Dunfermline	Seath, Alexander.
Durham	Sarsfield, William.
Eastbourne	Crook, Herbert.
Edinburgh	Stephenson, John B.
Elgin	Robertson, William.
Ely	Pate, Henry Thomas.
Evesham	Dingley, Richard Loxley.
Exeter	Delves, George.
Exmouth	Laugher, William.
Eye	Bishop, Robert.
Falkirk	Murdoch, David.
Falmouth	Newman, Walter Francis.
Fareham	Batchelor, Charles.
Faversham	Lanfestey, William G.
Flint	Jones, Michael.
Folkestone	Goodliffe, George.
Forfar	Ranken, James A.
Frome	
Gainsborough	Spouncer, Henry Thomas.
Gateshead	Elliott, Robert.
Glasgow	Kinninmont, Alexander.
Gloucester	Ward, Joseph.
Gosport	Hunter, John.
Grantham	Cox, John.
Gravesend	Bulgin, William.
Greenock	McNaught, Archibald.
Grimsby, Great	Cook, Robert, junior.
Guernsey	Arnold, Adolphus.
Guildford	Martin, Edward W.
Haddington	Watt, James.
Halifax	Dyer, William.
Harrogate	Davis, R. Hayton.
Hartlepool	Jackson, William G.
Harwich	Bevan, Charles F.
Hastings and St. Leonards	Bell, James Alfred.
Haverfordwest	Saunders, David Price.
Hawick	Craig, John.
Helston	Wakeham, Charles.
Hereford	Williams, Walter.
Hertford	Lines, George.
Hexham	Gibson, John Pattison.
Heywood	Beckett, William.
Horsham	Williams, Philip.
Huddersfield	King, William.
Hull	Bell, Charles Bains.
Huntingdon	Provost, John Pullen.
Huntly	Chalmers, George.
Hyde	Wild, Joseph.
Hythe	Lemmon, Robert Alce.
Inverness	Galloway, George Ross.
Ipswich	Anness, Samuel Richard.
Jersey	Ereaut. John, jun.
Kendal	Severs, Joseph.
Kidderminster	
Kilmarnock	Borland, John.
King's Lynn	Palmer, William Joseph.
Kingston-on-Thames	Walmsley, Samuel.
Kirkcaldy	Storrar, David.
Knaresborough	Potter, Charles.
Lancaster	Bagnall, Wm. Henry.

Towns eligible.	Names of persons appointed
Launceston	White, Thomas.
Leamington	Davis, Henry.
Leeds	Reynolds, Richard.
Leek	Johnson, William.
Leicester	Clark, Walter Beales.
Leighton Buzzard	Readman, William.
Leith	Finlayson, Thomas.
Leominster	Davis, David Frederick.
Lewes	Martin, Thomas.
Lichfield	Perkins, John Jaquest.
Lincoln	Maltby, Joseph.
Liskeard	Young, Richard.
Liverpool	Symes, Charles.
Llandudno	Penney, William Sealy.
Longton	Prince, Arthur G.
Loughborough	Paget, John.
Louth	Hurst, John B.
Lowestoft	Sale, Thomas J.
Ludlow	Woodhouse, George.
Lyme Regis	Thornton, Edward.
Lymington	Allen, Adam U.
Macclesfield	Bates, William Isaac.
Maidstone	Rowcroft, A. E.
Maldon	Wallworth, David.
Malmesbury	Brown, Francis James.
Malton	Buckle, James.
Malvern	Metcalfe, Edmund Henry.
Manchester, etc.	Wilkinson, William.
March	Davies, Peter Hughes.
Margate	Candler, Joseph Thomas.
Marlborough	
Marlow	
Merthyr Tydvil	Smyth, Walter.
Middlesborough	Buck, Thomas.
Midhurst	Cowap, Samuel Evan.
Monmouth	Key, Hobson.
Montgomery	
Montrose	Burrell, George.
Morpeth	Marshall, George T.
Neath	Hibbert, Walter.
Newark	March, William.
Newbury	
Newcastle-under-Lyme	Cartwright, William.
Newcastle-on-Tyne	Martin, Nicholas H.
Newport (I. of Wight)	Orchard, Herbert Joseph.
Newport (Mon.)	Seys, James Ancas.
New Radnor	
Newtown	Owen, Edward.
Northallerton	Warrior, William.
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	Fitzhugh, Richard.
Nuneaton	Iliffe; George.
Oldham	Hargraves, H. Lister.
Oswestry	Evans, John.
Over Darwen	Shorrock, Ralph.
Oxford	Prior, George Thomas.
Paisley	Hatrick, William.
Pembroke	Treweeks, Rich. Harwood.
Penrith	Kirkbride, William.
Penzance	Cornish, Henry Robert.
Perth	
Peterborough	Heanley, Marshall.
Petersfield	Edgeler, William B.
Plymouth	Hearder, Henry P.
Pontefract	Bratley, William.
Poole	Penney, William.
Portsmouth, etc.	Childs, James L.
Preston	Barnes, Lawrence R.
Ramsgate	Morton, Henry.
Reading	Hayward, Wm. Griffith.
Redditch	Mousley, William.
Retford	Clater, Francis.
Richmond (Yorks)	Thompson, John Thomas.
Ripon	Judson, Thomas.

Towns eligible.	Names of persons appointed.
Rochdale	Taylor, Edward.
Rochester	Harris, Henry William.
Rugby	Chamberlain, Arthur G.
Ryde (Isle of Wight)	Pollard, Henry Hindes.
Rye	Waters, William Allen.
St. Albans	Ekins, Arthur Edward.
St. Andrews	Govan, Alexander.
St. Austell	Hern, William Henry.
St. Ives (Cornwall)	Young, Tonkin.
Salisbury	Atkins, Samuel Ralph.
Sandwich	Baker, Frank.
Scarborough	Whitfield, John.
Seacombe	Walker, John Henry.
Selby	Cutting, Thomas John.
Shaftesbury	Barry, Frederic.
Sheerness	Bray, John.
Sheffield	Ward, William.
Shields, South	Mays, Robert J. J.
Shoreham	Fenner, Edwin.
Shrewsbury	Cross, William Gowen.
Slough	Griffith, Richard.
Southampton	Dawson, Oliver R.
Southport	Ashton, William.
Spalding	Shadford, Major.
Stafford	Averill, John.
Stalybridge	Brierley, Richard.
Stamford	
Stirling	Duncanson, William.
Stockport	Kay, Samuel.
Stockton-on-Tees	Brayshay, Thomas.
Stoke-on-Trent	Adams, Frank.
Stourbridge	Bland, Thomas Frederick.
Stratford-on-Avon	Hawkes, Richard.
Stroud	Blake, William F.
Sunderland	Harrison, John.
Swansea	Grose, Nicholas M.
Tamworth	Allkins, Thomas Boulton.
Taunton	Gregory, George Henry.
Tavistock	Gill, William.
Teignmouth	Cornelius, Joseph.
Tenby	Davies, Moses Prosser.
Tewkesbury	Allis, Francis.
Thirsk	
Tiverton	Havill, Paul.
Torquay	Smith, Edward.
Totnes	Michelmore, Philip W.
Truro	Percy, Thomas Bickle.
Tunbridge Wells	Howard, Richard.
Tynemouth	Stobbs, Robert.
Uttoxeter	Johnson, John Borwell.
Wakefield	Wice, Jonathan H.
Wallingford	Payne, Sidney.
Walsall	Bate, Joseph William.
Wareham	Randall, Thomas.
Warrington	Greenough, Hugh F.
Warwick	Pratt, Henry.
Watford	Chater, Edward Mitchell.
Wednesbury	Gittoes, Samuel James.
Wenlock	Botwood, Charles W.
Westbury	Taylor, Stephen.
West Bromwich	Stamps, Frederic.
Weston-super-Mare	Gibbons, George.
Weymouth	Groves, Thomas Bennett.
Whitby	Stevenson, John.
Whitehaven	Kitchin, Archibald.
Wick	Miller, Kenneth.
Wigan	Phillips, Jonathan.
Wigton	
Wilton	
Winchester	Hunt, Richard.
Windsor	Russell, Charles J. L.
Wolverhampton	Brevitt, William Yates.
Woodbridge	Betts, John.
Woodstock	
Worcester	Virgo, Charles.
Worthing	Cortis, Arthur Brownbill.
Wrexham	Edisbury, James Fisher.
Wycombe	Furmston, Samuel C.
Yarmouth, Great	Poll, Wm. Sheppard.
Yeovil	Maggs, Thomas Charles.
York	Davison, Ralph.

Mr. YOUNG raised the question whether it was necessary to appoint a Local Secretary for Edinburgh.

The Council went into committee to discuss the matter. On resuming,

Mr. YOUNG said he did not wish to divide the Council upon the question, and on the assurance of the President that the matter should be further considered before the appointments were made next year, the list as submitted was unanimously approved.

LOCAL EXAMINATIONS.

The SECRETARY presented the following table showing the attendance of candidates at the various centres for the last eleven examinations:—

PRELIMINARY EXAMINATION.

List of Centres and Table of Attendances of Candidates at each Centre.

	1880. Jan., Apr., July, Oct.	1881. Jan., Apl., July, Oct.	1882. Jan.	1882. Apr.	1882. July.	Total number of attendances at each centre at 11 examinations.
ENGLAND AND WALES						
Birmingham	72	62	15	17	15	181
Brighton	9	11	3	6	6	35
Bristol	41	38	9	10	9	107
Cambridge	14	18	7	8	3	50
Canterbury	19	19	2	4	2	46
Cardiff	23	29	8	5	10	75
Carlisle	26	27	8	5	9	75
Carmarthen	20	33	12	11	11	87
Carnarvon	25	15	5	6	6	57
Cheltenham	9	6	2	2	4	23
Darlington	22	23	1	5	5	56
Exeter	32	25	10	9	6	82
Hull	26	23	8	5	10	72
Lancaster	29	14	7	5	8	63
Leeds	53	57	13	13	24	160
Lincoln	35	29	10	7	7	88
Liverpool	50	44	6	9	10	119
London	170	147	36	47	54	454
Manchester	89	76	27	24	31	247
Newcastle	43	31	10	16	9	109
Northampton	17	17	2	6	4	46
Norwich	39	23	5	8	8	83
Nottingham	50	37	0	14	10	111
Oxford	9	7	2	3	2	23
Peterborough	15	15	10	5	5	50
Sheffield	24	24	5	8	8	69
Shrewsbury	20	25	4	2	7	58
Southampton	21	27	9	7	9	73
Truro	9	20	6	10	3	48
Worcester	9	11	4	3	2	29
York	25	34	6	12	9	86
SCOTLAND.						
Aberdeen	40	43	14	12	17	126
Dundee	23	33	7	10	9	82
Edinburgh	73	88	15	21	22	219
Glasgow	32	39	11	6	10	98
Inverness	10	12	3	1	1	27
Douglas, I. of Man	—	—	1	—	2	3
Guernsey	2	3	1	1	3	10
Jersey	2	1	—	—	—	3

It was resolved that Superintendents be appointed at the above-mentioned centres, and that the appointments be offered in the first instance to the Local Secretaries in the respective places, with the exception of London.

Reports of Committees—*continued.*

LAW AND PARLIAMENTARY.

The report of this Committee dealt with a communication from the Colonial Office, relating to an ordinance to regulate the dispensing and sale of drugs and poisons in St. Lucia, and stated that the following letter had been sent in reply:—

"Pharmaceutical Society of Great Britain,
"17, Bloomsbury Square, London, W.C.,
"*June* 22*nd*, 1882.

"Robert G. W. Herbert, Esq.,
"Colonial Office,
"Downing Street, S.W.

"Sir,—I have the honour to communicate, for the information of the Secretary of State for the Colonies, the following observations which the Council of this Society offers upon a copy of an Ordinance of the Legisture of St. Lucia, entitled 'An Act to Regulate the Sale of Drugs and Poisons in this Colony,' transmitted by you for that purpose under date 20th of May last.

"Section 6 appears to assume that the law relating to apothecaries and chemists and druggists in the United Kingdom of Great Britain and Ireland is uniform, whereas the contrary is the case (38 and 39 Victoria, cap. 57, relates exclusively to Ireland).

"It may prove in the course of the administration of this section that inconvenience will not arise upon the language used, but in fact verbal accuracy would be promoted by insertion of the words 'or a pharmaceutical chemist,' after 'apothecary,' and before 'or a chemist and druggist,' and of the words 'in any part of' immediately before 'the United Kingdom of Great Britain and Ireland.'

"Section 7, sub-section 1.—The exemption of homœopathic medicines is the first instance known to the Council of special exemptions in favour of such medicines. However harmless so-called 'homœopathic medicines' may for a time have been, it is now not open to doubt that potent and dangerous poisons are sold as 'homœopathic medicines,' and it is deemed probable that wherever an exemption, such as is contemplated by the sub-section, may prevail, the exemption will become used so as to practically evade and defeat the general law.

"Section 7, sub-section 1, and section 8.—And it may be added that retailers of 'homœopathic medicines' so-called, are not, as a rule persons holding qualifications.

"Section 7, sub-section 1, and section 8.—Observations made by the letters which in 1881, under dates June 9th and 20th, I had the honour to address to Mr. Wingfield, for the information of the Secretary of State for the Colonies, on the Sale of Drugs and Poisons Law (Jamaica), apply to these sections. (See heading sections 18 and 19 of the letter of 9th June.)

"Section 10.—This appears to have been framed upon provisions contained in the Apothecaries Act, of 1815, which provisions soon became and now are practically obsolete.

"The official copy of the ordinance you sent me is returned herewith.

"I have the honour to be, Sir,
"Your obedient servant,
"Richard Bremridge.
"*Assistant Secretary.*"

The report also included the following correspondence with the Privy Council respecting the proposed addition of sulphuric and other acids to the Poison Schedule:—

"Privy Council Office,
"Whitehall,
"9 *June*, 1882.

"Sir,—I am directed by the Lords of the Council to transmit to you the enclosed copy of a letter which has been received from Messrs. Dale and Plant giving reasons why sulphuric and other acids should not be added to the list of poisons under the Pharmacy Act, 1868, and I am to state that their Lordships would be glad to receive any remarks that the Pharmaceutical Society might desire to offer in reply to the objections raised by Messrs. Dale and Plant.

"I am, Sir,
"Your obedient servant,
(Signed) "C. L. Peel.

"The Secretary,
"Pharmaceutical Society,
"17, Bloomsbury Square, W.C."

"*Copy.*
"(44688).
"81, Smallbrook Street,
"Birmingham,
"31*st May*, 1882.

"Dear Sir,—In reply to your kind memorandum of the 18th inst., No. 44599, respecting the addition of sulphuric and other acids to the Pharmacy Act:—

"1. Firstly, we believe it would be injurious to freedom of trade in creating monopoly, especially in manufacturing towns, where it is largely used.

"2. Secondly, it would enhance prices considerably, as chemists do not lay themselves open, at present, for this branch of trade, therefore, would require special hands for supplying these articles.

"3. Thirdly, we believe that chemists, as a whole, would not care for this trade being added, as it is extremely cumbersome, heavy, dirty, and very liable to accident. It would, no doubt, interfere with their dispensing department, on account of the dirty bottles in which it is usually supplied to consumers.

"4. Fourthly, it would be very inconvenient to manufacturers, as a whole, to be compelled to send to certain places for a supply, instead of getting it near at hand.

"5. Fifthly, we do not see how any public good can accrue from any fresh restrictions, as it is rarely, if ever, used as a poison.

"6. Sixthly, it would very largely affect a large number of old-established drysalters, who have cultivated a manufacturing trade in these goods, and do not dispense medicines; therefore, we think they should receive an amount of consideration before destroying their trade.

"If you should deem it necessary, we shall be pleased to forward you a memorial from the trades interested in the matter.

"Thanking you for your courtesy, and hoping to receive a favourable reply.

"We are, Sir,
"Yours obediently,
(Signed) "Dale and Plant

"The President,
"Privy Council,
"London."

"Pharmaceutical Society of Great Britain,
"17, Bloomsbury Square, London, W.C.,
"*June* 22*nd*, 1882.

"C. L. Peel, Esq.,
"Privy Council Office.
"Whitehall, S.W.

"Sir,—I am directed to send for the information of the Lords of the Council the following observations on a letter received by their Lordships from Messrs. Dale and Plant, in reference to the proposed addition of sulphuric and other acids to the poison schedule of the Pharmacy Act.

"Messrs. Dale and Plant assume that if these acids be added to the schedule it would entail considerable inconvenience on manufacturers as purchasers, and dealers in heavy chemicals as sellers of these acids. They seem to be unaware that such dealings as are referred to would be of the nature of sales by *wholesale*, and as such would be exempted by Section XVI. from those provisions of the Act which require that the sale should be confined to registered persons. The only restriction imposed by the Act in the case of such wholesale dealings is that the vessel containing the scheduled poison shall be labelled with the name of the article and the word 'Poison.'

"This assumption renders it unnecessary to reply in detail to the points raised in Messrs. Dale and Plant's letter, except, perhaps, No. 5.

"As to this it is submitted that, though cases of poisoning resulting in death by these acids are not so numerous as by some other poisons, it is undeniable that many serious cases of accidental poisoning, inflicting much harm and damage to the health, do occur. Vitriol throwing, moreover, is not by any means an uncommon form of the misuse of sulphuric acid.

"I am further instructed to state that the Council of this Society, before resolving to recommend that these acids should be added to the schedule, made numerous inquiries throughout the country as to the probable effect of bringing these acids within the provisions of the Act, the result of which satisfied them that it would be conducive to the safety of the public to place some restrictions on the sale of them, and that it would be practicable to impose such restrictions without seriously interfering with trade or industrial manufactures.

"I have the honour to be, Sir,
"Yours obediently,
(Signed) "Richard Bremridge,
"*Assistant Secretary.*"

The report was received and adopted.

GENERAL PURPOSES.

The report of this Committee was, as usual, read in committee. It included letters from the Solicitor, giving particulars of cases that had been placed in his hands for prosecution; also details of several cases of alleged infringement of the Pharmacy Act, some of which were recommended for prosecution.

The report and recommendations were received and adopted unanimously.

Pharmaceutical Education.

The following letter from Professor Attfield including one from Dr. Carpenter, was read:—

"Ashlands, Watford,
July 4th, 1882.

"To the Council of the Pharmaceutical
"Society of Great Britain.

"Mr. President and Gentlemen,

"I hope I shall not incur a charge of excess of zeal, if I venture to lay before you some opinions that happen to have come before me in support of the principle you recently adopted respecting the future relationship of education and examination.

"Ever since I commenced the advocacy of a recognized compulsory curriculum in pharmacy, namely, ten years ago, in a paper read at the Conference at Brighton, I have frequently had to meet the objection that the Society's existing plan of examining all comers was also carried out at the London University, and that what was good enough for the latter was good enough for the former. The reply, of course, was that the University made an exception to the rule in the case of medical candidates, with whom pharmaceutical candidates might fairly be classed. That this contention was well founded is shown by the enclosed letter from Dr. Carpenter, than whom no one else is better acquainted with the aims and objects of the University. I have lately received equally satisfactory opinions from Sir Robert Kane, Professor Tyndall and other high authorities.

"Since the Council's adoption of the principle referred to, but prior to the last Annual Meeting, I have distributed to each of the three thousand six hundred Members and Associates in Business of the Society, copies of that Essay on the Relationship of Education and Examination which two years ago I sent to the Members of Council, Examiners, and other prominent pharmacists. Already upwards of three hundred letters, besides acknowledgments, have come to hand, *all but five* being in favour of the action taken by the Council.

"I apologize for having urged reform in this matter with a persistence which may at times have appeared obtrusive. I can only plead love for pharmacy and that the end has crowned the means.

"Yours faithfully,
"John Attfield."

"56, Regent's Park Road,
"London, N.W.
"*May* 7, 1882.

"Dear Professor Attfield,

"In my former official position as Registrar of the University of London, it was my duty to administer a great system of examination for degrees in arts, science, and laws, open to all comers, but devised, with the aid of the experience of able teachers, to defeat cram, as far as possible; and the proof of its efficiency has been given by the much greater success of really *educated* candidates, as compared with those who were merely trained for the examinations.

"It has often been urged that the medical degrees of the University should be opened, like those of the other Faculties, without any restriction as to the mode in which candidates for them should prepare themselves. But the Senate have firmly held (and I trust that they will ever continue to hold) to the principle, that as medical degrees attest the candidate's qualification to practise medicine, they stand upon a footing altogether different from degrees which simply attest the possession of certain intellectual attainments. And they consider it essential to the possession of that qualification, that the candidate should have been systematically educated for it, the use of examinations being to test the thoroughness of his education, and the degree in which he has profited by it.

"As pharmacy partakes in this respect of the character of medicine, I am entirely at one with you in the principle that candidates for a qualification to practise pharmacy should be required to go through an education suited to qualify them, rather than a training which may enable them to pass examinations; or, in other words, that the examination should be adapted to test the thoroughness of the education which the candidate has received, rather than that the education should be adapted to bring up those who receive it to a certain examination standard.

"Believe me,
"Yours very sincerely,
"Wm. B. Carpenter."

The President said it was very satisfactory that a man who had been at the helm of a great examining body like the London University should have stated so definitely that free trade in examinations was not the wisest policy to pursue where special qualifications were required. It was also remarkable that, concurrently with the writing of this letter and with Dr. Carpenter's resignation, a new university had come into existence, in which examinations were made secondary to training.

Mr. Hampson thought it was free trade in education rather than in examination which the President meant to refer to.

The President said that was so. Those who had had experience of graduates from various universities were aware that there was a vast difference in the result produced by a process which involved good training, finishing up by an examination, as compared with simply an examination which might be passed at any time without the candidate being properly trained. In pharmacy they could never hope to go in for such a kind of training as was contemplated in the London University for degrees, but it was important that this letter should be placed on record.

Mr. HAMPSON said it was rather remarkable that these letters should have been sent just at this moment when Mr. Schacht was about to move his resolution with regard to examinations.

Mr. SCHACHT said he had no knowledge of these letters until he came into the room that day. At the same time he was very glad that Dr. Carpenter had been kind enough to write this letter, as, though it would not be likely to alter the views the members of Council themselves entertained, it might have some weight outside, inasmuch as Dr. Carpenter's opinion would carry great weight with the public mind.

After some further discussion, it was resolved to print the letters above given, providing the permission of the writers were obtained.

Mr. SCHACHT then moved the following resolution, of which he had given notice:—

"That a Committee be appointed for the purpose of considering the best method of giving effect to the resolutions of the Council of April 5, upon the Report of the Special Committee appointed to inquire into the Relation to each other of Pharmaceutical Education and the Pharmaceutical Examinations, and of reporting thereon to the Council; together with any suggestions it may desire to advance as the result of its deliberations: and that the Committee consist of the President, the Vice-President, Messrs. Bottle, Greenish, Hampson, Hills, Schacht and Symes."

He said he should occupy but a very short time, seeing that it seemed to be the natural consequence of what was done on the 5th of April. Certain propositions were plainly approved and adopted, and as practical men their next step must be to see their way to carry out those conclusions. He would venture just to intimate that one of the first duties the Committee would have to do would be to inquire how far the present legislative power would enable the Council to carry out the resolutions which were adopted, and if it should appear that the Council had no power at all in the matter, of course the subject must be relegated to a future time when its power was increased. But if it should appear that existing powers would enable the Council to go a long way, if not the whole way, towards carrying out the desired results, then further steps could be taken. His own opinion was that the Council had power at present to carry out these resolutions which had been approved and adopted, and he hoped that it would be found on investigation that the Solicitor not only confirmed that view, but would amplify and enlarge his own idea of the scope of the Council's powers. That was a question entirely for consideration and inquiry. In the last sentence of the motion he had ventured to indicate that if in the course of the Committee's inquiries any further suggestions arose which it was thought ought to be presented to the Council for approval, it should have power so to do. In asking that he was simply asking for power to report to the Council; that the Committee should have within the scope of its duties to formulate any fresh ideas on this large subject which occurred to it, and present them to the Council. The motion was so simple that there was no occasion to enlarge further upon it.

Mr. SYMES seconded the motion.

Mr. ROBBINS thought it must be left to the Solicitor to decide what power the Council possessed, and he thought the first thing the Committee should do would be to consult the Solicitor.

Mr. GREENISH said the Committee would have full power to consult the Solicitor if necessary.

Mr. HAMPSON said he should ask Mr. Schacht to leave out the last part of the motion. A new Committee, appointed to give effect to the resolution of the Council, would naturally go into the details of the resolutions and the practical steps to be taken, and the latter part of the motion did not seem necessary unless Mr. Schacht was anxious to reopen the whole question and amplify his scheme. He did not want to enter into Mr. Schacht's inner consciousness, but that gentleman had made use of the expression that he wished the Committee to formulate fresh ideas, and it appeared to him that the Council having come to a decision upon this question, there ought not to be further recommendations from another committee upon it. The Committee sat a long time and inquired into the question very minutely, and after that inquiry the vote of the Council was given, when the greater part of the scheme was accepted, but one portion was rejected; and it seemed to him that after having come to a distinct decision, there was considerable danger in passing this resolution and reopening the whole question. What had been already passed was extremely simple and was all that was required, perhaps more than was required under the present conditions of pharmacy; more education was really being demanded than the pharmacists of to-day could possibly use, and he hoped this matter would not be pressed in such a way as to nauseate the chemists of this country with this grand philosophical scheme, which might not after all be a matter of practical utility.

Mr. BOTTLE also asked Mr. Schacht to withdraw the last two lines, as it seemed to him they were not necessary. The Committee would report anything it had to suggest, but he took it it would not be open to the Committee to take the comprehensive view which Mr. Hampson referred to. Its deliberations would be entirely confined to giving effect to the resolution of the Council; anything beyond that would be outside its duty.

Mr. SCHACHT said it might be remembered that there were practically four recommendations offered by the Committee, and after a considerable amount of discussion three were adopted, and the fourth was negatived by a very small majority. But between the passing of the third and the refusal to pass the fourth, there was a good deal of conversation. That fourth recommendation referred to the way in which it was suggested by the Committee that the examination should be divided. The Committee recommended that it should be divided into two portions of a certain character, and that one portion should be conducted in the provinces, and the other solely in London and Edinburgh. Between that suggestion and the process of conducting the examinations in future as they were now there were several views; amongst them was a suggestion that it should be divided, but not that any portion of it should be conducted in the provinces. Another view was that it should be divided, but that the arrangement of subjects should be different to that recommended by the Committee. There were many opinions on that point, and it seemed to him that the three recommendations which were adopted, though complete as far as they went, failed to carry out a complete scheme for the future, such as the Council could agree to, and that, therefore, it would be necessary to go a little further and do something in the way of arranging the details.

Mr. HAMPSON said he had asked Mr. Schacht a question, and Mr. Schacht was now going into the whole matter.

The PRESIDENT said he must hold that Mr. Schacht was in order. He was justifying the use of these two lines which he was asked to withdraw.

Mr. SCHACHT said he did not want to enlarge any further upon the point except to say that almost as matter of necessity the Committee, in considering recommendations 1, 2, and 3, must touch on the subject of number 4 more or less, and if it came to a conclusion unanimously that it was desirable somewhat to moderate the decision arrived at on April 5, he thought it would be a pity it should not have power to present that conclusion to the Council. It was really more or less a matter of detail.

Mr. Hampson said he gathered that Mr. Schacht declined to withdraw the last part of the motion, and he could see quite clearly why he wished to press it as he had framed it. He evidently contemplated a re-opening of the entire subject and had very frankly stated his views. He said that the Council had accepted three propositions, but that these would not be complete without the adoption of the fourth. Although Mr. Schacht was perfectly frank and fair in so stating, he (Mr. Hampson) did not think it was altogether fair to attempt to circumvent the resolution of the Council in this way and force upon it the fourth recommendation. He admired Mr. Schacht's tenacity, but that was not what the Council wished. It had after very careful consideration accepted only three propositions, and he maintained that those three could be adopted and the details settled without entering upon the fourth at all. In his opinion the Committee ought not to reopen the matter, but abide by the motion accepted by the Council and carry it out as the Council desired.

Mr. Williams very much agreed with the view expressed by Mr. Hampson. It did seem to him very strange that when the Council had, after full consideration and discussion, come to a distinct conclusion that it should be called upon under the guise of completing and carrying out that conclusion to really agree to something which would be just the contrary. The Council had arrived at that decision by a considerable majority, but that decision, if he understood it aright, Mr. Schacht wished to reverse. Under these circumstances he must vote against the motion, unless Mr. Schacht would modify it.

Mr. Hills asked what was the majority on April 5, on this resolution.

Mr. Williams said it was not a question of what the majority was; it was the decision of the Council.

Mr. Hills said he thought he was entitled to ask the question.

Mr. Schacht said there were 8 votes for the proposition and 9 against it.

Mr. Young suggested that it would be as well, since Mr. Schacht frankly stated that he intended to raise this question again, for the Council to be reminded of what the fourth proposition was.

Mr. Schacht said his object was to enable the Committee to arrive at a conclusion which the Council did not arrive at. The Council gave no verdict, except one, and that was, not to approve of the exact thing submitted. There were many things suggested, but nothing carried with reference to number 4; but it was imperatively necessary that something should be carried with reference to the subjects included in number 4, otherwise the Committee could not report intelligently on "recommendations" 1, 2 and 3. He only wished the Committee to have the power of completing that which was left incomplete.

The President said he was by no means sure that if the two lines were left out it would not be perfectly in order for the Committee to consider various points of detail in connection with recommendation number 4. The Council had decided on nothing except the broad lines. Number 4 was a recommendation that the Minor examination should be divided into two parts with an interval of not less than six months between the first and second.

Mr. Hampson said it was clearly understood that the Council had accepted the three recommendations. Was it now meant that this Committee would have power to make recommendations with regard to carrying out the fourth proposition?

The President said numbers 1, 2 and 3 could not be carried out by themselves.

Mr. Hampson asked if it were not possible for the Committee, irrespective of the fourth recommendation, which was rejected, to make regulations for carrying out the first three.

Mr. Schacht said, no, he thought not.

Mr. Williams said in that case he should vote against the motion.

The President then read the first three recommendations of the former Committee, which had been adopted by the Council. He said the Committee had been unanimous that the Minor examination should be divided, and it was only a question as to how it should be done.

Mr. Savage said time was an important consideration.

The President said it appeared to him that the Committee must consider the recommendations under number 4 in some shape.

Mr. Hampson again stated his opinion that the three recommendations were complete in themselves. It was most irregular to include the fourth in the discussion at all.

The President said if the word "fourth" were obliterated from the discussion the question would be much clearer. Mr. Schacht's opinion was that certain recommendations, previously submitted by the Committee, would have to be considered in carrying out the three recommendations adopted.

Mr. Greenish thought the portion of the motion to which Mr. Hampson objected was almost an invitation to open the whole question. It was true Mr. Schacht referred to the fourth recommendation only, but under the terms of this motion it would be competent for the Committee to open the entire question, which he thought was a dangerous proceeding whilst the resolution of the Council rejecting that fourth proposition still existed.

Mr. Williams said the motion was quite clear. The Committee was to report on the resolution of the Council, not of the former Committee. The whole sting of the thing lay in the last sentence, and the gloss Mr. Schacht had himself given of it was that it was intended to revive all that which the Council had rejected.

Mr. Schacht said he did not think that was a fair interpretation of it. His first explanation was simply this, that there was something left unconcluded by the Council, and that was included in a certain recommendation which the Council rejected; still that something had to be formulated in some shape. He did not say it was to be done in his fashion, but that the Committee should have the power of considering the subject and reporting upon it. He was perfectly willing to withdraw the two lines, but the subject of what was called number 4 must be taken up if the discussion of the details of numbers 1, 2 and 3 were to have any practical effect.

Mr. Symes said if Mr. Schacht withdrew those two lines he must ask him to withdraw his name from the Committee. He could not undertake any duty which would be of such a piecemeal character as the report would then necessarily be. The first duty of the Committee would be to ascertain the legal position, and he thought it was quite possible the Council was wasting time in discussing this matter before it knew whether it had any legal power at all. Much of what he intended to say had been already said by the President and Mr. Schacht. The Committee made a report which, as far as he could judge, was complete in itself, and had four legs to stand upon, but the Council had taken away one of the legs; now the Committee were asked to report upon this three-legged arrangement. It seemed to him the Committee must deal with the whole four points to make the thing work at all, and unless it was entitled to do so its work would be useless. There were many occasions on which the Council had come to a decision by a majority of one, and had regretted that decision subsequently. There was nothing very dreadful in reconsidering the matter.

The Vice-President said he gathered from Mr. Schacht that he was willing to withdraw those two lines, and if he did so he hoped Mr. Symes would not withdraw his name from the Committee. Mr. Schacht had told the Council frankly what his motive was in introducing those words, but he believed the whole of his object would be covered, even without them. If the Committee went into those three points and found that they formed three legs which would not stand without a fourth, it would have to report it to the Council. Without referring to the strength of the majority, he exceedingly regretted that by one vote a point which he considered of some importance was lost, and he believed when the Committee went into the details it would be found impossible not to deal in some way with the fourth recommendation. It was important that all who had worked on the original Committee should continue their labours, and therefore he hoped Mr. Symes would not withdraw.

Mr. SAVAGE could not see the logic of the Vice-President's observations. If it were to be open to the Committee to deal with this fourth recommendation, those lines ought to stand, and Mr. Schacht ought to have an opportunity of introducing anything which might be thought advantageous and necessary to consolidate the three previous resolutions. Whatever was the result arrived at, it would have to come before the Council for confirmation; therefore, he trusted Mr. Schacht would not withdraw these words.

Mr. SQUIRE agreed with Mr. Hampson. He differed from those who said that the consideration of the first three points necessitated a consideration of number 4. The first was that every candidate for the Minor should produce evidence of apprenticeship; the second that the Preliminary should be passed prior to apprenticeship; the third, that on presenting himself for the Minor the candidate should bring evidence that he had attended certain courses of lectures on practical chemistry. The fourth was that the Minor should be conducted in a certain way. Surely that had nothing to do with certificates of attendance at lectures and evidence of apprenticeship or that the Preliminary should be passed prior to apprenticeship. He could not see that the fourth had anything whatever to do with the first three. Whether it was an advantage to consider it at the same time was another point, but he thought it would simplify matters very considerably to deal with the first three first, and if necessary to deal with number 4 separately.

Mr. GOSTLING thought there was a great deal in the remarks made by Mr. Bottle, and that by cutting out the last two lines the motion would be equally effective. It was very undesirable to adopt these two lines, especially the words "together with any suggestions," because they involved a great deal more than the division of the examination. If this were omitted he should be pleased to vote for the motion.

Mr. SCHACHT remarked that it was only "any suggestion as to the result of the Committee's deliberations," and the line of its deliberations was laid down in the earlier part of the motion.

Mr. HILLS hoped Mr. Schacht would not withdraw the last two lines. If he, as one of the proposed Committee, was not permitted to say anything about the points covered by recommendation number 4, he thought a great deal of the work would be of no use, because the scheme was one which depended very much for its value on being carried as a whole.

Mr. BORLAND agreed with Mr. Hills. Without coming to some conclusion as to the mode in which the examinations were to be carried out, the Council could not come to any definite conclusion as to the first three recommendations. When the resolution was before the Council he voted against it solely on the ground that the details were not defined in such a manner as to enable him to come to a conclusion, but if the result of the Committee were such as to bring before the Council a clear and concise method for carrying out the curriculum and the examinations he should be able to come to a conclusion on the matter.

Mr. YOUNG said he was sorry to say that he must differ from his friend, Mr. Borland. He supported Mr. Schacht on the last occasion, but he thought with Mr. Bottle, who had put the matter very plainly, that with the omission of these words, the Committee would have all that was wanted, and on principle they should be omitted. But for the explanation so frankly put forward by Mr. Schacht, the Council would not have known what the sentence meant, but Mr. Hampson had admitted that if those two lines were taken away Mr. Schacht had a perfect right to make such recommendations as he desired.

Mr. SYMES said, assuming these lines withdrawn, and that the report to be drawn up included the recommendations which were related to what was known as clause number 4, would not those gentlemen, who were now taking exception to it, rise and say it was out of order, that the matter was never delegated to the Committee? With regard to the appeal made to him by the Vice-President, he was always willing to do any work on Committee if he could be of any use, and his reason for withdrawing his name was not because he felt hurt at the scope of the Committee being cut down, but he could not afford to give up time which was valuable to him in doing work which could be of no possible use.

The PRESIDENT said if such an exception were taken at the Committee, he should have ruled that it would have been perfectly competent to consider the proposition known as number 4 as supplementary to the others without the last two lines being included in the resolution, but this discussion had altered the case very materially. It indicated an intention to tie the hands of the Committee instead of leaving them open.

Mr. WILLIAMS said after the explanation which had been given he thought he could only consistently support the action of the Council by voting against this motion. He was sorry to do so, but he considered that with regard to number 4, not merely the wording but the principle involved had been rejected. He thought the best thing would be to reject the proposal *in toto*, and, perhaps, on some future occasion it might be brought forward in such a way that it might be carried.

Mr. SCHACHT asked leave to put a parallel case. Supposing the Council sent a Bill to the Privy Council for adoption, and that body declined to take it up, would the Council understand that it was never again to present a Bill to the Privy Council with any hope of its being adopted?

Mr. WILLIAMS said not the same Bill certainly.

Mr. SCHACHT said he was not asking any permission from the Committee to send up number 4 again, but anything which occurred to the Committee as a wise and sensible recommendation. He had said just previously he was willing to withdraw those lines, simply because he understood the President to hold that the subject could be gone into without those two lines, and if that were understood he would withdraw them; but if that was not the reading he could not do so, because the usefulness of the Committee would be almost entirely lost if that question were not considered.

The VICE-PRESIDENT said he considered that the ground which Mr. Schacht intended to cover would be covered by the motion, omitting the last two lines.

Mr. SAVAGE said, whilst he opposed number 4, it was only right Mr. Schacht should have an opportunity of bringing any modification of it forward again.

Mr. BORLAND thought the Council was treating the matter on too narrow a ground. It did not follow that the proposition number 4 would be recommended again; there might be an alternative suggestion. Without maturely considering the details the Council was not in a position to come to a decision.

Mr. HAMPSON then moved as an amendment:—

"That the following words be omitted from the motion proposed by Mr. Schacht:—'together with any suggestions it may desire to advance as the result of its deliberations.'"

Notwithstanding his persistent opposition, Mr. Schacht had kindly put his name on the Committee, but he must decline to serve on these grounds. It appeared to him that the ruling of the President was likely to be of such a nature as to include the consideration of one of the recommendations which the Council had excluded by passing three only. Mr. Schacht had told the Council what position he should take on the Committee. He regretted that decision. He had no objection to serve on the Committee if its duties were confined to carrying out the decisions of the Council, but it ought not to enter into extraneous matter which the Council had already decided upon.

Mr. Young asked if Mr. Hampson objected to any suggestion the members of the Committee might make.

Mr. Hampson said not in carrying out the first three recommendations.

Mr. Young said that would avoid all reference to the way in which the examinations should be carried out.

Mr. Hampson said incidentally perhaps the Committee could not avoid it, but he was told by the President that he should rule that the fourth proposal could be entertained.

The President said that was not exactly what he said. His opinion was that any proposition under number 4, if brought before the Committee, would be worthy of consideration.

Mr. Gostling seconded the amendment.

The President thought this was a matter now to be voted upon, and that no further discussion was necessary.

On a vote being taken, 7 voted in favour of the amendment, and 7 against it.

The President gave his casting vote against the amendment.

Mr. Schacht's motion was then put and carried by 8 to 7.

Report of the Board of Examiners.

June, 1882.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major (21st)	8	2	6
Minor (21st)	18	8	10
„ (22nd). . . .	23	9	14
	—41	—17	—24
Modified (22nd) . . .	3	3	0
	52	22	30

Preliminary Examination.

Six certificates received in lieu of the Society's examination:—

2 College of Preceptors.
1 Incorporated Law Society.
2 University of Cambridge.
1 University of Oxford.

The Secretary read the following resolutions, which had been forwarded from a meeting of chemists and druggists at Aberdeen:—

"Resolutions carried at a meeting of the Chemists and Druggists of the N.E. of Scotland, held in Aberdeen, on 28th June, 1882:—

"I. That this meeting, while approving of recommendations 1 and 2, disapproves of the proposed compulsory curriculum.

"II. That in order to enable assistants and apprentices to obtain an education suitable for the successful carrying on of the business of a chemist and druggist, this meeting is of opinion that the Council of the Pharmaceutical Society should formulate a scheme for the subsidizing of approved classes for pharmaceutical education, or otherwise that the Council of the Pharmaceutical Society should memorialize the Science and Art Department anent the institution of classes suitable for the same.

"III. That in the opinion of this meeting the provisions of the Pharmacy Act should be applicable to patent medicines and the compound preparations of the Pharmacopœia, and that in the interests of the public the sale of such articles should be confined to chemists."

The Secretary also read the following memorial from the Stockport Chemists' Association:—

"Memorial to the Council of the Pharmaceutical Society of Great Britain, from the Stockport Chemists' Association.

"Stockport Chemists' Association,
"Stockport,
"*June* 19, 1882.

"Your memorialists having observed that the sale of drugs and pharmaceutical preparations by grocers, tailors, etc., is increasing, and also, that they sell them at cost price, as an inducement for the sale of their legitimate wares,

"We, therefore, strongly feeling the injustice of our position, are of opinion that in any future legislation, affecting pharmacy, some attempt should be made to secure to the qualified chemist the sale of all pharmaceutical preparations, and if possible the materia medica contained therein, with a few manifest exceptions.

"On behalf of the Stockport Chemists' Association,
"We are,
"Yours faithfully,
(Signed) "Hervey Lowndes, *President*,
"Wm. Billing Orton, *Secretary*."

The British Pharmaceutical Conference.

The following members of the Council were appointed delegates to attend the meeting of the Conference, in August:—The President, the Vice-President, the Treasurer; and Messrs. Andrews, Greenish, Hampson, Savage, Schacht, Squire, Symes and Williams.

Provincial Transactions.

MEETING OF CHEMISTS AND DRUGGISTS OF THE N.E. OF SCOTLAND IN ABERDEEN.

A meeting of the chemists and druggists of the N.E. of Scotland was held in the Imperial Hotel, Aberdeen, on the 28th inst. There were twenty-seven present, twenty-one sent in apologies regretting their inability to be present. Mr. James Paterson occupied the chair.

It was moved by Mr. W. M. Ferrier (Brechin), and seconded by Mr. J. M. Munro (Aberdeen):—"That this meeting, being of opinion that the chemists and druggists in the North of Scotland are inadequately represented on both the London and Edinburgh Councils of the Pharmaceutical Society, resolve to appoint a Committee for the purpose of inducing suitable candidates to allow themselves to be put in nomination at next election."

The motion was carried unanimously, and the following gentlemen were nominated as a Committee to carry the resolution into effect, viz.: Messrs. Burrell, Montrose; Ellis, Banff; Robertson, Elgin; Chalmers, Huntly; Ferrier, Brechin; Reid, Sangster and Strachan, Aberdeen. Mr. Strachan, convener.

It was moved by Mr. A. Strachan (Aberdeen), and seconded by Mr. Ritchie (Aberdeen):—"That this meeting approves of the report of the Committee appointed by the Council of the Pharmaceutical Society to inquire into the relation of pharmaceutical education to pharmaceutical examination, as adopted by the Council in April last."

An amendment to the following effect was made by Mr. John Gordon and seconded by Mr. R. D. Presslie, viz.:—"That this meeting, while approving of recommendations one and two, disapproves of the proposed compulsory curriculum."

On being put to the meeting there voted—

For the Motion:—Messrs. Giles, Broomhead, Ritchie, Munro and Strachan, Aberdeen; Henry, Macduff; and Fraser, Clatt.—7.

For the Amendment: Messrs. Sim, Presslie; John Gordon, Johnston, Cruickshank, Spence, Mortimer and Paterson, Aberdeen; Ferrier, Brechin; Stephen, Macduff; Simpson, Woodside; Simpson, Peterhead; Bertie, Auchinblae; Fewtrell, Turriff; Sievewright, Cullen; and Clark, Portsoy.—16

The amendment was declared carried.

It was moved by Mr. John Gordon (Aberdeen), and seconded by Mr. R. D. Presslie (Aberdeen):—"That, in order to enable assistants and apprentices to obtain an education suitable for the successful carrying on of the business of a chemist and druggist, this meeting is of opinion that the Council of the Pharmaceutical Society should formulate a scheme for the subsidizing of approved classes for pharmaceutical education, or otherwise that the Council of the Pharmaceutical Society should memorialize the Science and Art Department anent the institution of classes suitable for the same."

The motion was carried unanimously.

It was moved by Mr. W. Giles (Aberdeen), and seconded by Mr. G. E. Broomhead (Aberdeen):—"That in the opinion of this meeting the provisions of the Pharmacy Act should be applicable to patent medicines and the compound preparations of the Pharmacopœia, and that in the interests of the public the sale of such articles should be confined to chemists."

The motion was carried unanimously.

It was moved by Mr. J. Hay Henry (Macduff), and seconded by Mr. Clark (Portsoy):—"That this meeting approves of the formation of a Chemists and Druggists' Society for the N.E. of Scotland, and resolves to take the necessary steps for having such a society constituted, and that it be remitted to the Aberdeen Society of Chemists and Druggists to report."

The motion was carried unanimously.

After the usual vote of thanks the meeting terminated.

ABERDEEN SOCIETY OF CHEMISTS AND DRUGGISTS.

The annual dinner of the members of the above Society was held in the Imperial Hotel, on Wednesday.

There were present—Messrs. Broomhead, Cruickshank, Giles, A. Gordon (Sim and Co.), Gordon (J. and J. Urquhart), John Gordon, Jun., Johnston (Reid and Sons), Mortimer, Munro, Paterson, Presslie, Ritchie, Sim, Sinclair, Shepherd and Strachan, Aberdeen; Bertie, Auchinblae; Clark, Portsoy: Ferrier, Brechin; Fewtrell, Turriff; Fraser, Clatt; Henry, Macduff; Lunan, Banchory; Simpson, Peterhead; Simpson, Woodside; and Stephen, Macduff.

Mr. Broomhead, the President, occupied the chair; and Mr. Munro, Vice-President, acted as croupier.

After a substantial repast, a number of toasts were proposed, including "The Queen and Royal Family," by the Chairman; "The Aberdeen Society of Chemists and Druggists," by Mr. Fewtrell, Turriff, and replied to by Mr. J. Gordon; "The Pharmaceutical Society of Great Britain," by Mr. J. Hay Henry, Macduff, and replied to by Mr. W. Sinclair, Aberdeen; "The Town and Trade of Aberdeen," by Mr. J. W. Stephen, Macduff, and replied to by Mr. D. Ritchie; "Country Friends," by Mr. J. Sim, and replied to by Mr. J. Clark, Portsoy; "The Ladies," by Mr. W. Giles, and replied to by Mr. R. D. Presslie; "The Croupier," and "The Chairman."

In the evening a number of the members drove out to Corby, where, after enjoying an hour's stroll in the pleasant grounds, they were hospitably entertained by Mr. and Mrs. Paterson.

Proceedings of Scientific Societies.

PHILADELPHIA COLLEGE OF PHARMACY.

A pharmaceutical meeting of the members of this College was held on May 16. The first paper read was the following on—

Bay Rum.

BY A. H. RIISE.

Bay rum is made by distillation of the leaves and berries of the bayberry tree with rum. Although bay rum is so much used in the United States, very little is known there about its origin, production, and the characters by which it is distinguished from imitations. A brief sketch of it will, therefore, be of interest to the druggist and importer as well as to the public in general.

The bayberry tree (*Pimenta acris*, W. A.; *Myrcia acris*, DC.) belongs to the large family of Myrtaceæ, which abound in fragrant volatile oils. The plant is glabrous, of a considerable size, the stem is straight and rigid, the branchlets green and shapely four angled, the leaves opposite, oval or roundish, shining, coriaceous, from 3 to 5 inches long, with numerous parallel nerves, and sprinkled with many pellucid dots. The flowers are arranged in axillary panicles, and are white, with a reddish tinge. The berries are round, of the size of a pea, two-celled, and contain six to eight seeds. The leaves, and particularly the berries, are of a very aromatic odour. The tree flowers from June to August.

There exist many varieties of the bayberry tree throughout the West Indies, scarcely to be distinguished botanically, but with a quite different odour from that which the genuine tree has, and, therefore, great care must be taken in collecting the leaves which are to be used in the distilling of bay spirit, as the admixture of a small quantity of the other leaves may entirely spoil the product of distillation.

In the manufacture of distilled bay spirit only the true leaves are used, and they are not dried, but thrown fresh into the still, as experience has shown a great difference between the spirits distilled from good fresh and from dried leaves, the odour of the latter being materially altered by the necessary exposure to the sun and air in drying.

The leaves are mixed, in the still, with the ripe berries in a certain proportion. The ethereal oil of the berries having a much stronger aroma than that of the leaves alone, a bay rum distilled partly from the berries has, therefore, a much stronger odour, and keeps its flavour much longer than if distilled alone from the leaves, but the cost of the berries is also from fifteen to twenty times that of the leaves, since they can only be procured with great difficulty.

The rum used for the distillation must be selected with great care. It must be of the very best quality, perfectly pure, and without any foreign odour. Rum from different sources cannot be used indiscriminately. A good St. Croix rum serves the purpose best, but it must be considerably stronger than what is generally brought into the market from there.

After having thus obtained the proper materials for the distillation, the next care is to be bestowed upon the operation. Distillation by steam, in large copper stills, ensures, to a certain extent, a uniform good quality of distilled bay spirit; it never gets burnt; the distillation is not carried too far; nothing of the fine aroma is lost by this process, which generally is the case by distilling over an open fire. Nearly all the distilled commercial bay rums are prepared over an open fire, to the great detriment of the flavour, but most of the bay rums in the market are not the product of distillation, being simply a solution of bay oil of a more or less good quality in common rum, or even in alcohol.

A comparison of bay spirit distilled from fresh material by steam with other bay rums will at once show the difference, the former being much stronger and finer in odour, so that a small quantity of it has not merely the same strength as a larger quantity of the others, but its odour will be found to be much more lasting and agreeable.

Bay spirit is used as a wash for the face, the hands, and the whole body, refreshing and invigorating the skin, and is highly valued when diluted with water for soothing the soreness after shaving. A bath to which about a quarter of a bottle of bay spirit is added strengthens the flesh, takes away the heat and dryness of the skin, gives softness and strength to the tired limbs, destroys all smell of perspiration, and produces a feeling of invigoration. In the sick room it is invaluable, as well for the sick person as for those around him; it purifies and refreshes the air in a remarkable degree. It is inestimable to travellers, especially in hot climates or in summer in the North, quickly relieving the feelings of lassitude of voyages. In fact, its uses are numberless and, while other perfumes quickly sicken many persons with excess of fragrance and the pungency of their aroma, the consumer will never get tired of using a good bay spirit.

In the discussion on this paper this subject was said to be of importance from the little that had been published. Bay rum is hardly known on the continent of Europe, and twenty-five years ago its true origin was also unknown in the United States. In a paper published in the *American Journal of Pharmacy*, in 1861 (p. 289), it was shown that bay rum was produced from *Myrcia acris*, the material for identifying the plant being a few leaves and branchlets, without flowers and fruit. Subsequently, the late Mr. Elias Durand ascertained, through one of his West Indian correspondents, that the plant had been correctly determined, but nothing was then known of the use of the fruit in this connection. That the volatile oil of this plant contained eugenol was known for some years, but this was first published by Professor Markoe, in 1877, who had made many interesting experiments with the volatile oil distilled by himself from the leaves, which proved its close chemical relation to the volatile oils of clove and pimenta. The composition accounts for the resemblance in odour; still there is a marked difference in this respect, fully as great as, for instance, in those volatile oils which contain anisol, and the cause of this difference is as yet not known. Plants which are of near botanical relation are often of very similar chemical composition; yet in the volatile oils there is sometimes a wide difference, not merely in odour, but in their constituents. Attention was drawn to the collection of volatile oils of different species of Eucalyptus which some years ago were presented to the College cabinet by Mr. Bosisto, of Melbourne, and of which one, obtained from *Eucalyptus persicifolia*, possesses not only an odour closely analogous to, but contains also the same chemical compounds which are found in the volatile oil of bitter almonds. It was suggested by Professor Maisch that probably the volatile oils of several of the many West Indian myrtles might contain eugenol and have a more or less distinct allspice odour, but that others had most likely an entirely different composition, and that the many varieties of the bayberry tree, referred to in the paper of Mr. Riise, were really different species of the genera Pimenta, Myrcia and other Myrtaceæ.

Mr. Shinn showed four samples of commercial bay rum, of which the one made by Mr. Riise had the specific gravity ·9210, corresponding to 48½ per cent. by weight of alcohol, while the density of the others was ·9290, ·9325 and ·9380, equal to 44½, 43 and 40½ per cent. of alcohol. A specimen of St. Croix rum had the specific gravity ·930 = 44 per cent. alcohol. The fragrance of these and similar spirits may be compared by first filling a clean test-tube or small vial and then emptying it, after which the peculiar flavour and its permanence become more apparent.

(*To be continued.*)

Notes and Queries.

[729]. Tinct. Quiniæ Amm.—I think there are points in this query not cleared up by the two replies It is easy to get a clear solution if you use proof spirit, full strength, liq. ammon. (B.P. 0·959), and distilled water. The variation in the strength of liq. ammon. usually kept, no doubt, is the cause of the complaint of the quinine precipitating, and I find the use of a hard water produces the same effect, which is assisted also by the small quantity usually made and kept in stock.

A Country Chemist.

[*** Seeing that quinine is soluble in ammonia, it is questionable whether quinine is precipitated at all in this case.—Ed. Ph. J.]

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[731]. Colour of Pil. and Syr. Ferri Iodidi, B.P.—Your correspondent, "Specific Gravity," very properly calls attention to the colour of the above preparations. This might appear trivial, but for the fact that Squire's 'Companion to the B.P.' is held in such high esteem by the medical profession; and since a case in point has occurred where a medical man refused a well-made syrup, because it had the tinge of green in the transparent liquid, the words "is a transparent liquid with a tinge of green," would be better than "a colourless liquid."

This is the colour of syrup made either with the proper quantity of solution of iodide of iron and syrup, or as ordered in the B.P.

With reference to the pil. ferri iodidi, which certainly should not be black, if "Specific Gravity" were to varnish small masses of it before placing in well corked bottles, the minimum decomposition would be ensured, and then it would have the colour of the ingredients, viz., yellowish-grey.

William Fowler.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Pharmaceutical Apparatus.

Sir,—In reply to the letter of Mr. W. Watson Will, which appeared in the Journal of June 24, I regret to say that I cannot give any information respecting the use of gas as a source of steam for laboratory purposes. We may, however, look forward to the time when gas, having been driven out of the market as a source of light (or very greatly so), it will be manufactured in great measure for the sake of the ammonia, aniline, etc.

We may then expect to have the gas supplied at such a moderate price as to be available as a cheap source of heat.

A. C. Abraham.

John.—The pin hole may be too small or the Bunsen defective. In the case of the Bunsen used by Mr. Symons the supply of air is regulated by the usual ring, so that the flame shall not descend when the gas is supplied *viâ* pin hole only, and there is still sufficient air to give a smokeless flame when full on. If your Bunsen is not so manageable, the difficulty can be overcome by placing a cap of wire gauze over its mouth.

Erratum.—In the notice of Roscoe and Schorlemmer's volume on Organic Chemistry last week it is incorrectly stated (p. 19, col. ii., l. 22) that the authors speak of the addition of methyl chloride to zinc sulphate to form zinc methyl iodide; it should have been to zinc coated with copper (copper zinc couple).

E. Hayward.—An explosion might be expected to occur when such substances are triturated together. See *Pharm. Journ.*, [2], xi., 552.

Communications, Letters, etc., have been received from Messrs. Lambie, Chipperfield, Shenstone, Warden, Peet, Chemicus.

THE INTERNATIONAL ELECTRIC EXHIBITION.

(*Continued from Vol. XII., page* 1032.)

The fact of a continuous solid conductor being raised to incandescence by the passage of a current of electricity of sufficient volume through its substance has been known from the earliest days of current electricity, and the heating of metallic wires by the transmission of a current of electricity has received thorough investigation at the hands of the older experimenters. Among those who have worked at this subject may be mentioned the great names of Davy, Faraday, Joule, Becquerel, Lenz, Harris, Grove, De la Rive Fourcroy, Vauquelin and Thenard.

Joule's masterly experiments resulted in the discovery of the law of the heating effect of a current. This law has been given in a previous paper when treating of the "electric arc;" but being peculiarly apposite in the present instance it may be stated once more—

$$H = C^2 R\, t \times 0{\cdot}24.$$

Where C is the current in ampères, R the resistance in ohms, t the time in seconds, and H the amount of heat produced in gramme degrees. It can be shown from this law that* "*a current of* 1 *ampère flowing through a resistance of* 1 *ohm developes therein* 0·24 *heat units per second.*"

When *the same* current passes alternately through a thick and a thin wire of the same metal, the thin wire becomes hotter than the thick one; this follows from the greater resistance of the thin wire, and also on account of its smaller capacity for heat and lesser radiating surface. Different metals having unlike specific resistances, and the heating effect being directly proportional to the resistance, it follows that in wires of different metals having the same length and diameter, the greater resisting wires will become the most highly heated. For instance, in similar wires of copper and platinum, ten times more heat would be produced by the same current in the platinum wire than in the copper wire, as the specific resistance of platinum, according to E. Becquerel's determinations, is ten times greater than that of copper. The heat produced in a wire is of the same amount, whatever may be its length, provided its diameter be the same throughout, *and the same quantity of electricity passes through it.* Faraday has left it upon record that the same current that will heat an inch of wire to redness will heat a mile or even a thousand miles of similar wire to the same extent. This statement is strictly true. It must, however, be remembered that as the length of the wire increases, the resistance increases proportionately; and so in order that the *same current* may flow, it follows that the electromotive force must be increased proportionately. This may easily be seen as a consequence resulting from Ohm's law (*Pharm. Journ.*, xii., p. 822). As regards the influence of the diameter of the wire on the amount of heat produced, it has been deduced from Newton's law of cooling that "for the same quantity of electricity, the increase of temperature in different parts of a wire is inversely as the fourth power of the diameter."

The foregoing considerations will greatly assist in the discussion of the various methods of obtaining light by the incandescence of a solid conductor.

* Silvanus Thompson.

As far as can be ascertained it was not until the year 1845 that any attempt was made to utilize an electrically incandescing solid conductor as a source of light. It would seem that the merit of being the first experimenter in this direction rests with Mr. Edward Augustin King, of London. Mr. King's patent is dated November 4, 1845. The preamble of the specification commences by stating that "this invention has for its basis the use of metallic conductors or of continuous carbons, heated to whiteness by the passage of an electric current. The best metal for this purpose is platinum; the best carbon is retort carbon." The lamp consisted of a vertical incandescent conductor of retort carbon generally resting upon conducting blocks at each end; from these blocks proceeded metallic conductors. Parallel with the incandescent rod was a bar of porcelain attached by metallic arms to the conducting blocks. One of the metallic conductors passed into a bath of mercury; the conductor in connection with the other end of the incandescing carbon passed through the upper part of a cylindrical glass envelope, which covered the whole arrangement. The lower narrower part of the glass cylinder was continued as a barometer tube, about 30 inches long. The lamp was exhausted of air by filling the lamp and the attached barometer tube with mercury; on inverting the entire apparatus the glass cylinder containing the rod of carbon emptied itself of mercury, thus forming the torricellian vacuum. The mercury in the barometer tube was made part of the electrical circuit. No dimensions are given of the carbon rod; the patent specification merely states that the retort carbon may be made into pencils or thin plates by the aid of saw and file. If platinum were used it was to be worked into thin sheets a quarter of an inch broad and of a length proportional to the number of battery cells used. The method recommended for obtaining the platinum in thin sheets was to place a piece of platinum foil between thick plates of copper and reduce the whole to a thin sheet by rolling; by this means the sheet would be of equal thickness throughout. The patentee makes the curious and interesting statement that, by this method of rolling, the platinum may be obtained so thin that on holding it before a printed page the letters can be distinguished through it. This early attempt to produce an incandescent lamp must be pronounced an extremely creditable one. The distance between King's thin carbon rod and the modern carbon filament cannot be considered remote. King's invention was much ahead of his time, and it really does seem as though, if the period had been favourable to such an invention, the "carbon filament in a vacuum" might have been a matter of near forty years ago instead of a thing of to-day.

The next advance was made by Greener and Staite, in 1846. These inventors devoted their experimental efforts to the preparation of purified carbon and the fashioning of this manufactured carbon into rods, hollow cylinders or square prismatic shapes. This patent is another striking example of the aphorism which declares that "there is nothing new under the sun." The patent practically, with slight exceptions, describes the modern manufacture of carbon rods for arc lights.

Messrs. Greener and Staite note that when carbon, in the purest state hitherto obtainable, is ignited by an electric current in an air-tight glass vessel the glass becomes obscured by the volatilized impurities.

The process of the inventors has for its object the removal of this inconvenience. They take lamp-black, charcoal or plumbago, or preferably* Church's patent coke in fine powder. The finely powdered material is digested with dilute aqua regia, afterwards washed with a weak alkaline solution, and finally with distilled water. The purified carbon obtained in this manner is dried and pressed into solid prisms or into cylinders, either hollow or solid, by means of hydraulic or screw pressure or by a fly press, "in the same way as the well-known porcelain buttons are formed." Sometimes to ensure better dryness and homogeneity the moulded carbons are exposed to intense heat in a furnace for twenty-four hours.

The lamp in which these purified carbons are used consists of an air-tight globular glass vessel containing two platinum cones whose bases face each other. In these cones is fixed a rod of the purified carbon, which may be either plain or have projecting points formed on its surface. This latter feature is claimed as an improvement, and some little stress is laid on it. The ends of the platinum cones are attached to the terminals of the battery. The inventors do not definitely state whether the containing vessel was vacuous or not, nor do they think it necessary to say how the external connections were made. Greener and Staite's incandescent lamp is thus seen to be identical in principle with King's. In practice, however, no doubt the superior purity and homogeneity of the prepared carbon rod would be found of material advantage, both as regards economy and durability.

In 1849, Petrie obtained a patent for an incandescent lamp, in which it was proposed to use rods of metallic iridium as the incandescing material. The iridium was to be fused in the electric arc and in some way formed into an ingot, which was then to be cut into rods of suitable shape. These iridium rods were to be used in place of the carbons used in the previous lamps. This scheme cannot be regarded as an advance on the previous ones, either as regards practicability or economy; indeed, it was undoubtedly somewhat retrogressive.

According to Fontaine, several other patents have been taken out in America, France and England for obtaining light by the electrical incandescence of a conductor, but he states that none of them are more complete or practicable than the method proposed by King.

* Church's patent coke was purified by an extraordinary kind of electrical process. The following are the details given in the patent which was taken out in 1845. As soon as the flame on the ignited mass of coal in the coke oven begins to die away, the air apertures are closed and through the temporary brickwork an iron-rod is introduced into the ignited coke near the bottom of the mass, and another iron rod is laid on the surface of the coke, taking care to make as good a contact as possible. The lower iron rod is made the positive electrode of a powerful battery, and the upper rod is arranged to complete the circuit. Care is taken that no short circuiting of the current occurs. Six tons of coke are said to require two hours of this electrical treatment. Church states that by repeated analysis he has found that the electrically treated coke is freer from sulphur than the same coke untreated, in the proportion of twelve to one. This statement is made so clearly and definitely that it is perhaps worth while for interested proprietors of coke ovens who have a dynamo machine in the works to consider the advisability of ascertaining whether any such obscure reaction takes place or not.

The whole subject appears to have been forgotten and lost sight of until 1873. In that year M. Lodyguine, of St. Petersburg, brought forward a lamp which appears to have been a reinvention of the leading principle of King's lamp. The St. Petersburg Academy of Sciences, however, awarded a substantial prize to Lodyguine for his invention. In the report made to the Academy upon it, it is stated that M. Lodyguine was the first who had conceived the idea of replacing the incandescent platinum by bars of carbon (coke) analogous to graphite, retort carbon being meant probably. It is evident from the preceding matter that this statement was a mistake, and the incandescent carbon lamp may be fairly regarded as of English and not of Russian origin.

The next inventor after Lodyguine appears to have been M. Konn, also of St. Petersburg. His lamp was apparently an improvement on its predecessors, as in this lamp arrangements were made so that when a carbon rod burnt out or failed, another rod was automatically put in circuit; no extinction of light therefore occurred until the second rod failed. Konn's lamp appears to have found some little practical application in Russia. Although the lamp was vacuous, the carbons only lasted on an average two hours each.

M. Bouliguine, another Russian, designed an incandescent carbon lamp with one long carbon rod, of which only a portion was incandescent at once. As the carbon rod consumed it was raised by the joint action of a counterweight and an electromagnetic contrivance. The additional complexity of M. Bouliguine's lamp would probably be found in practice to have little advantage over Konn's arrangement.

The foregoing descriptions are representative of the most important developments of this interesting subject, with one important exception, which will be dealt with fully later on. The record now reaches down to the time when Mr. Edison began his experiments in electric lighting, which have now reached such a successful issue.

(*To be continued.*)

NOTE ON THE PRESENCE OF A SECOND POISONOUS PRINCIPLE IN THEVETIA NEREIFOLIA.

BY C. J. H. WARDEN,

Bengal Medical Staff, Professor of Chemistry, Calcutta Medical College.

In the annual report of the Chemical Examiners' Department for 1880–81, the poisonous nature of thevetin,—a glucoside, isolated by De Vrij, contained in the kernels and bark of the *Thevetia nereifolia* plant,—was maintained. A further examination of the kernels has resulted in the detection of a second poisonous principle, apparently of greater activity than thevetin.

This second principle was obtained by precipitating the mother-liquor left after the crystallization of thevetin by aqueous tannic acid, and decomposing the precipitate by lime. By the action of absolute alcohol a yellow extractive was obtained, which had the following properties: it was persistently bitter, non-crystalline, and readily soluble in water. On aqueous solutions reagents produced the following effects: concentrated nitric or sulphuric acid, a yellow coloration; concentrated hydrochloric acid, no change in the cold or on heating; bichromate of potash and sulphuric acid, ferric chloride, or chlorine water and ammonia, no colour reactions; tannic acid, a white precipitate. ·017 of a gram injected into a cat's stomach caused in five minutes convulsive movements of the hind legs, which lasted for some time; there was also vomiting and profuse salivation. The cat recovered.

The amount of this principle isolated was only ·067 of a gram, so that it has only been possible to make a very cursory examination of its physical and chemical properties. It appears to differ from thevetin in a marked manner. Pure thevetin is white and crystalline, and only faintly bitter, and its aqueous solution is not precipitated by tannic acid. At present, through lack of material, I am unable to continue the investigation, which, however, I trust I shall be in a position to complete before the end of the current year.

THE ANALYSIS OF WINE.*

BY J. NESSLER AND M. BARTH.

I. Determination of the Amount of Extract.

The methods at present in use for the determination of the amount of extractive in wine differ from one another not only in subordinate details, but also in principle, according as extract is understood to mean the constituents of the wine absolutely non-volatile without decomposition, or the wine deprived of its water, alcohol and volatile acids. In the former case it is especially necessary to volatilize the glycerine completely without partially decomposing the non-volatile constituents of the wine through submitting them to too high a temperature. Determinations of extract in this manner are usually made with only a small quantity of wine (5 or 10 c.c.), which is heated upon a water-bath so long as water is perceptibly driven off, and the drying is then continued in an air-bath at 110° C., or preferably *in vacuo* until the weight remains constant. The other kind of determination has for a special object the retention of the glycerine as completely as possible in the extract. This can be effected either by avoiding raising the temperature above 100°, or by making an addition to the wine which will prevent the volatilization of the glycerine at a temperature of from 110° to 115° C.

In estimating a wine extract the authors concentrate 50 c.c. of the wine to a syrupy consistence on a water-bath, and then further dry it for three hours at the temperature of boiling water. In order to maintain this temperature exactly they used a jacketed apparatus, arranged like a paraffin drying chest, the interspace being filled with boiling water, and made sufficiently large for the water to be maintained in vigorous ebullition during four hours without exhaustion.

In order to ascertain whether in this process access of air exercised an essential influence upon the weight of the extract parallel experiments were made in which 25 c.c. of wine were placed in each of two platinum boats, enclosed in test-tubes, and arranged so that whilst side by side in the above-mentioned drying chamber a current of dried coal gas could be passed over one and a current of dried air over the other. A thermometer fixed in the drying chest showed that when the water was boiling vigorously the temperature in the interior was 100° C. After heating for eight and ten hours the residue was weighed with the following results:—

	Eight hours.	Ten hours.
Current of coal gas .	1·84 per cent.	1·80 per cent.
Current of air . .	1·90 „	1·86 „

* Abstract of a paper in Fresenius's *Zeitschrift für analytische Chemie*, xxi., 43.

The difference between the results of the two estimations is probably due to the extractive matter in the one case taking up oxygen from the air; but it is not considered sufficient to constitute an essentially larger quantitative result in drying under access of air than in a current of coal gas.

If the wine be first evaporated upon a water-bath in an open platinum dish to a syrupy consistence it only requires to be heated for three hours in the drying chest before reaching a point where the difference between two weighings is dependent entirely upon the volatility of the glycerine. Experiments made to determine the extent of this volatility showed that it amounted to about 10 per cent. of the glycerine present during the evaporation on the water-bath and another 4 per cent. in the drying chest. So that a wine containing 1 per cent. of glycerine would lose about 0·14 per cent. through its volatilization during evaporation and drying; but in a low wine, which with 5 or 6 per cent. of alcohol would probably contain only 0·4 per cent. of glycerine, the loss would only amount to 0·05 per cent. If, however, the extract be dried at 110° C., experiment has shown that in this part of the operation alone, in three hours, about 10 per cent. of the glycerine present is driven off, so that at the end of the drying the total loss is considerably larger than in drying at 100° C.

Alteration in the other constituents of the extract is relatively small when the drying is effected at 100° C. Fifty c.c. of wine, containing 0·47 total acids, was evaporated to the consistence of a syrup, then heated further for half an hour upon a water-bath, after which the non-volatile acid amounted to 0·36 per cent. The extract of the same wine after drying three hours at 100° showed upon titration 0·28 per cent.; that dried at 110° C. showed 0·22 per cent.; and that dried at 120° C. 0·11 per cent. of non-volatile acid.

Grete has recommended that in order to obviate the decomposition of the non-volatile constituents of the extract during drying, and especially to entirely prevent volatilization of glycerine, the wine should be evaporated with a measured quantity of titrated baryta water. Some experiments have been made by the authors to determine (1) whether an indifferent body like glycerine actually enters into chemical combination with caustic baryta so as to be no longer volatile at 110° C.; and (2) whether, if this be the case, the quantity of extract usually present in 10 c.c. of wine is sufficient to combine chemically with the whole of the baryta in 10 to 15 c.c. of baryta water of ordinary strength, so that in the dry residue no barium hydrate shall be present, since the reckoning of a variable amount of it as BaO would affect the result. An Alsace wine of 1876 was used, and it was found that the first of these questions must be answered in the affirmative, 0·489 per cent. out of 0·5 per cent. of added glycerine being recovered. As to the second, it was found that when 10 c.c. of baryta water was used it was certainly all combined, and that this was also the case with 15 c.c., unless the wine was particularly poor in extract. The partial decomposition of the nitrogenous organic constituents, which is made evident by the odour of trimethylamine when the extract containing baryta is heated, does not appear to exercise any essential influence upon the weight of the extract, whilst the acids of the wine, in the form of barium salts, better resist decomposition at a high temperature than in the free state.

This method has, however, the disadvantage that the same wine would be made to appear considerably richer in extract by the presence of traces of acetic acid, because whilst this would have been produced from the alcohol, it would be weighed with the extract. But the purpose of the adulterator, who had added glycerine to make up for the want of extract in a wine which had been diluted before fermentation with alcohol and water or sugar and water, would be thus served, as the extract would be brought up to the normal quantity, whilst in external characters the extract containing baryta from a diluted wine that has been treated with glycerine does not differ from that of a natural wine. In practice, therefore, in many cases an estimation of the acetic acid and glycerine would also be necessary. As previously mentioned, by far the greater portion of the glycerine present in wine is retained in the extract. A wine, therefore, to which any considerable quantity of glycerine had been added would yield an extract that is soft and viscous even after three hours' drying, whilst the extract from a natural wine is hard and generally bulky and blistered, or at the most,—where the wine is strongly alcoholic through fermentation, which increases the normal quantity of glycerine,—is plastic, somewhat like hard dough.

Hager has compiled a table* by the help of which the amount of extract in a wine can be ascertained from the specific gravity of the liquid after being deprived of alcohol. In almost all the completely normal wines the quantity of extract found by the above method corresponded within two to three hundredths per cent. to that indicated by Hager's table. If the wine contains sugar still unfermented, or unfermentable constituents of potato sugar, then usually the extract calculated is somewhat higher than what is found; but if, on the contrary, it contains an abnormal quantity of glycerine the extract calculated is considerably less than what is actually found. Therefore, it is always advantageous to compare the amount of extract calculated according to Hager's tables with that found by the method described. This method does not do away with the necessity for an estimation of the glycerine itself in such wines as may be suspected to have received an addition of glycerine.

The authors have applied this method in the estimation of the extract of several hundred kinds of undoubtedly genuine wines of different years and from widely separated districts. The results of these determinations are set out in a tabular form in a separate communication.† It was found that the absolute quantity of extract in pure natural wines may vary within very wide limits. Among other conditions exercising an essential influence upon it are the nature of the soil of the district in which the wine is grown, the situation of the particular vineyard, the weather, degree of ripeness of the grapes, the course of the fermentation, and unskilful treatment of the wine, which may induce a considerable alteration in the composition of the extract without any foreign addition being made.

The amount of extract present in pure, completely fermented wine stands in definite relation to the acid present. It amounted in none of the genuine wines examined by the authors, after the deduction of the free acid of the wine, to less than 1 per cent. It may happen that a genuine wine may contain less than 1 per cent. of extract free from acid; but in such cases the *non-volatile* acid is determined, and after deducting this fixed acid from the total extract there is always a residue amounting to at least 1·1 per cent. The estimation of the fixed acid is made with sufficient exactitude by evaporating 20 c.c. of the wine to a syrupy consistence, heating it further for half an hour to an hour on a water-bath, subsequently treating it with hot water and titrating after it has cooled.

But a larger proportion of extract than 1 per cent. after deduction of total acids may be expected—

(1) In wines which contain much sugar still unfermented, but in which from any cause fermentation is stopped. The fully fermented dry wines usually still contain a small quantity of sugar, which may vary between 0·01 and 0·001 per cent. The minimum of extract free from acid to be expected in a natural wine would exceed 1 per cent. by as much as the quantity of sugar as ascertained under suitable precautions by means of Fehling's solution exceeds 0·1 per cent.

(2) In wines from certain districts which are known by experience to produce in their best years a relatively full-bodied wine.

(3) In red wines. In these the smallest amount of acid-free extract is usually 1·2 per cent.; but in "berry wines," and in such red wines as have stood only for a very short time over the husks and stalks, the minimum is exceptionally 1 per cent.

Wines rich in ash also stand higher in respect to amount of extract. If a wine yields much ash and gives relatively little extract, and if in addition the ash is easily fusible and not blackened by incineration, then the authors thinks there is reason to suspect that the wine consists partially of the product of fermentation of a solution of sugar over wine residues.

Provided that the total amount of extract, free from ash and sugar, does not sink below a certain quantity, it may vary very considerably in composition according to the quality of the wine. For instance, since glycerine is a bye-product of fermentation, and may amount to from 7 to 10 per cent. of the weight of alcohol produced, a clear natural wine, rich in alcohol, would evidently contain more glycerine than one poor in alcohol. Another portion of wine extract consists of pectin bodies, which occur, however, in less quantity in proportion to the ripeness of the grapes used in making the wine. Very ripe grapes, rich in sugar, leave after fermentation relatively much glycerine and little pectin substance, while with unripe, very acid grapes, poor in sugar, the contrary is the case.

The ash constituents amount on the average to about 10 per cent. of the entire weight of the extract, but this amount is not an indispensable characteristic of a pure wine, since it may be affected by various conditions. For instance, a wine may be rich in extract, but not in ash, when it contains a considerable quantity of unfermented sugar; or the ash may be low through separation of tartar not only when a wine contains much alcoool, but when it has been exposed for a long time to a low temperature, which causes a separation of the tartar in crystals that do not redissolve on the normal temperature being restored. The total amount of ash found by the authors in genuine wines did not fall below 0·14 per cent.

II. A Modification of Neubauer's Test for Potato Sugar in Wine, and the Optical Behaviour of Pure and Saccharated Wines.

Neubauer's method for the recognition of an addition of potato sugar to wine or must is based upon the optical behaviour of the wine in a polarimeter. Whilst pure natural wine, which contains unfermented fruit sugar, rotates the plane of polarized light to the left, and completely fermented wine is quite neutral in its behaviour or rotates the plane only a few tenths of a degree of Wild's scale to the right, a fermented potato solution has a considerable residue of strongly dextrogyre constituents, which are not sugar. According to recent experiments by the authors with various kinds of commercial potato sugar, even the best qualities, pure white and in crystalline granules, contain from 15 to 18 per cent. of unfermentable substance, each 1 per cent. of which, in 200 mm. tubes, has a dextrogyre action of 1·5° (Wild). Consequently 1° of rotation by the fermented wine due to this cause would, on the average, correspond to an addition of 4 kilos of potato sugar to the hectolitre of wine. In the presence of unfermented sugar this result would be modified: 1 per cent. of sugar rotates about 1·25° to the right, so that 1° of rotation, due to unfermented potato sugar, would correspond to about 800 grams of chemically pure grape sugar in the hectolitre. But inferior kinds of potato sugar contain from 26 to 30 per cent. of the unfermentable substances, which do not reduce Fehling's solution.

As before mentioned, wine frequently contains a small quantity of a dextrine-like constituent, capable of exercising a slight dextrogyre action amounting to 0·03° to 0·6° (Wild). But this substance is almost completely

* *Zeitschrift f. analyt. Chemie*, xvii., 502.
† *Zeitschrift f. analyt. Chemie*, xxi., 198.

insoluble in alcohol, whilst the greater portion of the dextrogyre residue from fermented potato sugar is soluble in 90° alcohol. Upon this fact Neubauer based a method of distinguishing between the slight dextrogyre action of a normal wine and that of one containing potato sugar. The method, however, has the defect of admitting the possibility of the result being affected by the presence in the test solution of free tartaric acid, which also has a dextrogyre action. It is, therefore, proposed by the authors to modify it as follows:—

210 c.c. of wine, after the addition of a few drops of concentrated solution of potassium acetate, is evaporated to a thin syrup, treated with 90° alcohol, the alcoholic solution decanted when perfectly clear or filtered, water added, and the liquid decolorized with animal charcoal, evaporated to about 15 c.c., filtered, the filter washed and the filtrate brought up to 30 c.c. (one-seventh of the original volume of the wine) and polarized. If the resulting liquid shows a rotation of more than 0·6° (Wild), the wine may be considered with certainty to contain potato sugar.

If a wine contain non-inverted and unfermented cane sugar, which would probably have been added to it after fermentation to increase the amount of extract, the dextrogyre action of such a wine would be changed into a levogyre action during the evaporation even by the influence of the natural acids, but more certainly if a few drops of hydrochloric acid be added. The presence of unfermented cane sugar would therefore be indicated when a wine first shows a dextrogyre action and then after evaporation with hydrochloric acid shows a corresponding levogyre action.

A 6·5 per cent. solution of cane sugar, which rotated 8·4° to the right, was heated in a water-bath during three-quarters of an hour with some hydrochloric acid, brought to its original volume and polarized, when it showed a left-handed rotation of 2·2°. In order to test whether the inversion was quite completed, this solution was now kept in active ebullition for half an hour, evaporated water being restored as far as possible; it had then acquired, without any perceptible charring, a wine yellow colour, and having been brought to its original volume, showed a left-handed rotation of 1·7°. A sugar determination with Fehling's solution gave 5 per cent. of invert sugar. It follows that a 1 per cent. aqueous solution of invert sugar rotates about 0·34° to the left (1 per cent. cane-sugar solution rotates about 1·3° to the right); that the inversion of a tolerably large amount of sugar is completely effected in three-quarters of an hour on the water-bath; and that by longer heating to a little over 100° C. (*i.e.*, to the boiling point of the sugar solution) a portion of the resulting invert sugar is again decomposed. When small quantities of cane sugar are present the natural acids of the wine are sufficient to effect complete inversion during heating; but with larger quantities (1 per cent. and upwards) it must be assisted by a little hydrochloric acid. As soon as cane sugar in wine has completely fermented its addition to the must can no longer be detected by optical means.

The question whether an addition of caramel to a wine exercises any influence upon its optical behaviour has been answered in the negative by the authors' experiments, caramel proving to be optically inactive.

III. Chlorine Determination and the Amount of Chlorine in Wine.

It is known that in the estimation of wine by experts an essential value is placed, among other things, upon the amount of ash found in it, and that manipulations for increasing its bulk considerably lower the proportion of incombustible substances that it yields. In order to cover this poverty of ash constituents an addition is often made of such salts as will remain completely dissolved in the wine and hence not raise suspicions, and for this purpose an addition of common salt to a sophisticated wine is not very extraordinary. But it is more common to use water from a spring rich in residual matter, by which means the lowering of the ash constituents through dilution of the wine is much lessened. Such waters, however, are often very rich in chlorine compounds, and therefore the estimation of chlorine in wines is not unfrequently of especial interest. But isinglass occasionally, though not very often, contains some added salt, so that the presence of a sophistication cannot be assumed with certainty upon the single ground of the occurrence of a somewhat too large quantity of salt.

All wines that contain abnormal quantities of common salt are distinguished by the ash not burning white so easily as that of most other wines: it pertinaciously retains carbon, and upon using a very strong heat in incinerating it probably fuses and a large portion of the alkaline constituents is volatilized. If the incineration residue be left to cool, treated with water so as to separate the salt from the carbonaceous particles, and then heated carefully so as to avoid spirting (a characteristic of common salt), a pure white ash will probably be obtained, but it will not contain all the salt. Further, if the extract be simply carbonized and then treated with water, the residue from the evaporation of the liquor cannot be looked upon as containing all the sodium chloride as such; because the organic acids of the wine, immediately upon being heated, and before they are decomposed, expel a considerable quantity of hydrochloric acid and eventually form carbonates. Consequently a chlorine determination of ash produced as carefully as possible gives the amount of chlorine compounds in a wine too low.

In the estimation of chlorine in original wines those quantitative analytical methods which depend upon the use of potassium chromate as an indicator are not available, because the red-brown silver chromate is not insoluble in the free acids of wine. The previous neutralization of the wine results in the production of colour during the reaction, which prevents the commencement of the end reaction from being distinguished with the necessary sharpness.

In using Volhard's method of determining chlorine white wine must be first decolorized with animal charcoal free from chlorine compounds, as the yellow tannin-like substances of the wine will produce with the ferric salt used as an indicator an intensely dark green or black colour, and even by this decolorization the production of colour in the wine upon the addition of ferric salts, silver solution and potassium sulphocyanide cannot be entirely avoided.

A slight modification of Volhard's method induces a sharp end reaction and gives exact results. 40 to 50 c.c. of decolorized wine is acidulated with nitric acid and treated with excess of titrated silver solution, and titrated solution of potassium sulphocyanide added gradually, until a drop of the liquid allowed to fall into a drop of dilute solution of a ferric salt (iron alum) upon white porcelain shows a distinct red colour. If the quantity of potassium sulphocyanide solution required be large, the experiment should be repeated, taking as small an excess of silver solution as possible. Twenty-five undoubtedly genuine wines from different districts (including five red wines) were examined for chlorine, and it was found that the normal amount of chlorine in wine does not exceed 0·005 per cent., whilst in most wines it is below 0·002 per cent. Five genuine "Markgräfler" wines, of the years 1822, '62, '68, '70 and '75, showed an amount of chlorine varying between 0·002 and 0·0025 per cent. Italian and similar wines, grown in the neighbourhood of the sea-coast, frequently yield an easily fusible ash that does not burn perfectly white; but none have yet been observed in which the amount of chlorine exceeded 0·006 per cent. At Carlsruhe several wines have been examined in which the chlorine amounted to 0·03 per cent., representing 0·05 per cent. of common salt, or 25 per cent. of the entire ash.

IV. Detection of Free Tartaric Acid in Wine.

If 100 c.c. of wine be evaporated to a thin syrup, and this, while kept stirred, be treated with strong alcohol until a fresh addition of spirit no longer causes precipitation, all the tartar will separate within two hours and the alcoholic solution will contain the free tartaric acid. The alcohol is evaporated, the residue taken up with water, the somewhat turbid liquid cleared by the addition of pure washed animal charcoal,* filtered, and the filtrate, which may amount in volume to one-tenth of the original wine, treated cold with 1·5 to 2 c.c. of a 20 per cent. solution of acetate of lime. A wine, which tested according to Berthelot and Fleurieu's method is found to contain no free tartaric acid, does not show the slightest turbidity when treated in the above manner. Wines containing 0·05 per cent. of free tartaric acid show after a short time a crystalline separation, and after half an hour a distinctly crystalline granular deposit on the sides and bottom of the containing vessel; in two hours the separation is considerable, after which it does not perceptibly increase. An amount equal to 0·01 per cent. gave in two hours distinct crystals of tartrate of lime. The presence, however, of so small a quantity of free tartaric acid is of little consequence in judging a wine. Wines from unripe or partially unripe grapes contain free tartaric acid; but according to the results of experiments on wines from most diverse districts it never exceeds one-sixth of the non-volatile acids present.

V. Estimation of Citric Acid in Wine.

Citric acid is sometimes used as an addition to the acid in an excessively diluted wine, either in substance, or, if it be desired to give to the beverage at the same time body and the appearance of old wine, in the form of tamarinds, in which it is present in considerable quantity. The estimation of citric acid in wine has therefore considerable interest.

For the detection of citric acid the characteristic behaviour of its lime salt can be used, it separating in a crystalline form upon prolonged boiling of the aqueous solution; but the citric acid must previously be separated as much as possible from other acids and the special extract constituents of the wine, since citrate of lime remains dissolved in the neutral saline solutions of most acids. After many unsuccessful experiments the following method was found to give useful results.

100 c.c. of wine being evaporated to about 7 c.c., it is allowed to cool and then treated with 80 per cent. alcohol; after standing about an hour the undissolved matter is removed by filtration, the alcohol evaporated off, water added to bring the residue up to 20 c.c., part of the acid neutralized with a thinnish milk of lime (red wine requires here an addition of some washed animal charcoal), and then filtered. The filtrate, which must still be distinctly acid, is brought up to the original volume of the wine with water, and 0·5 to 1 c.c. of a cold saturated solution of neutral acetate of lead added and very briskly agitated. The lead precipitate contains a portion of the malic acid (another portion remains dissolved as an acid salt in the dilute acid liquid), phosphoric acid, a trace of sulphuric acid, tartaric acid and citric acid. It is filtered off, washed with cold water, placed together with the filter in a closed retort containing water saturated with sulphuretted hydrogen and energetically shaken and thus decomposed. After standing some time the perfectly colourless, clear liquid, which contains the above-mentioned acids, is filtered off, washed with water containing sulphuretted hydrogen, the sulphuretted hydrogen driven off by evaporation, and the liquid, amounting to about 15 c.c., made faintly alkaline with thin milk of lime, so as to separate phosphoric acid, then filtered, the filtrate acidulated with the smallest possible quantity of acetic acid, and by standing from half to one hour the tartaric acid present sufficiently removed as tartrate of lime. The liquid is then evaporated to dryness to separate free acetic acid, the residue taken up with hot water and this concentrated until the separation of the crystalline citrate of lime. After being once separated it is no longer soluble in hot water; it is filtered off, washed hot, dried and weighed. The salt has the composition $(C_6H_5O_7)_2Ca_3 + 4H_2O$. In this way, in a case where 20 mg. of citric acid had been added to a wine a precipitate corresponding to 13 mg. of citric acid was obtained.

In a specimen of commercial tamarinds 13·5 per cent. of citric acid was found.

Most of the natural wines tested were found to be free from citric acid. Some of them contained traces; as, for instance, a white Alsace wine of 1878 and a white Italian wine of 1880. But the amounts of citric acid in these wines only amounted to between 0·003 and 0·002 per cent.

* The charcoal must be boiled with hydrochloric acid and washed so that whilst moist it shall have a perfectly neutral reaction, and contain scarcely any salts, especially phosphate.

EXAMINATION OF THE ROOT OF BERBERIS AQUIFOLIUM—VARIETY REPENS—OREGON GRAPE ROOT.*

BY HENRY B. PARSONS.

This plant is found in the mountainous regions of Oregon, California, Utah, Colorado, Nevada and Montana, from which latter section the sample here examined was received.

The roots, as received, were in broken pieces, about a foot in length and ½ inch in diameter; they had a brownish exterior layer, underneath which was a bright yellow layer. The powdered sample has a bright lemon-yellow colour and a decidedly bitter taste.

The root is said to be much used in form of decoction for the treatment of what is known as the "mountain fever" among the western miners. By them it is reported to be an efficient tonic and antiperiodic, capable of replacing salts of quinia in the treatment of malarial disorders.

In 1837, a French physician, Piorry,† stated that he preferred a properly made extract of the root of *Berberis vulgaris* (a closely related plant) to quinia salts in all diseases where "he found the spleen enlarged in a patient suffering from ague, intermittent, or hectic." Some years later, his former pupil, Dr. L. M. Klein, made further experiments in treatment of fevers in Algeria, and he strongly confirmed the statements of Piorry. As the root of *Berberis vulgaris* (the common "barberry" of the Eastern States) is very similar in composition to the root of *Berberis aquifolium*, variety *repens*, the therapeutic action of the two is likely to be about the same, and the statements based on trials of the one are probably applicable to the other. Be this as it may, the fact remains that recent trials in the United States seem to show that the tonic properties of *Berberis aquifolium* are unquestionable, and eclectic practitioners have long claimed that its antiperiodic virtues were equally well defined and established.

A careful chemical analysis of the powdered roots reveals the presence of two alkaloids, to which, in all probability, can be ascribed the medicinal effects of the roots. None of the other substances were of a character likely to have any decided activity.

The first alkaloid, *berberina*, is the substance to which the yellow colour of the root is due; it is freely soluble in alcohol, moderately soluble in water and in chloroform and ether. Its taste is decidedly bitter. It forms sparingly soluble lemon or orange-yellow salts with sulphuric, hydrochloric and nitric acids, and salts more freely soluble with acetic, phosphoric and hypophosphorous acids.

* Report of the United States Commissioner of Agriculture, for 1880, p. 139. From *New Remedies*, March, 1882.

† *Lancet*, 1872, December 5, p. 498.

	Properties and Reactions.	Berberina.	Hydrastina.	Oxyacanthina.
		$C_{20}H_{17}O_4$	$C_{22}H_{23}NO_6$ (?)	$C_{16}H_{23}NO_6$(?). $C_{32}H_{46}N_2O_{11}$ (?).
1	Colour	Lemon or orange	Pure white	White; yellowish, on exposure.
2	Taste	Bitter	Nearly tasteless	Bittter.
3	Water	Moderately soluble	Insoluble	Nearly insoluble.
4	Absolute alcohol	Moderately soluble	Soluble	Soluble.
5	Commercial 90 per cent. alcohol	Soluble	Soluble	30 cold; 1 boiling.
6	Ether	Nearly insoluble	Soluble	125 cold; 4 boiling.
7	Chloroform	Moderately soluble	Soluble	Freely soluble.
8	Benzole	Nearly insoluble	Soluble	Soluble.
9	Ammonia	Soluble	Insoluble	Sparingly soluble.
10	Soda	Soluble	Insoluble	Moderately soluble.
11	Sodium carbonate	Soluble	Insoluble	Nearly insoluble.
12	Tinct. iodine	Dark red precipitate	Dark red precipitate	Dark brown-red precipitate.
13	Iodine in iodide	Nearly black precipitate	Nearly black precipitate	Dark brown-red precipitate.
14	Potas. merc. iodide	Yellow precipitate	Yellow precipitate	Yellowish precipitate.
15	Phosphomolybdic acid	Yellow precipitate, soluble in ammonia.	Brownish precipitate: not soluble in ammonia	Brownish precipitate, insoluble in but turned dark-blue by NH_4OH.
16	Potas. cadmium iodide	Yellow precipitate	White precipitate	White precipitate.
17	Picric acid	Yellow precipitate, insoluble in dilute HCl.	Yellow precipitate, insoluble in acetic acid	Yellow precipitate, insoluble in acetic acid.
18	Platinum chloride	Yellow precipitate, soluble in HCl.	Yellowish precipitate, soluble in HCl	Yellowish precipitate, insoluble in HCl.
19	Gold chloride	Yellow precipitate, insoluble in HCl.	Yellow precipitate, insoluble in HCl.	Orange precipitate, insoluble in HCl.
20	Tannic acid	Yellow precipitate, insoluble in HCl or $HC_2H_3O_2$.	Brownish precipitate, soluble in $HC_2H_3O_2$, but insoluble in HCl.	Brownish precipitate, insoluble in $HC_2H_3O_2$ and dilute HCl.
21	Conc. sulphuric acid	Yellowish-red, olive-green, brown, olive-brown	Yellow, purple-brown, green	Brownish-purple, browner, more purple on standing.
22	Sulphuric and molybdic acids	Yellow-brown, olive-green; same warmed.	Deep green, brick-red, red-brown, dark chocolate-brown	Purple; fades slowly; becomes yellow, then green.
23	Conc. nitric acid	Orange-red; no effervescence	Orange-red; effervesces; brown and darker	Orange-red; effervesces; colour permanent.
24	Fused zinc chloride	Yellow; light-brown	Light yellowish-brown	Chocolate-brown.
25	Specific rotatory power		+153·5 (in excess dilute HCl).	

This alkaloid is removed from the plant by water; much more readily, if a little acetic acid is added.

The alkaloid and its salts have been used as a tonic, and as an antiperiodic, and glycerin solutions of the alkaloid are still considerably employed in treatment of ulcerated surfaces.

The second alkaloid is called "*oxyacanthina*;" it is a white, bitter, difficultly crystallizable solid, which changes to a light yellow colour if it is long exposed to the air in a moist condition. The presence of a little caustic or carbonated alkali seems to intensify this colour, and may possibly cause the change. If this alkaloid be treated with dilute nitric acid in excess, and slightly warmed, it gives off nitrous vapours, and is converted partly into a yellowish-red resin-like substance, and a soluble substance much resembling berberina in colour, and precipitated by Mayer's solution. It may be possible that this alkaloid is closely related to berberina; a similar action occurs with hydrastina.

There seem to be no statements regarding the medicinal properties of oxyacanthina. As it is easily prepared, the matter might readily be investigated. It may be separated from the mother-liquors, after berberina has been crystallized from extracts of *Berberis aquifolium* or *B. vulgaris*, by adding a very slight excess of sodium carbonate solution with constant stirring. The yellowish precipitate should be allowed to separate; it can then be washed on the filter until nearly free from berberina, dissolved in dilute hydrochloric acid, and again precipitated by careful addition of ammonia. After washing and drying the substance is moderately pure. It may be further purified by crystallization from alcohol. It cannot be crystallized from chloroform alone.

The other chemical properties of these two alkaloids are given in the above table.

The yellow alkaloid, berberina, is geographically very widely distributed, plants containing it having been found growing in Europe, Asia, Africa and America. It is also found, probably, in more natural orders, and also in more distinct plants, than any other alkaloid; possibly caffeina may prove an exception.

Of the natural orders, it has been found in *Ranunculaceæ*, *Anonaceæ*, *Menispermaceæ*, *Berberidaceæ*, *Rutaceæ*, and *Leguminosæ*. The first five of the above natural orders are closely related, and it may prove that the presence of berberina, together with certain other alkaloids, may be of service in the identification and classification of doubtful botanical specimens. Thus it is at present possible to distinguish chemically between the root of *Hydrastis canadensis* (nat. ord. *Ranunculaceæ*) and the root of *Berberis aquifolium* or *B. vulgaris* (nat. ord. *Berberidaceæ*); for while both plants contain berberina, still this yellow alkaloid is associated in hydrastis with a white alkaloid (hydrastina), which gives quite different chemical reactions from the white alkaloid of berberis (oxyacanthina). A more complete study of this question would be of scientific and practical interest.

The following is a proximate analysis of the roots:

Proximate Analysis of the roots of Berberis Aquifolium, variety repens. "Oregon Grape Root."

Moisture		6·08
Ash, soluble in water	1·63	
Ash, insoluble in water	2·08	
		3·71
Crude fibre		23·33
Albuminoids, insoluble in water and alcohol	3·15	
Albuminoids, soluble in alcohol, insoluble in water	1·68	
		4·83
Berberina*		2·35
Oxyacanthina*		2·82
Black substance with oxyacanthina		0·23
Resin, insoluble in ether, soluble in alcohol		1·91
Sugars (traces), organic acids (?), extractives, colours		4·55
Ether extract, chiefly wax		1·36
Gum and yellowish colour		5·56
Starch isomers, by titration		18·05
Substances extracted by acid and alkali, determined by difference		25·22
		100·00

In the table on the previous page are given some of the properties and characteristic reactions of these three alkaloids. It will be seen that the different solubilities of the platinum salts (18) and of the tannate (20) and the strikingly different colour reactions, especially with sulphuric and molybdic acids (Fröhde's reagent), (22), serve to make the distinction between hydrastina and oxyacanthina comparatively easy and certain. Lack of material and of time prevented further chemical investigation of oxyacanthina.

TAPIOCA CULTIVATION IN MALACCA.†

The mode of cultivating tapioca in the Straits varies but little on different estates, whether owned by Europeans or Chinese. If jungle composed of large trees is to be cleared the trees are cut down at some height from the ground, the stumps remaining in the ground, and the whole set on fire, the charred remains of the trees being generally allowed to lie where they fall until the first crop is being cleared off, when they are utilized for fuel. After the ground has been dug over and the soil put into a friable condition the cuttings of tapioca are planted in rows from 3 to 4 feet apart and about 9 inches or a foot in the rows. The cuttings are lengths about a foot long of the stem of the matured plant. These root easily, and in less than two months the ground is covered with a carpet of green almost a foot high. From this time to the time the crop is lifted, beyond weeding and slightly banking-up, nothing is done to the crop, although on some estates the tall stems are sometimes cut down to about 4 feet from the ground, which must evidently keep the plants in a growing state, and prevent the proper storage of starch. On some estates I have known the crop lifted nine months after planting, with good results; but the Chinese planters in Malacca usually keep the roots in the ground sixteen or even eighteen months. Perhaps each has its advantages, but it has struck me that tubers kept in the ground over a year develope a large amount of woody fibre without increasing the quantity of starch, which is evidently a disadvantage to the machinery.

* The figures of berberina and oxyacanthina are probably a little too low, owing to the sparing solubility of the alkaloids or compounds which were weighed. The error does not probably exceed 0·1 per cent. in either case, and is probably least for berberina, which was weighed as platinum salt. The oxyacanthina was weighed as base.

† Extract from a communication to the *Gardeners' Chronicle*, June 17, 1882.

The general mode of lifting the crop is to cut off a certain portion of the tops, and pull up the tubers, the broken pieces being dug out afterwards. Of course, on land that has previously carried a tapioca crop, manure should be used, which by some planters is applied previous to planting, and by others after the young plants have started into growth. In Malacca, however, cow-shed refuse is a scarce article, and the cost of carriage would be considerable where estates are distant from the base of supply and roads in many instances steep and bad.

On one estate in Singapore under European management a green crop is grown with the tapioca, consisting principally of *Arachis hypogœa*, various crotalarias, principally *C. striata*, etc., which is dug in with lime, etc., while green, for the next crops, but the plan does not appear to find acceptance with other planters. The root of the tapioca it is hardly necessary to describe here, but I may state that while in Malacca I saw some specimens over 2 feet long, and weighing between 6 and 7 lbs. The roots being laid in heaps are carted to the manufactory, and the sticks laid in stacks for supplying cuttings for the next crop.

The estate first visited in Malacca was Buki Bruang (literally Bear Hill), and here we found J. M. Lyon and Co's patent machinery in full working order.

Of course steam is the motive power, in fact the most primitive styles of preparation seem unable to do without this, as I will show later on. The roots, being first divested of their woody tops, are thrown into a large revolving drum, in which pipes are so arranged that constant jets of water play on them as they are turned over and over, and gradually they reach the farther end of the drum perfectly clean, and empty themselves into a rasping machine, whence they emerge in the form of a fine pulp, which is thrown direct from the rasper into another cylinder covered either with stout muslin or brass-wire gauze, through the sides of which jets of water are continually passing. By this process the starch is separated from the pulp, the starch passing through the muslin or gauze into a tank beneath, where further supplies of water send it off through gutters to vats prepared for its reception, while the pulp is discharged from the drum into baskets and thrown into heaps either for cattle feeding or manure, for either of which I imagine it is little suited.

After the starch in the vats has been allowed to subside the water is gradually drawn off, fresh water supplied, the whole stirred up and again allowed to subside, and the water again drawn off. The treatment of the starch in this stage depends on the purity of the water used—as, unless the tapioca when prepared is of the purest whiteness it can hardly be given away. Hence, one of the principal points to be attended to is the supply of clean water in abundance. After the starch has become sufficiently pure it is allowed to dry in the vats, whence it is cut out in cakes and is then ready for the last stages of preparation. If tapioca flour is required it is placed first on racks to dry, then on large, almost flat tin sheets which form the top of a brick flue where an extremely gentle fire is kept up.

If flake tapioca is requisite it is submitted to rather stronger heat in concave pans at first, whence it is removed to the previously mentioned sheets and kept turned over with wooden rakes, etc., until it assumes the flake-like form so familiar to consumers in Europe. The flakes are then sifted, to separate the various sizes, and the prepared tapioca is ready for placing in the bags for shipment.

Next morning at 6 o'clock we were *en route* to another estate, belonging to Mr. Koh Hoon Boh, at Matchap, about eighteen miles distant. The first ten miles is along the public road, along some parts of which in wet situations are large indigenous plantations of the glam (*Melaleuca leucodendron*), the bark of which is used by Malays for caulking their boats. In all directions we saw the natives busy planting the rice fields.

On leaving the public road, however, our troubles began; to drive over the road we did the day before was a delight compared with the one it now fell to our lot to drive over, and it was with no little satisfaction that I gave up the reins at Matchap to the syce, after his informing me when within fifty yards of the house that I had two miles more to drive. Here we found the primitive style at work. The roots are first half-peeled with knives, in which operation a large part of the root is cut off, then thrown into a tank of water, when they are washed by the Chinese treading on them; thence they are lifted in baskets to the rasping machine, which is worked by a traction engine, built in the brickwork, and regulated by hand. The pulp falls from the rasper into baskets, which are carried about twenty yards, and the contents emptied on muslin covers of concave wickerwork baskets, above which a wooden water gutter is placed, the supply of water being regulated by plugs over the baskets. Here the Chinamen separate the starch by arranging a constant fall of water on the muslin, and keeping the mass well stirred with their hands until they think they have extracted all the starch, when they throw the refuse pulp away, and receive a fresh supply from the rasper, the water with which they wash the pulp serving to convey the starch to vats prepared for it. Of course the starch prepared in this manner requires more washing than that prepared by the machinery I have described, and I venture to think that consumers in England would prefer tapioca, made by machinery, when it need never be handled, to that which is carried about so much amongst decaying vegetable matter and mud, as that hand-prepared usually is. Here the starch is baked by fire passing beneath a tile-covered flue on which it is placed. Pearl tapioca is manufactured here as follows:—A cloth is attached like a hammock to the beams and kept open by cross sticks. A man at each end alternately jerks the cloth to and fro, the slightly warmed starch under this treatment soon forming small, completely spherical balls, which are afterwards baked on a tile covered flue.

The number of coolies about here was surprising, and it is hardly necessary to say that only about 30 piculs of tapioca is produced per diem; in fact, Mr. Koh Hoon Boh is so thoroughly convinced of the superiority of manufacture combined with economy of the preparation by machinery, after comparing the cost at his estate, which we visited the day before, with the cost of hand preparation, as at Matchap, that he ordered a machine to be erected at once.

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Continued from page* 26.)

SODII SALICYLAS (*Salicylate of Sodium*).

Salicylic acid, dialysed	33
Bicarbonate of sodium	20
Distilled water	q.s.

Mix the acid and bicarbonate in a porcelain capsule, with the least possible quantity of distilled water to a thick paste and heat the mixture, on the water-bath, to a temperature no exceeding 60° C. (140° F.). When no more carbonic acid gas escapes, ascertain if the solution has still a slight acid reaction, and, if this is the case, evaporate it to dryness, under constant stirring.

A white powder, crystalline or amorphous, soluble in 0·8 part of water and in 5 parts of strong alcohol.

SANGUIS BOVINUS SICCUS (*Dried Ox-blood*).

Fresh ox-blood	q.s.

Free it, while still fresh, by beating, from the fibrin, strain and evaporate it, under continuous stirring, on the water-bath to dryness, at a temperature not exceeding 60° C. (140 F°.).

Preserve the powder in a well-stoppered bottle.

SAPO GUAIACINUS (*Guaiac Soap*).

Guaiac	2
Potassa	1
Water	q.s.

Rub them together and add enough water, in drops, to produce a mass of a pilular consistence.

It should not be kept in stock.

SAPO PICIS LIQUIDÆ (*Tar Soap*).

Medicinal soap (Castile soap)	24
Carbonate of sodium, dried and powdered	2
Borate of sodium, powdered	1
Tar	8
Water	q.s.

Mix them together to a mass of a pilular consistence and divide it into pieces of suitable size.

SAPO TEREBINTHINÆ LIQUIDUS (*Liquid Turpentine Soap*). [Balsamum vitæ citrinum.]

Carbonate of sodium	3
Medicinal (Castile) soap	4
Oil of turpentine	6
Compound spirit of mastic	6
Compound spirit of juniper	6
Water	60

Heat the carbonate of sodium, soap, oil of turpentine and water for several hours on the water-bath, filter and add the spirits.

COMPOUND SPIRIT OF MASTIC (*Pharm. Neerl.*) is prepared thus:—

Mastic	1
Olibanum	1
Myrrh	1
Amber	1
Stronger alcohol	10
Water	12

Distil them together until the distillate has a specific gravity of 0·873 to 0·878.

COMPOUND SPIRIT OF JUNIPER (*Pharm. Neerl.*):—

Juniper berries	3
Caraway	1
Fennel	1
Stronger alcohol	14
Water	30

Distil them together until the distillate has a specific gravity of 0·929 to 0·935.

LIQUOR ACIDI ARSENICI (*Solution of Arsenic Acid*).

Arsenious acid, powdered	4
Hydrochloric acid	1
Nitric acid	9
Distilled water	q.s.

Boil the acids together in a glass flask, until a portion of the liquid, after being neutralized with soda solution, is no longer rendered green by solution of bichromate of potassium.

Evaporate, on the water-bath, in a porcelain capsule, until acid vapours are no longer given off, and the liquid has a syrupy consistence.

Finally, add enough distilled water to obtain 80 parts of product.

The solution contains 5·75 per cent. of arsenic anhydride (As_2O_5).

LIQUOR FERRI ALBUMINATIS (*Solution of Albuminate of Iron*). [Solutio Albuminatis Ferrici.]

Albuminate of iron	1
Hydrochloric acid	0·1
Distilled water, warm	100

Dissolve the albuminate of iron by aid of the acid in the water, and filter the solution, if necessary.

The product contains 0·033 per cent. of iron, and should be freshly prepared when wanted for use.

(Fer formula of Ferri albuminas, see vol. xii., p. 662).

* From *New Remedies*, April, 1882.

Liquor Hydrargyri Albuminatis (*Solution of Albuminate of Mercury.*

[Solutio Albuminatis Hydrargyrici.]

White of egg	32
Bichloride of mercury	1
Chloride of sodium	4
Distilled water	q.s.

Mix the white of egg thoroughly with 45 parts of distilled water; filter the mixture, and precipitate it by enough of a solution of the bichloride of mercury in 19 parts of distilled water, until a few drops of the liquid, when mixed with solution of carbonate of sodium, begins to assume a red colour.

Then add a solution of the chloride of sodium in 16 parts of distilled water, or as much thereof as may be required to redissolve the precipitate.

Dilute the mixture with distilled water to 100 parts.

Let it stand a few days, filter it, and preserve it in small, completely closed vials.

Sapo Stibiatus (*Antimony Soap*).

Sulphide of antimony (Schlippe's salt)	1
Medicinal (Castile) soap	3
Water	3

Dissolve the sulphide of antimony in the water, add the soap and reduce the mass to a pilular consistence, by a gentle heat.

Whenever the mass assumes a red colour, on the water-bath, add a little solution of soda.

The soap should have an ash-grey colour, and be soluble in water. It should be kept in a well-stoppered bottle.

N.B.—Schlippe's salt is prepared as follows:—75 parts of carbonate of sodium (cryst.) are dissolved in 300 parts of water, heated to boiling and mixed with a milk of 26 parts of lime and 100 parts of water. After half an hour's boiling, 9 parts of sublimed sulphur and 36 parts of levigated sulphide of antimony are added, and the whole boiled until the grey colour has disappeared, when the liquid is filtered and crystallized. The salt has the composition: $Na_6Sb_2S_8.18H_2O$. It is a sulphantimoniate of sodium.

Liquor (Bromo-) Arsenicalis Clementis (*Clement's Solution of Arsenic and Bromine*).

[Solutio Arsenicalis Clementis.]

Arsenious acid	1
Carbonate of potassium	1
Bromine	2
Distilled water	q.s.

Heat the arsenious acid with the carbonate of potassium and 10 parts of distilled water in a flask, until the acid is completely dissolved. When cold, add to it the bromine and enough distilled water to make the product weigh 100 parts.

Liquor Arsenicalis Isnardi (*Isnard's Solution of Arsenic*).

[Isnard's Water.]

Arsenious acid	1
Distilled water	q.s.

Dissolve the acid in 100 parts of distilled water, and dilute the solution with distilled water to 10,000 (ten thousand) parts.

Liquor Chloroformi cum Morphia (*Solution of Chloroform with Morphine*).

[Solutio Chloroformi cum Morphino.]

Morphine (alkaloid)	1
Acetic acid	q.s.
Stronger alcohol	20
Chloroform	80

Dissolve the morphine in just enough acetic acid at a gentle heat. Then add the alcohol and chloroform, and preserve the mixture in a well-stoppered bottle.

Liquor Ammonii Citratis (*Solution of Citrate of Ammonium*).

Citric acid	16
Water of ammonia	q.s.
Distilled water	q.s.

Dissolve the citric acid in 40 parts of distilled water; add enough water of ammonia to neutralize the solution (about 40 parts). Filter and dilute with enough distilled water to make the product weigh 100 parts.

The solution contains 20 per cent. of citrate of ammonium, and should be freshly prepared when wanted for use.

Tinctura Ferri Iodidi (*Tincture of Iodide of Iron*).

[Solutio Iodeti Ferrosi Spirituosa.]

Iron, in powder	3
Iodine	8
Distilled water	q.s.
Stronger alcohol	q.s.

Mix the iron and iodine in a glass flask, with 20 parts of distilled water. When the mixture has acquired a bright green colour, filter it, wash the filter with a little strong alcohol, and add enough alcohol to the filtrate to make it weigh 100 parts.

The tincture contains 9·7 per cent. of ferrous iodide, and should be freshly prepared when wanted for use.

Tinctura Iodinii Decolorata (*Decolorized Tincture of Iodine*).

[Solutio Iodii Decolorata.]

Iodine	10
Hyposulphite of sodium	10
Spirit of ammonia	16
Distilled water	q.s.
Alcohol (stronger)	75

Digest the iodine with the hyposulphite and 10 parts of distilled water in a glass flask until all is dissolved. When cold, add the spirit of ammonia, shake a few minutes, and then add the alcohol. Let the mixture stand in a cool place until it has become colourless; then filter.

A clear, colourless liquid, of a peculiar ammoniacal odour, and a specific gravity of 0·940 to 0·945.

Liquor Ferri Dialysati (*Solution of Dialysed Iron*).

[Dialysed Iron.]

Solution of chloride of iron (ferric chloride), specific gravity 1·480–1·484	35
Water of ammonia (0·960)	20
Distilled water.	

Place the solution of chloride of iron in ice for fifteen minutes; then mix it gradually with the water of ammonia, previously cooled by ice. Stir the mixture, and when it has become clear again, pour it into a hog's bladder, previously cleansed by treatment with dilute solution of potassa and washing with water. Tie the bladder as close to the liquid contents as possible, and suspend it in a cylindrical glass containing five times the volume (of the bladder) of distilled water, so that the surface of the water is about 1 cm. above the top of the bladder.

Change the water, first every twelve, afterwards every twenty-four hours, and continue to do this until the water, when acidulated with nitric acid, is no longer rendered turbid by nitrate of silver. Then dilute the liquid in the bladder with distilled water until it has a specific gravity of 1·046.

The solution contains 5 per cent. of iron, is clear, has a dark brown colour, no odour, and scarcely any taste. It is miscible with strong alcohol, but on addition of an acid or an alkali, it separates a red-brown precipitate.

It should give no reaction either with ferricyanide of potassium or with nitrate of silver.

Liquor Sodii Carbolatis (*Solution of Carbolate of Sodium*).

[Solutio Phenylatis Natrici.]

Carbolic acid	5
Solution of soda (specific gravity 1·330)	1
Distilled water	4

Mix them.

A clear liquid of an alkaline reaction, a specific gravity of 1·060 to 1·065, and miscible with water and alcohol in all proportions.

It should be freshly prepared when wanted for use.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, JULY 15, 1882.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PROPOSED AMENDMENT OF THE WEIGHTS AND MEASURES ACT.

CONSIDERABLE inconvenience has been experienced in the working of the Weights and Measures Act, 1878, from the permissive character of the provisions in regard to the fees charged for verification and stamping, and the opportunity thus afforded for inequality in the charges made for this work. It is from the manufacturer's point of view highly desirable that, whatever charges are made for verification and stamping of weights and measures, there should be one uniform rate for the whole Kingdom. Probably it is from considerations of this kind that a Bill has been brought into Parliament by Major Ross and Dr. CAMERON to amend the Weights and Measures Act, 1878. According to the official report of the votes and proceedings the Bill was read a second time on Wednesday evening and committed for Monday next, and as it deals with apothecaries' weights and measures, as well as those of other denominations, it will be well to recapitulate the amendments which it proposes to effect.

According to the forty-seventh section of the Act an inspector may take for verification and stamping any fees fixed for the time being by the local authorities appointing him, provided only that they do not exceed in amount those specified in a schedule appended to the Act. By the Bill now before the House of Commons it is proposed to repeal so much of the forty-seventh section as relates to the amount of the fees, also to replace the schedule in the Act by another scale of fees, and to enact that an inspector under the Act shall take in respect of the verification and stamping of weights and measures such fees and no other as shall be according to the scale contained in the new schedule.

The chief point of interest in this Bill for pharmacists is the introduction of a scale of fees for the verification and stamping of what are termed apothecaries' weights and measures. For each weight from ten ounces to one ounce inclusive the fee is to be twopence, and for each weight from four drachms to half a grain inclusive the fee is to be one penny. The fees for graduated measures are to be one shilling for each measure containing more than one hundred subdivisions; sixpence for each measure containing more than fifty and not more than one hundred subdivisions; fourpence for a measure containing between one and fifty subdivisions; threepence for each measure of forty fluid ounces to one fluid ounce respectively, and twopence for each separate measure of four fluid drachms to one minim. These fees will obviously add to the cost of the weights and measures referred to; but in view of the purposes to which they are applied, and the importance of accuracy for those purposes, it does not appear that the proposed fees would unreasonably augment the cost of the weights and measures used by pharmacists. In any case, however, it is desirable that a Bill of this nature should not pass unnoticed through it various stages and become law without due consideration.

THE BRITISH PHARMACEUTICAL CONFERENCE.

WITHIN six weeks from the present date, the period fixed for the meeting of the British Pharmaceutical Conference will have arrived, and it is not too soon to remind our readers that this year the Conference will hold its sittings at Southampton, under the presidency of Professor ATTFIELD. The course hitherto followed of associating this meeting with that of the British Association will again be adhered to, the Tuesday and Wednesday of the fourth week in August being the days fixed for conducting the ordinary business of the Conference. A circular is now in course of being issued by the Honorary General Secretaries to the members of the Conference, informing them of the arrangements that have been made, and requesting those who intend to be present to communicate with Mr. O. R. DAWSON, the Secretary of the Southampton Committee, to that effect, and for the purpose of making inquiries as to the local arrangements for lodgings, hotel accommodation and railway routes, etc. We understand that a room has been engaged at RADLEY'S Hotel for the general use of the members of the Conference, and that a limited number of beds have been secured in the same house for those who desire to be at the headquarters of the Conference. The business meetings will take place at the WATTS Memorial Hall.

One of the first points to be remembered is that intending contributors of papers are expected to send in their manuscripts to the General Secretaries ten days before the meeting takes place, accompanied with a short abstract for insertion in newspapers, and that the titles of their papers are to be forwarded two or three weeks before the meeting, addressed to the Secretary of the Conference, 17, Bloomsbury Square. It is important that this requirement should be attended to in order to admit of the subjects for discussion being brought under the notice of pharmacists beforehand, and thus to secure for them full interest.

The attractions presented by Southampton as a place of meeting are not equal to those of towns situated in the manufacturing districts of the

Midland counties and the North; but there are in the neighbourhood many objects of interest, both ancient and modern, which, together with the well-known natural beauties of Hampshire and the Isle of Wight, may be expected to excite a very general desire to take part in this year's Conference. The town itself possesses some remarkable antiquarian remains, notably the Bargate and portions of the wall which probably existed in the time of CANUTE, while the modern extension of the town beyond the old boundaries has the advantage of comprising a large area of public parks and finely wooded common land. Within a few miles of the town are the picturesque ruins of Netley Abbey, and close by is the Royal Victoria Military Hospital. At somewhat greater, but still easily accessible distances, are the New Forest, the Isle of Wight, the naval port and dockyard of Portsmouth, and the cathedral cities of Salisbury and Winchester, all presenting features of interest that are worthy of observation.

The works connected with Her Majesty's Ordnance Survey Office, where operations are carried on for the production of the ordnance maps, are situated at Southampton, and it is expected that the Local Committee will be able to obtain permission for the visitors to the Conference to inspect these works during their stay in Southampton.

The excursion which is a usual feature of the Conference gatherings will this year be by steamer to the Isle of Wight, on Thursday, the 24th August. On this occasion the visitors will have an opportunity of seeing Ryde and Ventnor and the remains of a Roman villa at Brading. If the weather should by that time have assumed a character more consistent with the summer season there is much reason for anticipating that this excursion will not form the least agreeable part of the proceedings at this year's Pharmaceutical Conference.

AMERICAN PHARMACEUTICAL ASSOCIATION.

A CIRCULAR has been issued notifying that the thirtieth annual meeting of the American Pharmaceutical Association will commence on Tuesday, September 12, at Niagara Falls, New York, and it is anticipated that the conditions under which the meeting is to be held will tend to make it one of the largest the Association has yet had. It is incidentally mentioned in the circular that the Association now numbers thirteen hundred members.

PROPRIETARY REMEDIES.

THE Connecticut Medical Society appears to have listened approvingly last month to a vigorous denunciation, by Professor LINDSLEY, of the patronage of proprietary remedies by the medical profession, which was described as destroying scientific nomenclature, rendering useless scientific pharmacy, and unfitting the physician to combine remedies. There was a disposition to make an exception in favour of preparations that could be best made on a large scale and elegant pharmaceutical preparations, even though protected by a trade mark. But there was an unsparing condemnation of the use of proprietary preparations having complicated and unknown formulæ, or representing such articles as a pharmacist with a moderately well equipped laboratory could make, as well as a "host that are advertised to the profession exclusively and used with the same blind faith and for precisely the same reason that the people use hop bitters and St. Jacob's oil." It was pointed out that the practice encouraged indiscriminate dosing amongst the people, since each circular contained a list of diseases and their symptoms for which the compound is alleged to be a certain cure, and presented a temptation to an invalid to fit his symptoms and disease to a remedy and buy his bottles without the intervention of the physician, especially if his disease were of a chronic nature and had once been named.

THE RESPONSIBILITY OF PHARMACISTS.

AN important case has recently been tried in the State of New York, which involved a decision as to how far the pharmacist is bound to act under the physician's orders. It appears that in October, 1880, a prescription was presented by a woman to an assistant in a drug store in the Broadway, New York, ordering a considerable quantity of laudanum, and bearing the instruction, "Please give to bearer sixty drops in the store." The assistant sought the advice of his employer, who objected that twenty-five drops of laudanum was a full dose, and refused to administer sixty drops in the store unless the physician were present to take the responsibility. Eventually, upon the woman's plea that she was ill and needed the laudanum, the pharmacist poured out ten drops, which she swallowed in his presence. A year afterwards, two suits for damages were entered against the pharmacist, one by the woman for ten thousand dollars and one by her husband for five thousand dollars, on the ground that had the pharmacist complied strictly with the physician's orders the woman would have been spared a miscarriage and its consequences. For the defence it was urged that whilst a pharmacist is bound to make up a physician's prescription it is no part of his duty to administer the medicine. The judge adopted this reasonable view, and further remarked that if a physician, intentionally or by mistake, wrote a prescription for a dangerous quantity of poison, and a pharmacist administered the poison with a knowledge that it was dangerous, he would be personally responsible for the consequences if the patient died. It was further urged that the quantity of laudanum administered was not only insufficient to do good, but had acted injuriously. But this argument also failed and the jury returned a verdict for the defendant.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

THE annual meeting of this Association will be held on Thursday, July 20, at 8.30 p.m. precisely. The President, Professor ATTFIELD, F.R.S., will occupy the chair.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

On Wednesday the 5th instant, the usual monthly meeting of the Council of this Society was held in the College of Physicians, Kildare Street, Dublin, at three o'clock.

The President, Professor Tichborne, in the chair.

The other members of the Council present were:—Dr. Montgomery, Messrs. Allen, Bennett, Brunker, Grindley, Hayes, Pring, and Simpson.

Mr. Hugh J. Fennell, the Registrar, read the minutes of the last meeting, which were confirmed.

A letter was received from Dr. R. W. Harley, stating his wish to resign the Examinership in Pharmacy.

The President suggested that Dr. Harley, who was at that moment conducting an examination in an adjacent room, should be asked whether he could conveniently assist at the next following examination, so that the election for his successor could afterwards be held cotemporaneously with the other elections.

Dr. Montgomery was deputed to ask that question and, having done so, brought back word that Dr. Harley wished to be relieved at once from the duties of examination, as from the extent of his private practice he felt that he should be unable to devote to them the necessary time and attention.

On the motion of Mr. Brunker, seconded by Mr. Grindley, it was resolved that the resignation of Dr. Harley be accepted with regret, and that the Registrar be directed to advertise for another Examiner to be appointed at the August meeting of the Council.

A letter was received from Mr. Adam Speers, B.Sc., of London University, and Head Master of the Sullivan Schools Laboratory, Holywood, county of Down, dated June 28, requesting that the Chemical Laboratory of that institution should be recognized by the Pharmaceutical Society. The writer stated that the laboratory was licensed for advanced chemical work by the Science and Art Department, and was large enough to accommodate twelve students, analysing at the same time. It was constructed on the South Kensington plan, and contained all the appliances necessary for qualitative and quantitative analyses of both organic and inorganic substances. Amongst the students there were always some who were studying for the examinations of the Pharmaceutical Society. An inspection of the laboratory was invited. He (Mr. Speers) had had seventeen years' experience as a teacher.

The President: Does Mr. Pring know anything about the school?

Mr. Pring: I know Mr. Speers. He is a very superior man; but I never inspected the school.

The President suggested that the matter should be referred to Mr. Pring for investigation. At the same time it might be laid down as an axiom that unless an establishment of the kind was exactly suited to what the Society required it should not be recognized. What they wanted was practical working for a given period, quite independent of any theoretical teaching. The theoretical course was a separate matter.

Mr. Brunker said he did not like the idea of adding any schools to the list of institutions already recognized by the Society. The English Society was making strides in the direction of a fixed curriculum, which was quite inconsistent with maintaining a connection with small schools that they knew nothing about. The Society had already recognized two schools in Belfast, which was quite sufficient for the North.

On the motion of Mr. Brunker, seconded by Dr. Montgomery, it was resolved:—

"That the Council are not disposed to extend their list of schools of practical chemistry at present."

A letter was received from Mr. William Savage, B.A., of Rathfarnham, in reply to a letter which had been addressed to him by the Registrar relative to the Medical Hall, No. 4, Mall, Waterford. The writer stated that he was the only brother of the late Mr. Savage, proprietor of the concern, and was appointed his executor by the Court of Probate on March 22, 1881. The deceased, who left no issue, had named as his successor a son of the writer, Mr. James Savage, who was studying for a qualifying examination and had a pharmaceutical chemist engaged in conducting the establishment. The writer was merely managing the establishment as executor until certain liabilities were paid off, and so far from having even received his administration expenses he was already a loser.

The Registrar was directed to acknowledge the receipt of the letter of Mr. Savage.

A letter was read from Mr. G. A. Webb, of 141, York Street, Belfast, who stated that he had seen a statement which was erroneous in the report of the proceedings of the last meeting of the Council in reference to the case of Mr. Carse.

The consideration of the letter was postponed until next meeting.

The Registrar was directed to send a copy of the letter to Mr. Payne.

A letter was read from the Secretary of the British Pharmaceutical Conference, requesting the Society to appoint delegates to the approaching meeting of the Conference at Southampton.

The Registrar was directed to reply that the President and Mr. Bennett would attend the Conference as delegates.

A communication was made to the Council in reference to Messrs. Boyd and Goodwin, and after some discussion,

On the motion of Mr. Pring, seconded by Mr. Grindley, the Registrar was directed to inform that firm that the Council had proof that they were still engaged in compounding, and to call their attention to the penalties which they incurred by so doing.

On the motion of Mr. Brunker, seconded by Mr. Simpson, the Registrar was requested to communicate with the Registrar of the King and Queen's College of Physicians, thanking him for his letter with reference to the proposed additions to the Schedule of the Poisons Act, and informing him that the Council approves of the recommendations made by the College.

Mr. Brunker submitted a report of the Pharmacy Act Amendment Committee. It gave a *résumé* of the amendments which the Committee had from time to time proposed to be made in the Pharmacy Act (Ireland), 38 and 39 Vict., cap. 57. These were in print and had been circulated. The Committee now recommended for the consideration of the Council the following additional amendments:—1. That no pharmaceutical chemist or apothecary shall legally hold a branch establishment for the retail of poisons or compounding of prescriptions, except under the responsible management of a duly qualified pharmacist. 2. That all assistants engaged in dispensing must give sufficient proof of their competence by examination, or by having passed a sufficient time as apprentices. 3. That all candidates for the licence shall be required to produce evidence of having passed three years in a *bonâ fide* apprenticeship to an apothecary or pharmaceutical chemist keeping open shop.

The President said he did not think the Council ought to go back on apprenticeships, involving fees. These had been discarded in every branch of the medical profession. If the Council wished to increase the time to be spent in the practical learning of pharmacy to three years, that was another question and it should equally apply to apprentices and assistants engaged in compounding.

Mr. Pring said he never took a fee with an apprentice.

Mr. Grindley remarked that there had not been time to consider the new recommendations.

The President suggested that they should be printed and sent round.

On the motion of Mr. Hayes, seconded by Mr. Bennett, it was resolved—

"That the additions proposed by the Pharmacy Act Amendment Committee be printed and circulated amongst the members of the Council at an early date."

The report of the Committee appointed to examine the certificates of candidates for the licence was submitted. It appeared that the certificate for practical pharmacy of one gentleman had been rejected.

Exception was taken to the action of the Committee in that respect, but as it only put back the candidate for three months the report was unanimously adopted.

Some formal business having been transacted, the Council adjourned.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The last ordinary meeting of this Association for the present session was held on Thursday, July 6, 1882. Mr. H. G. Greenish, Vice-President, in the chair.

Mr. A. T. Job read the second part of his paper upon the "Artificial Production of Benzoic Acid and of Oil of Bitter Almonds." This portion of the paper dealt mainly with the practical details of the process. The two papers will be published as a whole in a future number of this Journal.

A discussion followed the reading of the paper, in which the Chairman, Secretary, Messrs. Alcock, Cripps, Evans, Haward, Parker and Yeatman took part. A vote of thanks was passed to Mr. Job.

Mr. E. Marsh then read some "Notes upon some Reactions of Glycerine," in which the tests that have been proposed from time to time for the recognition of this substance were described. The principal tests, experimentally shown, were: the permanganate of potassium test, which substance glycerine reduces only slowly; Reichl's test, depending upon the formation of glycereïn when glycerine is heated with sulphuric acid and carbolic acid, the glycereïn being recognized by its reaction with ammonia, resulting in the production of a red coloration; Senier and Lowe's test, which depends upon the property which glycerine possesses of liberating boracic acid from borax, which is recognized by the green colour imparted to the flame, and also Donath and Mayrhofer's test, founded upon the same fact as the preceding.

A discussion then took place, in which the Chairman, Secretary, Messrs. Alcock, Braithwaite and Evans took part. A vote of thanks was passed to Mr. Marsh.

After the transaction of a considerable amount of miscellaneous business the meeting adjourned.

ROYAL INSTITUTION OF GREAT BRITAIN.

Some of the Dangerous Properties of Dusts.*

BY F. A. ABEL, C.B., F.R.S.

(*Concluded from page* 17.)

The locality selected for the first experiments formed a portion of some obsolete fortifications at Chatham, and consisted of a masonry gallery or *Caponier*, 8 feet 8 inches high to the spring of the arch, and 8 feet wide below the arch, to a distance of 28 feet from the closed end; from that point it tapered on one side to 6 feet along a length of 2 feet 6 inches, and was 6 feet wide for a length of 3 feet 6 inches, up to a pier or square column 4 feet by 3 feet 6 inches; round which the gallery curved, being at this part 4 feet 2 inches wide. The straight part of the gallery, from the dead wall at one end to the projecting pier at the other, was 34 feet long. In the wall to the left of the blocked end there were six narrow loop-holes up to the curve, commencing at 18 feet from the end, and 2 feet 6 inches apart; in the opposite wall there were four, commencing at the same distance and 5 feet apart; over the wall at the blocked end of the gallery there was an opening into the outer air, and a considerable current of air passed through it along the gallery to the curved end, which led into a large narrow gallery at right angles to this wide one, and having large chambers opening into it.

In some preliminary experiments, an iron tube was let into the face of the wall at the blocked end of the gallery so as to represent a strong blast hole, and this was charged with 1½ lb. of powder, untamped in some experiments and tamped in others. Some pieces of guncotton were suspended from the roof of the gallery at a distance of 28 feet and farther along, and observers were stationed outside the gallery opposite the several loop holes. But, while the pieces of guncotton were not inflamed, there were conflicting opinions concerning the distances at which flame was seen, probably caused by the general illumination of the gallery by the flash of the explosion It was moreover, found that the iron tubes containing the charges were more or less considerably torn, so that portions of the exploding charge escaped laterally. The following method of experimenting was eventually adopted. Charges of 1½ lb. and 2 lb. of powder, untamped and tamped, were fired from a small roughly bored out gun block, the bore of which was 1 foot 9 inches long and 2⅝ inches in diameter; the gun was raised so as to project the flame right along the gallery at about its centre. A light woodwork frame, 5 feet square, was fitted with thirty-six cross wires 1 foot apart, so as to furnish thirty-six points of intersection; to each of these points a small tuft of guncotton was attached, and the target thus fitted was fixed vertically so as to face the charge, in the centre of which was fixed an electric fuse. In this way small charges of guncotton were distributed uniformly over all parts of the target, which filled a great part of the section of the gallery. The distance of the target from the charge being gradually increased in successive experiments to 20 feet, it was found that with the employment of 1½ lb. and 2 lb. charges, untamped, in three instances out of ten experiments only one, or at most two of the tufts of guncotton were inflamed, this being apparently the extreme distance to which flame, or matter sufficiently hot to inflame guncotton, was projected. At a distance of 19 feet, with 1½ lb. charges, two out three shots did not inflame any of the guncotton tufts. With 1½ lb. charges firmly tamped, one tuft only of the thirty-six was fired, in two experiments, at a distance of 20 feet, while in three others no guncotton was inflamed.

It appears from these results that in a gallery or mine working of an area not very dissimilar to that in which the accidents just referred to occurred, the flame or heated gases from 1½ lb. and 2 lb. charges, fired under conditions favourable to the production of the maximum flame, and its complete projection in the direction of the discharge, only reaches occasionally, and to a very limited extent, to a distance of 20 feet. No doubt a powerful air current in a mine, passing in the direction in which the shot is fired, must have a tendency to aid the spread of the flame to a greater distance, but the difference between 20 feet and 100 feet, the flame having in the latter instance extended to a distance of 75 feet along a gallery at right angles to the point of ignition, is far too great to be only ascribable to the effect of an air current in elongating the flame. As the first of the loopholes above referred to existing in the walls of the gallery was 18 feet from the shot, they could hardly affect the distance to which the flame was found to reach.* It will be observed that these results correspond with those which Mr. Hall obtained with 4 lb. charges of powder in an adit, the dimensions of which are not specified.

No gallery of large dimensions and free from the small lateral openings was available for the continuance of these

* Read at the Weekly Evening Meeting, Friday, April 28, 1882.

* The closing up of these was not found to affect the results.

experiments, but it was thought that some experiments in subterraneous passages of much smaller dimensions (military countermines) might give instructive results. A so-called envelope gallery was therefore first selected for the purpose. This gallery was 5 feet 9 inches high to the crown of the arch, and 4 feet 9 inches to the springing of the arch, and only 2 feet wide. The part selected for the position of the gun and the target was straight, but the portion immediately beyond was curved. In rear of the gun, the gallery was quite open to a considerable distance. One and a half pound charges, untamped, were fired, and a frame target the width of the gallery and 4 feet 6 inches high, constructed so as to give 15 points for the attachment of guncotton tufts, was placed at gradually decreasing distances from the gun, commencing at 20 feet. Even at a distance of only 14 feet from the charge, none of the guncotton tufts were inflamed; but the target was blown forward about 12 feet and partly broken. It was evident that the fact of the gallery being open at the *rear* of the charge greatly reduced the tendency to the projection of flame to a distance in the direction of the explosion. The resistance opposed to the movement of the air by the curvature of this very narrow gallery, a short distance in front of the seat of the experiments, may have also contributed to diminish the distance to which the flame or highly heated gases would extend. When the experiments were continued in another gallery, of the same dimensions, but straight and terminating in a head, like a drift in a mine, the cannon being placed close up to the face of the drift, several of the tufts of guncotton were inflamed at a distance of 27 feet; one was inflamed when the target was 30 feet off, and one also at a distance of 32 feet, but none were ignited at a distance of 35 feet from the charges. Here then, in a long gallery, narrow in proportion to its height, but in all respects representing a drift way in a mine, the distance to which the flame of a blown-out shot of $1\frac{1}{2}$ lb. of powder extended was less than 35 feet, and therefore considerably less than one-half the distance from the seat of the blown-out shot of 1 lb. of powder where the men were burned, in both directions in the cross workings, in the accident above cited. The influence of coal dust in increasing the distance to which the flame from a blown-out shot will extend in mine workings is therefore conclusively demonstrated by a comparison of the effects of those accidents with the foregoing experimental data. On the other hand, the important circumstance noticed by Mr. Hall, that no signs of burning on the props in the mine were visible at greater distances than a yard or two beyond the spots where the men were waiting, although there were open workings in both directions for some considerable distance, and although the flame was sufficiently extensive at those spots to injure the men severely, proved conclusively that coal dust had not the power, in these two instances, to carry on the flame to a great distance from the source of fire. Had there been any gas in the air of the mine the flame would doubtless have extended much farther, and perhaps throughout the adjacent workings. The amount of dust raised by the blown-out shots may, however, have been less considerable than in other similar occurrences, and the dust itself may not have been so highly inflammable, or otherwise of so suitable a character for carrying on flame, as that existing in other mines where undoubtedly dust has played an important part in enhancing the magnitude of explosions. At any rate these results demonstrate the necessity for the exercise of caution in drawing conclusions of too sweeping a nature with regard to the causes and the extent of such coal mine explosions as cannot be quite clearly ascribed to fire-damp. A few experiments have been made, in the largest gallery (Caponier) at Chatham, to test the power of coal dust to carry on the flame from a blown-out shot. A large quantity of very fine and inflammable coal dust, from Seaham collieries, was suspended in the air by employment of sufficient mechanical contrivances, and clouds of the same dust were also blown into the gallery in the direction of the shot, and immediately in front of it, just when it was fired. One of the frame screens was placed across the gallery where the pier jutted out (at a distance of 34 feet from the shot), and pieces of guncotton were attached to nails driven in the wall along the short narrow part of the straight gallery and to some distance round the curve. In every one of the experiments tried (three) with $1\frac{1}{2}$ lb. of powder, fired when dust was thickly suspended and carried along in the air, the flame burned a number of pieces of guncotton on the screen; in two experiments guncotton was burned at a further distance of 1 foot 6 inches, but not beyond; in the third, some flame travelled to the end of the straight gallery, and to a distance of 4 feet 8 inches beyond the curve, but guncotton was not inflamed beyond that point. In this case, therefore, flame reached rather more than, and in the others not quite, double the distance with dust thickly suspended in the air, to what it did in the absence of dust. Experiments will be continued in the long narrow galleries which have been spoken of.

It must now be accepted as beyond question that very few, if any explosions have occurred of which the destructive effects, so far as burning and production of the fatal after-damp are concerned, have not been more or less considerably increased through the agency of the coal dust raised by the explosion, and that the latter has been in very many cases instrumental in causing the burning effects of the explosion to spread over great areas, and to reach to workings which, in the absence of dust, would have escaped the visitation. Even of late years, long since the observations of Faraday and Lyell have been confirmed and extended, mining engineers and others immediately connected with the working of coal mines have been very prone to ascribe explosions, which did not admit of satisfactory explanation by an accidental failure of ventilation or other evident causes, to the sudden disengagement or outbursts of fire-damp, such as are, in fiery coal seams, of no uncommon occurrence, and sometimes very serious in their magnitude and long continuance, and to charge such sudden escapes of gas into some part of the mine workings with the whole extent of the disaster, rather than to credit coal dust with any important share in the origination or even in the extension of the explosion. In many instances the occurrence of such outbursts, following upon falls of roofs or the firing of shots, or the rapid disengagement of fire-damp from coal or goaves, consequent upon sudden changes in atmospheric pressure, have been clearly proved to have preceded disastrous explosions; in others, however, the conclusion that an explosion has been connected with the occurrence of a sudden disengagement of gas in considerable volume, has been based upon assumptions or conjectures, more or less admissible, or upon evidence of doubtful nature collected after the explosion (as in the case of the recent explosion at Seaham Collieries). Under any such circumstance, however, it is, to say the least, extremely difficult to realize how sufficient gas to produce an explosive atmosphere can be conveyed, even by the most powerful ventilating currents which can circulate in mines, from the seat of such a sudden outburst to far distant portions of the mine to which the actual explosion is proved to have extended, within the period which is known or believed, to have intervened between the first disengagement of the gas and the firing of the explosive atmosphere produced thereby *in the vicinity* of the outburst, by the firing of a shot, by a defective lamp, or by other means of ignition. On the other hand, the character of the effects which in many instances have been produced by the explosion; the evidences of severe burning such as could not be produced by the rapid explosion of a gas mixture only, and the deposition of partially burned or coked dust in very distant and distinct parts of the mine workings, leave no room for doubt that coal dust has played a more or less important part in almost all the explosions which have been of late submitted to investigation. Further, it must be conceded that in some instances, coal dust would indeed appear to have been the chief instrument of destruction.

To sum up; it has not been difficult, as will have been seen from the foregoing, to demonstrate experimentally that the existence of a very small proportion of fire-damp in the air of a mine may determine the propagation of flame by coal dust, ignited by the explosion of some local accumulation of a gas mixture, or by the inflammation of gas suddenly disengaged, or even by the flash from a blown-out shot. It has also been clearly established that in so called fiery mines the air is never likely to be actually free from fire-damp, and that as much as 2 per cent. may exist in the return air of a very efficiently ventilated mine of that class. It must therefore be regarded as a thoroughly well grounded conclusion that, in many disastrous explosions, coal dust is the chief agent of destruction, and it is indisputable that but few explosions occur of which the effects have not been more or less considerably extended and aggravated by the coal dust which is raised by the fire-damp explosion. It may also be admitted as not improbable that in some instances, the influence of dust may, apart from its combustibility (as described), determine the ignition of a mixture of air and dust with a small proportion of fire-damp, by the flame which a blown-out shot, or the accidental ignition of some local accumulation of explosive gas mixture has produced. Lastly, it is conceivable, as contended by Friere Marreco, Galloway, and some continental observers, that a mixture of an inflammable coal dust and air, may even, in the complete absence of fire-damp, both originate and carry on to some distance, explosions which, though much inferior in violence to those developed through the agency of gas mixtures, will be at least equal to them in regard to the disastrous effects on the lives of those exposed to them. That mixtures of coal dust and air alone may have the power to carry on the explosion originally caused and disseminated by a gas, air, and dust mixture, into regions where no gas whatever exists, will now be generally admitted. The great disturbance of the air which must proceed in immediate advance of the rush of flame produced by the ignition of a mixture of gas and air charged with coal dust, will, in many mine workings, raise a dense cloud immediately in front of the flame, and the latter will thus be fed as it advances. Mr. Galloway concludes, as the final result of his experiments with coal dust, that the presence of fire-damp is altogether unnecessary to *bring about* a coal mine explosion, but, admitting that the result of certain experiments may seem to favour this conclusion, its realization necessitates the fulfilment of conditions which cannot but be very exceptional, and its acceptance is certainly unnecessary to add to the formidable character of coal dust as a source of danger and an agent of destruction in mines.

Whether an explosion originates with, or is chiefly caused by, the production of a mixture of fire-damp with air in such proportions as to be more or less rapidly and violently explosive; whether the originating cause be the reciprocal influence of a small proportion of fire-damp and of coal dust (or dust of other descriptions of minerals occurring in coal mines) co-existing in the air of a mine; whether, possibly, it simply originates with a mixture of very inflammable coal dust and air in the complete absence of fire-damp, or whether, lastly, only the very limited concession be made that coal dust will add to the extent, and increase the burning effect, of a fire-damp explosion; in any case, the existence of dust in abundance, and in a dry state, in coal mine workings, must be recognixed as a source of danger not greatly inferior to that caused by local accumulations, or the accidental liberation, of fire-damp. The possibility of dealing with this source of danger should therefore be as much an object of earnest work as has been the improvement of ventilatlng arangements for mines.

It being generally impracticable effectually to deal, by actual removal, with the continual accumulation of dust in mine workings, the only available method of diminishing the dangers arising from its constant production appears to be that of maintaining the floor in the roads, etc., in a damp condition by efficient watering arrangemenst, almost continally applied. The high temperature of the mine, in many instances, must often render this a difficult and costly process, on account of the rapidity with which the water will evaporate; hence attempts have been made to apply hygroscopic substances (such as calcium chloride, sea-salt, or rock-salt) in conjunction with water, or to use brine, with a view to retard its evaporation, and some successful results appear to have recently attended their application in several districts. In some instances with improved appliances for the uniform and periodical distribution of sufficient water, the maintenance of mine roads in a sufficiently damp condition to prevent dust from being raised in any considerable quantity appears to have been accomplished with fair success; there are, however, localities where it is almost impracticable to maintain the floor of the roads in a damp condition, in consequence of the great increase thereby of the tendency to their being gradually raised by the pressure to which they are subject.

Apart from the effects of dust in augmenting the disastrous results of such fire-damp explosions as may arise from the existence of a defective, or an open safety lamp in the vicinity of an accumulation of gas, or of a locality where a sudden outburst of gas occurs, the *blasting* of coal or of rock, in those parts of a mine where fire-damp may exist, if even only in very small quantities, constitutes the chief source of accidents in which coal dust may have played an important share. There is no doubt, therefore, that the elaboration of really safe methods of getting coal in places where blasting by powder is now resorted to, and of removing the harder rock in the working of drifts where fire-damp may exist, will most importantly contribute towards the diminution of danger arising from the accumulation of dust in mines. The substitution of efficient coal cutting machines for blasting may to some extent supplant the use of powder, and the employment of compressed air as an agent for bringing down coal or rock has been made the subject of ingenious contrivances, which appear, however, as yet, to labour under some disadvantages in regard to cost, facility of use and general efficiency. Attempts have been made to render the employment of powder in the presence of fire-damp safe, by using it in conjunction with water. In the first instance it was proposed by Dr. Macnab to bring the latter into direct operation as the cleaving or blasting agent by inserting a cylinder containing water into the blast hole, and connecting it with a very strong external vessel, in which the powder charge was fired, much as the powder charge is fired in the powder chamber of a gun, the generating gas being brought to bear upon the confined column of water, and causing the latter to exert a rending force upon the coal by which it was surrounded. As the results furnished by this method of operation were not promising, the comparatively very simple expedient was resorted to by Dr. Macnab of employing water simply as tamping in a charge hole, a cylinder containing the liquid and of suitable length to fill the hole being inserted over the charge of powder. In the event of a charge blowing out, the dispersion of the water in a very finely divided condition was relied upon to effect the extinction of the volume of flame which, under these conditions, would be projected into the air of the mine. Some carefully conducted experiments, with blast holes charged by this method and surrounded by an explosive gas mixture, showed that occasionally no ignition of the gas resulted from the blowing out of the shot, but that in most instances, the conditions of the experiments being the same, the gas mixture in front of the blast hole was exploded, when the shot blew out. It is possible that a careful regulation of the charge and length of tamping may render this mode of operation a comparatively safe one, though it may be doubtful whether absolute reliance could be placed upon the invariable extinction of flame in the case of blown-out charges. When the attention of the Royal Commission was directed to the subject of the dangers attending the employment of explosives in coal mines, it occurred to Mr. Abel to attempt the application to the getting of coal of the principle which he developed some years ago, in the course of his researches on explosive agents, namely, the sudden transmission in all directions of the force exerted instantaneously by a *detonation*, by surrounding the detonating charge with water. It was found in a large number of experiments that when comparatively small charges of guncotton or dynamite (the latter being preferable) were enclosed in cylinders of light metal or paper filled with water, and occupying the entire available space (or nearly so) in a blast hole, the detonation of the charge in holes of excessive strength, when employed in proper proportion to the amount of water by which it was surrounded, was always accomplished without ignition of the explosive gas mixture with which the opening of the blast hole was surrounded. The interesting fact was moreover established, by operations carried out in hard coal in Lancashire, that the action of the detonating charge is modified to great advantage, by enclosing the envelope in a long column of water. Instead of exerting a powerfully crushing or disintegrating action, confined within comparatively narrow limits, whereby a charge of guncotton or dynamite is rendered of little value as a means of getting coal when used in the ordinary way, the distribution of the explosive force in all directions by the column of water causes it to exert a cleaving or splitting action even superior to that exercised by ordinary blasting powder. The farther development of this method of applying detonating agents to blasting purposes in coal-mine workings appears therefore well worthy of attention.

Another method of getting coal, which, though not new in itself, has been applied in a novel manner and with most promising results by Messrs. Smith and Moore, has the great advantage of dispensing entirely with the use of explosive agents, and of any but the most simple mechanical appliances.

It consists in applying the force which quicklime will develope if confined, and made to combine under that condition with water, whereby it undergoes very considerable expansion, a large amount of heat being at the same time developed. Messrs. Smith and Moore convert the freshly burned and crushed quicklime into very compact cylindrical masses, or cartridges, having a small groove on one side so that when the requisite number of cylinders are inserted symmetrically into the mechanically drilled hole in the coal, which they fit accurately, a narrow pipe, with perforations along its entire length, enclosed in a tight-fitting stocking of open webbing and provided with a stopcock, may be inserted into the side of the charge, which is afterwards tamped in the usual manner. The proportion of water necessary to slake the lime, *plus* an excess of about one-sixth, is then forced into the hole through the pipe by means of a simple hand syringe, and the stopcock of the pipe being closed the operation is complete. In a brief space of time sounds indicative of the cracking of the mass of coal which contains the cartridge show that the expansion of the lime by its union with the water, and the very considerable development of steam within the cartridges, are performing their work, and after an interval of time varying with the strength of the part of the seam operated upon, the coal is detached in large blocks. The holes can be charged so rapidly that a considerable number may be put into operation in quick succession by one or two men.* As the action of the charge occupies some little time (fifteen or twenty minutes), they really come into operation together, and in this way large faces of hard coal in longwall workings are brought down with ease and certainty. Whether these compressed lime cartridges can be applied with any success in stone still remains to be determined, but in point of cost, simplicity, and above all, safety, this method of detaching coal appears to rank before any other yet tried. Besides entirely avoiding the use and production of flame or fire in the blasting of the coal, the operation is conducted gradually and almost noiselessly, and the raising of dust by the more or less violent concussions which attend the employment of explosives in any form or manner is avoided.

It is insisted upon by a great majority of those most competent to judge that the employment of explosives cannot be dispensed with in the profitable working of coal mines. That the use of gunpowder in the ordinary way, even with strict attention to all practical precautions, is a most prolific source of accident has long been recognized. The development of safe methods of applying explosive agents or of simple and effective substitutes for them is therefore of such paramount importance in securing protection to the miner against the dangers of fire-damp and of coal dust, that those who are entrusted with the management of coal mines should spare no exertions to test rigorously but fairly the merits of any proposals which afford promise of success in this direction.

* In one of several operations of this kind recently witnessed by the lecturer at Shipley Collieries, Derby, in the "deep hard seam," which is nearly 3 feet thick, ten shots were fired together, bringing down a block of coal 39 feet long by 3 feet thick and 2 feet 10 inches high, weighing about ten tons. The average time occupied in boring a hole (by mechanical drill), charging and tamping it, and watering the charge was twenty minutes. The usual operation of bringing down this very hard coal by wedging is exceedingly slow and laborious.

PHILADELPHIA COLLEGE OF PHARMACY.

(*Concluded from* p. 40.)

The following paper was then read on—

Chlorinated Oil.

BY DR. L. WOLFF.

The use of chlorine gas, in the form of chlorine water, in chronic affections of the skin, is by no means of recent origin, and already Thenard and Cluzel recommended the frequent immersion in chlorine wster of the hands of those afflicted with itch, by which they claimed to have obtained most excellent and rapid results.

About fifteen years ago I had cause to try it, and had a most excellent success with it; though to make its effect more lasting and emollient, I experimented with a liniment composed of equal parts of olive oil and chlorine water. The efficacy of this was not less potent, but the absence of any of the characteristic odour of the gas in this liniment struck me as very peculiar, and I attributed it to a chemical change taking place. As a part of this latter would naturally have to result in the formation of hydrochloric acid, the question arises, if it is the latter or the chlorine gas which had combined with the oil that gave the beneficial results. As the free chlorine in the water, however, had proved effective, the inference is that the chlorine in combination with the oil had given the curative effect.

To test this matter, I was urged by my friend, Dr. J. V. Shoemaker, to make a chlorine compound with oil free from hydrochloric acid, which in the course of therapeutic experiments proved equally effective.

To prepare it I induced a stream of dry chlorine gas, generated in the usual way, into a quantity of oil equal to that of the water in making the chlorine water of the Pharmacopœia, but, to my surprise, found that I was unable to supersaturate the oil, as I had done with the water, no free chlorine becoming at any time evident, until after many days of experiment I ultimately succeeded in my purpose.

The oil so treated showed at first but little change, save that of turbidity, which could not have been due to water being present, as the gas had been well dried. It soon warmed and heated, and vapours of hydrochloric acid were then evolved. It had changed its colour but little, grew viscid and of the specific gravity of 1·059. It was insoluble in alcohol, disproving the presence of free oleic acid; when washed with an equal bulk of water, to free from adherent hydrochloric acid, it showed an emulsifiant tendency. Dissolved therefrom with benzin, and the latter evaporated after previously filtering the solution, it left a product such as I here exhibit. Neutral to test paper at first, it grew acid at standing for some time, with well marked turbidity, thus proving the loosely molecular combination of the chlorine, which, being again substituted by hydroxyl, forms more hydrochloric acid. It possessed no marked odour, and certainly not that of chlorine, and varied in taste but little from that of ordinary oils, no irritant action being manifest when applied to the tissues.

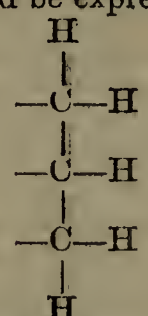
An inquiry on this subject at our former meetings led me to investigate this matter more thoroughly, and I arrived at results which, from a chemical point of view, turned out very interesting.

In order to understand the chemistry of this process it is necessary, however, to enter somewhat into the molecular position of the vegetable and animal oils and fats to show exactly where and how a chlorine substitution can take place.

Vegetable and animal oils consist in the main of two principles: one of them, forming on saponification, either with or without great heat or alkalies, is an alcohol named glycerin; the other, forming acids, are termed relatively stearic, palmitic and oleic acids, etc. The radicals of these two constituents are for the former termed propenyl or glyceryl, while for the latter they are known as stearyl, palmityl, and for what that which forms the greatest part of the liquid and semi-liquid fats, oleyl.

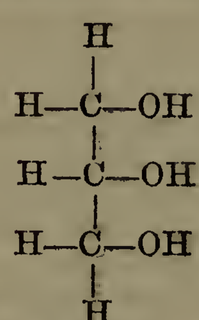
While the propenyl would be expressed as follows:—

C_3H_5 =



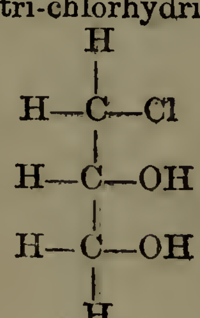
the glycerin or its triatomic alcohol would be constituted thus:—

$C_3H_5 + 3OH$ =

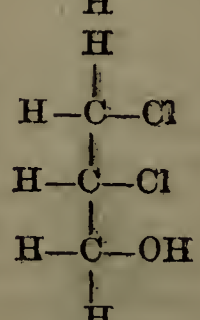


The three molecules of hydroxyl in the glycerin are easily substituted by several elements or compounds, such as acetic, benzoic, hydrochloric, hydrobromic and other acids; to illustrate this I give below the molecular position of mono-, di- and tri-chlorhydrins:—

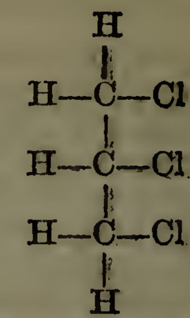
Chlorhydrin, $C_3H_5 + 2OH + Cl$ } =



Dichlorhydrin, $C_3H_5 + OH + 2Cl$ } =



Trichlorhydrin, $C_3H_5 + Cl_3$ } =



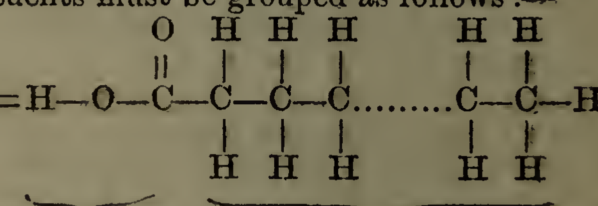
In the fats and oils, however, the molecules of hydroxyl of the glycerin are substituted by the radicals of the fatty acids, such as stearyl, palmityl and oleyl, producing ethers, as which fats and oils must be viewed, as for instance:—

Stearins or propenyl tristearyls = $C_3H_5.3(C_{18}H_{35}O_3)$

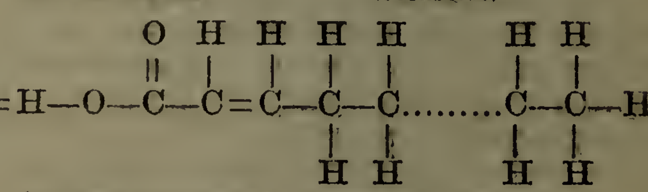
Oleins or propenyl trioleyls = $C_3H_5.3(C_{18}H_{33}O_2)$.

Again, as stearic, palmitic, and oleic acids are acids derived from stearyl, palmityl and oleyl, and have an analogous constitution, the former belonging to the series of formic and the latter to that of acrylic acids, their relative constituents must be grouped as follows:—

Stearic acid =

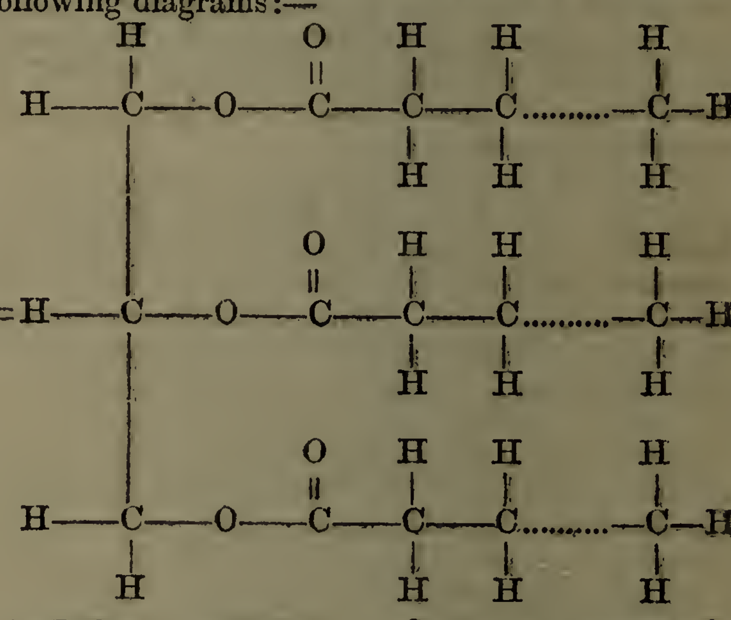


Oleic acid =

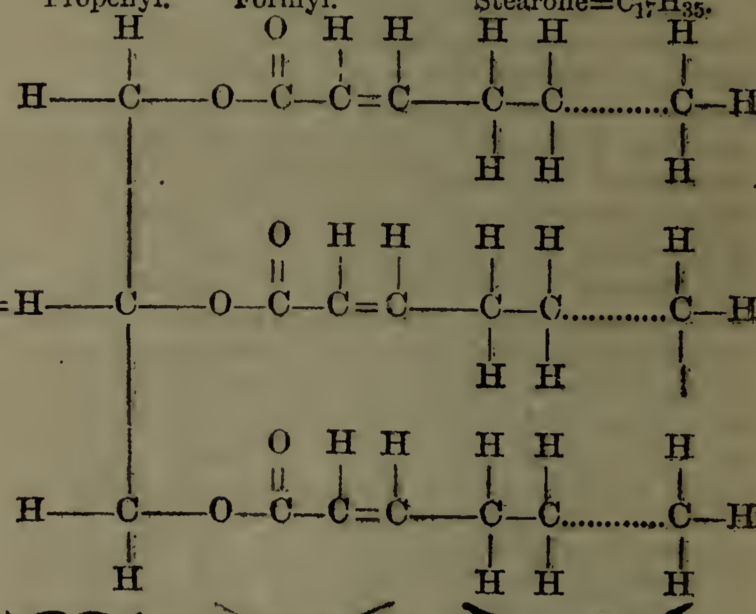


Thus the constitution of fats and oils will be represented by the following diagrams:—

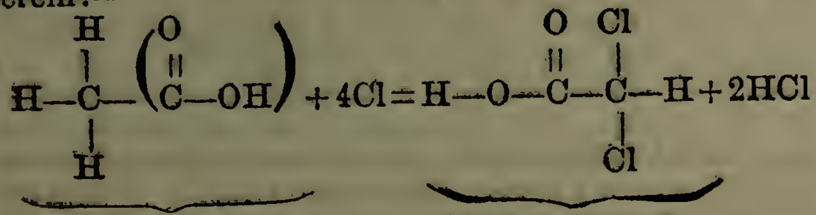
Stearin =



Olein =

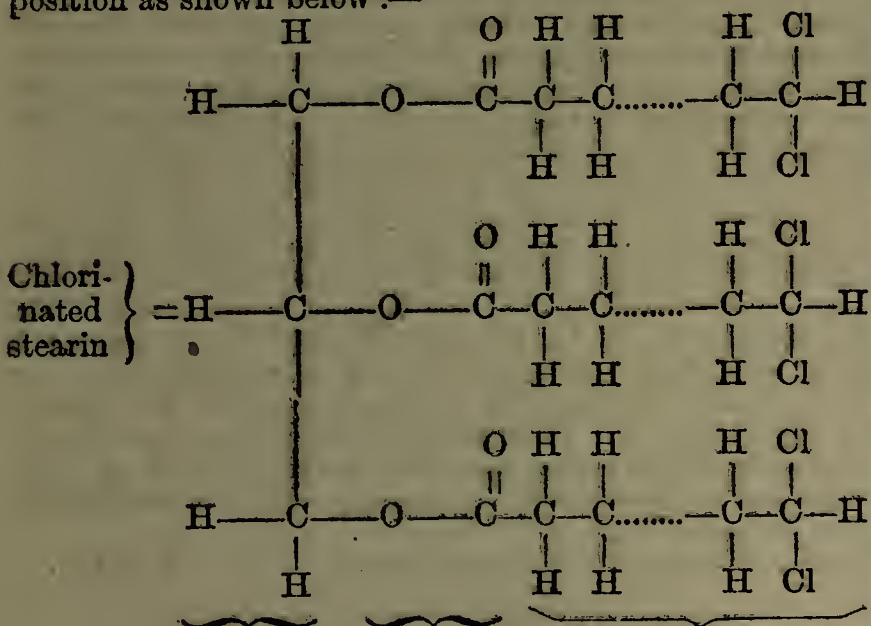


Therefore, if free chlorine gas comes in contact with these molecules, it cannot attack the propenyl, as this is really substituted by the stearyl and oleyl. Again, the stearyl and oleyl cannot be acted on by the chlorine in their acid nuclei, according to the analogy established by the formation of dichloracetic acid, as will be seen herein:—

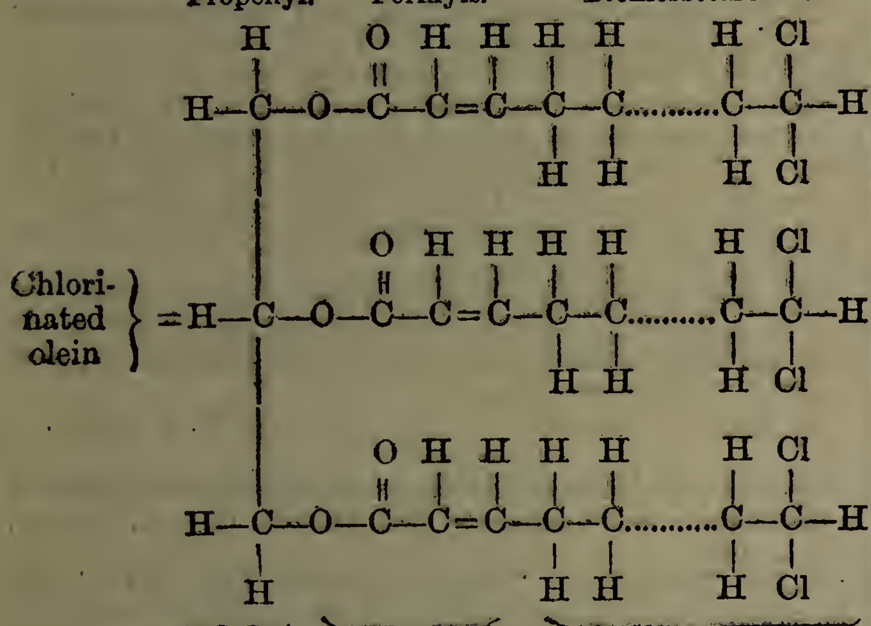


Acetic acid. Dichloracetic acid.

The chlorine must act, therefore, on the hydrocarbon appendices, $C_{17}H_{35}$ and $C_{15}H_{31}$, substituting therein the relative hydrogens by chlorine, resulting in a molecular position as shown below:—



Propenyl. Formyls. Dichlorstearones.

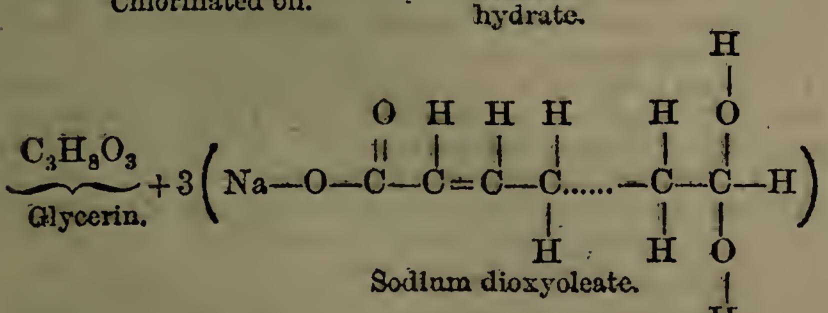


Propenyl. Acrylyls. Dichloroleones.

As palmitin and stearin are much alike in their constitution, a reproduction of the structural formula of the former is necessary.

As this chlorinated oil is saponifiable with boiling solutions of the hydrates of alkalies, yielding soap, glycerin and chlorides, I would give below a diagram illustrating its saponification with sodium hydrate:—

$$\underbrace{C_3H_5 3(C_3O_2H_2\text{—}C_{15}H_{29}Cl_2)}_{\text{Chlorinated oil.}} + \underbrace{9(NaOH)}_{\text{Sodium hydrate.}} =$$



$+ \ 6NaCl$

The soap so produced manifests no material difference from ordinary soaps, only that in the course of its preparation it separates as it is formed, owing to the great amount of sodium chloride formed in the process.

The chlorinated oil, by computation of its atomic weight, shows 100 parts by weight to contain about 17·9 parts by weight of chlorine, or, in other words, it would take 48 parts by weight of chlorine gas to convert 100 parts of oil into the chlorinated product of which 24 parts by weight enter into the 100 parts of oil, and 24 parts form hydrochloric acid.

It would appear, hence, that in chlorinated oil we have not alone a very interesting chemical body, but one that is very rich in chlorine as well; and as the latter exists therein in a loosely molecular condition, it will readily substitute itself again for hydroxyl, forming chlorine compounds with bodies of stronger affinity, and as such will prove probably of great therapeutic value wherever the use of chlorine, both as disinfectant and parasiticide, is indicated, and possibly presenting a proper antagonistic for bacteriæ, which are daily more shown to form the causation of many diseases.

During the discussion on this paper it was stated that commercial olive oil was frequently adulterated with cotton seed oil, and it was said that the latter was also mixed with lard oil, and that a reliable test for its presence was very desirable.

Dr. A. W. Miller spoke of a new and clumsy adulteration of *sassafras oil* with kerosene, detected by its odour and its insolubility in alcohol; a sample of the adulterated oil was exhibited.

Also a new *vermilion substitute*, free from mercury and of handsome appearance; it is said to be made from a fine specimen of "orange mineral" tinted with eosine.

Parliamentary and Law Proceedings.

Poisoning by Sulphuric Acid.

On Saturday, July 8, Mr. Poole (coroner for North Warwickshire) held an inquest at Aston, on the body of David Nixon, 43, grocer and postmaster, who died on the 5th inst.

The evidence of Dr. Hoare was to the effect that on May 8 deceased took a quantity of sulphuric acid. Witness was called in, and on ascertaining what had occurred he asked deceased what he had done it for. Nixon replied, "I wish I had done it completely." Deceased did not at any time express regret at having taken poison.

A juror said the deceased frequently came to his house, and had on several occasions threatened to commit suicide.

The jury returned a verdict of "Suicide whilst temporarily insane."—*Birmingham Daily Post.*

Poisoning by Ammonia.

On Saturday, July 8, a boy named George Ashworth, aged 11 years, was poisoned by mistake at Halifax. He took hold of a bottle which he thought contained ginger beer, but which contained ammonia, and had a good drink. Milk was given to him afterwards, and medical assistance sent for. By the use of emetics all danger was soon overcome, and the boy recovered.—*Yorkshire Post.*

Alleged Poisoning by Camphor.

A singular case of poisoning was investigated on Tuesday at an inquest held at Oldham. Mary Ogden had been in delicate health for some time, and her husband obtained a prescription from a Spaniard named Maurize Picano. This prescription consisted of laudanum, peppermint, and essence of camphor. Deceased partook of some, and shortly afterwards she began to be sleepy, and died.

The medical opinion was that deceased had died from an overdose of camphor.

The jury censured the seller, Mrs. Wild, who gave the mixture for the prescription, for not intimating how the medicine was to be taken.—*Morning News.*

Obituary.

Notice has been received of the death of the following:—

On the 25th of April, Mr. Frederick Farrer, Chemist and Druggist, Kessingland, late of Wrentham, Suffolk. Aged 71 years.

On the 27th of May, Mr. Thomas Day Easton, Chemist and Druggist, Danby End, Yorkshire. Aged 50 years.

On the 9th of June, Mr. Charles Christopher Spink, Chemist and Druggist, Market Place, Pontefract. Aged 44 years.

On the 12th of June, Mr. Edward Parker, Pharmaceutical Chemist, Carlisle. Aged 64 years. Mr. Parker had been a Member of the Pharmaceutical Society since 1842.

On the 18th of June, Mrs. Ruth Mabbott, Chemist and Druggist, Manchester. Aged 58 years.

On the 23rd of June, Mr. Richard Eustace Williams, Chemist and Druggist, Mumbles, Swansea. Aged 69 years.

On the 29th of June, Mr. George Alfred Webster, Chemist and Druggist, Green Road, Leeds. Aged 39 years.

On the 29th of June, Mr. Thomas Williams, Chemist and Druggist, Welshpool. Aged 28 years.

On the 8th of July, Mr. Thomas Hill, Chemist and Druggist, Bath. Aged 67 years.

On the 10th of July, Mr. Alfred Fox, Chemist and Druggist, Porter Street, Hull. Aged 27 years. Mr. Fox had been an Associate in Business of the Pharmaceutical Society since 1875.

BOOKS, PAMPHLETS, ETC., RECEIVED.

A Dictionary of Popular Names of the Plants which furnish the Natural and Acquired Wants of Man, in all Matters of Domestic and General Economy. By John Smith, A.L.S., etc. London: Macmillan and Co. 1882.

Manual for the Physiological Laboratory. By Vincent Harris, M.D., etc., and D'Arcy Power, M.A. Second Edition. London: Baillière, Tindall and Cox. 1882.

The Manual of Colours and Dye Wares. By J. W. Slater. Second Edition. London: Crosby, Lockwood and Co. 1882.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Future of Pharmacy.

Sir,—Our Stockport brethren evidently believe that if they have not virtue they ought to assume it. Their petition reads very well and displays a very laudable anxiety for the future state of pharmacy. I have no doubt these worthy representatives of a worthy craft will point with pride to the memorial, and lay this flattering unction to their souls that at all events their town is free from the reproach of having done nothing to improve the trade. After this commendable display of virtue, you, sir, will no doubt be surprised to hear that by far the larger number of chemists in Stockport "do a large trade" in supplying not only grocers, etc., but little hucksters' shops with (not patents that require no skill in manipulation, but) "drugs, pharmaceutical preparations, etc.;" and these men are not, as you would suppose, small chemists with large families who do not live but simply exist, they are the men of "light and leading" (save the mark), the principal chemists in the town, one, at least, of whom employs a traveller to cultivate this particular trade. One of these worthy gentlemen, when remonstrated with upon the seeming inconsistency between his words and his deeds, indignantly replied, "I am not going to give up so good a portion of my living for all the societies that ever were." Surely the height, or rather the depth, of absurdity has been reached in this. They supply a class of tradesmen with goods, take the cash for them, and then beseech the powers that be to stop these customers of theirs selling the very things they have importuned them to take; these, too, are the men who are loudest in their complaints of the Society doing nothing to help them, whilst they themselves will not so much as lift one little finger to help themselves. The immortal bard says, "To thine own self be true, and it follows," etc. Then let each individual member of our craft be true to the better interests of his chosen trade; let each man of us resolve to leave the trade better than he found it. Then, I venture to predict, we shall have very little of the jealousy and want of confidence of the medical profession, and the question of 9*d.* or 1s. 1½*d*, for "Cockle's" will become a very secondary matter, whilst at the same time the Council will be compelled to keep abreast of the opinion of the trade. But so long as every individual has no aim and no ambition higher than his own selfish ends, so long must our and every other community formed of such selfish men continue to grovel in the dust.

131, *Embden Street, Manchester.* J. Hart.

Fresh Bael Fruit (Ægle Marmelos).

Sir,—I notice that some fresh bael fruit has recently been sent to the Museum by Mr. P. W. Squire, and I am glad to find that it is coming somewhat into use.

Three years ago I presented a specimen to the Society, and drew attention to it at an Evening Meeting (April 2, 1879). This was brought to me from Calcutta, by Dr. James M. Laing, of the Indian Service, who told me that the fruit itself was most frequently ordered to be gathered and eaten as occasion required.

The best preparation of it, however, that I have been able to discover, is that made according to the directions given in the Indian Pharmacopœia for 1868, p. 47, and known as extractum belæ.

35, *Baker Street, W.* A. W. Postans.

Senex.—No doubt an iodide of bismuth is formed, which is insoluble. See a paper by Mr. Thresh, *Pharm. Journ.*, [3], x., 641.

C. S.—There is no "Tinct. Valerian. Co., B.P.," and the difference in the appearance of the mixtures was probably due to the preparation used to represent this ingredient of the prescription.

J. Currie and T. Cragg.—Your communications have been handed to the Secretary, to whom all instructions from members, etc., as to the posting of the Journal should be sent.

P. Boa.—*Hypericum pulchrum.*

"*Infantilis.*"—If you will first turn your attention to the rule respecting anonymous communications, we shall be happy to assist you in your study of the point in question.

H. C. H.—(1) *Vicia hirsuta.* (2) *Trifolium medium.* (3) *Raphanus Raphanistrum.* (4) *Orobanche minor.* (5) Probably *Angelica sylvestris*: send specimen in fruit. (6) *Helminthia echioides.*

C. P.—(1) *Dactylis glomerata.* (2) *Polyporus versicolor.* (3) *Hypnum rutabulum.* (4) *Funaria hygrometrica.* (5) *Evernia Prunastri.*

H. J. Jackson.—*Euphorbia Lathyris.*

"*Worcester.*"—(1) *Carex riparia.* (2) *Aquilegia vulgaris.* (3) *Vicia Sepium.* (4) *Cytisus Laburnum.*

Communications, Letters, etc., have been received from Messrs. Reynolds, Saul, Delacre, Gregory, Conellan, Boa, West End Pharmacist, John, Naphtha, Inquirer, Theta, C.S.

NOTES ON THE PRODUCTION OF BENZOIC ACID AND BITTER ALMOND OIL FROM TOLUENE.*

BY A. T. JOB,

Student in the Laboratories of the Pharmaceutical Society.

The following notes are the results of a series of experiments conducted in the laboratories of the Pharmaceutical Society upon a process, recently patented by Dr. Emil Jacobsen, for the artificial production of benzoic acid and benzaldehyde from toluene.

A commercial sample of toluene was purified by successive redistillations at 111° C., rejecting all that came over below that temperature, and any that remained in the retort above that temperature.

The distillate thus obtained possessed the appearance of a clear mobile liquid, with a marked odour and powerful refractive properties. Its sp. gr. at 0° C. was 0·88.

In chemical composition toluene may be regarded as benzene, in which one of the hydrogen atoms is replaced by CH_3.

When toluene is treated with dry chlorine gas, two different series of products are obtained, depending upon the temperature. These differ both in their chemical and physical properties. Both series are represented by the same empirical formulæ, C_7H_7Cl, $C_7H_6Cl_2$, $C_7H_5Cl_3$, depending upon the amount of chlorine introduced. They are, in fact, isomeric bodies. As an explanation of this isomerism it is supposed that when chlorine is passed into cold toluene,—or even into hot toluene, if either iodine, molybdic chloride or antimonic chloride be present,—the chlorine is substituted in the benzene nucleus of toluene; but when chlorine is passed into heated toluene, the substitution takes place in the methyl or CH_3 group.

Toluene, $C_6H_5CH_3$.

Action of chlorine on toluene in the cold, substitution taking place in the benzene nucleus.	Action of chlorine on boiling toluene, substitution taking place in the methyl group.
$C_6H_4ClCH_3$	$C_6H_5CH_2Cl$
$C_6H_3Cl_2CH_3$	$C_6H_5CHCl_2$
$C_6H_2Cl_3CH_3$	$C_6H_5CCl_3$

This hypothesis is supported by the fact that when substitution products obtained by the action of chlorine upon cold toluene are treated with water, no benzaldehyde is formed; on the other hand, if the product formed by the action of chlorine upon boiling toluene be similarly treated, benzaldehyde is set free.

Such being the case a rational formula is required that shall indicate this. And inasmuch as all the bodies are chloro-substitution compounds of toluene, all are called chlorotoluenes. Beilstein and Kuhlberg have suggested a simple and graphic numerical method of indicating this, which is now generally adopted. It consists of figures indicating the number of atoms displaced in either group. Those displaced in the benzene group being represented by a numeral placed to the left of a horizontal line, and those in the methyl group by one to the left, thus

$C_6H_3Cl_2CH_3$	$C_6H_5CHCl_2$
Dichlorotoluene (2—0)	Dichlorotoluene (0—2)
(Methyldichlorobenzene)	(Dichloromethylbenzene)

Or, to express this in ordinary chemical terms, toluene being regarded as methylbenzene, the (2—0) dichlorotoluene would be called methyldichlorobenzene, whilst the (0—2) dichlorotoluene would be spoken of as dichloromethylbenzene.

The first step in the practical process is the formation of the required chlorotoluenes. Working experimentally after many trials, I found the following apparatus to give the most satisfactory results, small quantities of toluene being worked upon. A Bohemian flask of a capacity of about half a litre, and having a short wide neck, is fitted with a thermometer ranging above 215° C., a glass distillatory tube in connection with a Liebig's condenser, together with a straight tube for the introduction of the chlorine gas, which tube when fitted with a small thistle funnel also serves as a means of replacing the distillate back into the flask without in any way disturbing the cork or luting.

The chlorine before entering the flask is dried by passing through a wash bottle containing sulphuric acid.

The toluene is placed in the flask and heated over a shallow sand-bath; when it boils the chlorine is passed through it in a continuous stream, the action of the chlorine being accompanied by a rise in the temperature of the liquid.

When the thermometer indicates a constant temperature of 176° C. the distillate will be found to consist of monochloromethylbenzene, $C_6H_5CH_2Cl$, a colourless liquid with a very irritating odour.

Upon continuing the chlorination, the next body formed is the dichloromethylbenzene, $C_6H_5CHCl_2$, a colourless liquid with faint odour, boiling point 206° C.

By carrying on chlorination until no increase in weight on the part of the liquid in the flask takes place trichloromethylbenzene, $C_6H_5CCl_3$, is obtained; this is the third product of the action of chlorine upon heated toluene. It is a colourless liquid boiling at 215°–216° C.

From the two latter chlorotoluenes the benzaldehyde (bitter almond oil) and benzoic acid are respectively formed. For example, when heated in sealed tubes with water at 150° C. the following decompositions take place:—

$$C_6H_5CHCl_2 + H_2O = C_6H_5COH + 2HCl$$
$$C_6H_5CCl_3 + H_2O = C_6H_5COCl + 2HCl$$
$$C_6H_5COCl + H_2O = C_6H_5COOH + HCl$$

Benzoic acid and aldehyde may also be obtained from these substances by other reactions, thus by the action of alcoholic potash. These methods, however, as manufacturing processes, are of little value.

Jacobsen states in his patent that when benzodichloride (dichloromethylbenzene) is acted upon by glacial acetic acid in the presence of chloride of zinc the following reaction takes place, resulting in the formation of benzaldehyde, acetic chloride, and hydrochloric acid:—

$$C_6H_5CHCl_2 + CH_3COOH = C_6H_5COH + CH_3COCl + HCl.$$

He also states that the chloride of zinc in the above reaction may be replaced by oxide of zinc.

I found that upon placing together in a retort, molecular weights of dichloromethylbenzene and glacial acetic acid with oxide of zinc energetic action ensued. A liquid of a deep red colour distilled over which possessed a peculiar pungent odour, very different from that of bitter almond oil. On standing, crystals were deposited, and these were afterwards kindly analysed by Mr. Wyndham R. Dunstan, Demonstrator of Chemistry in these laboratories, and were found to be the acetyl derivative of benzaldehyde, their formulæ being $C_6H_5CH(C_2H_3O_2)_2$.

* The substance of two papers read before the School of Pharmacy Students' Association, June 15 and July 6, 1882.

Mr. Dunstan has suggested the following reactions to account for the formation of this substance.

In the first process anhydrous acetate of zinc being present it probably acts directly upon the dichloromethylbenzene, forming the acetyl derivative of benzaldehyde, thus—

$$Zn(C_2H_3O_2)_2 + C_6H_5CHCl_2 = C_6H_5CH(C_2H_3O_2)_2 + ZnCl_2.$$

In the second process, where chloride of zinc is present, this compound is most probably produced by a secondary reaction. The acetic chloride produced in the primary reaction decomposes the acetic acid with formation of acetic anhydride, thus—

$$CH_3COCl + CH_3COOH = (C_2H_3O)_2O + HCl.$$

The acetic anhydride then reacts upon the benzaldehyde—

$$(C_2H_3O)_2O + C_6H_5COH = C_6H_5CH(C_2H_3O_2)_2.$$

This acetyl derivative is decomposed by water, yielding benzaldehyde and acetic acid—

$$C_6H_5CH(C_2H_3O_2)_2 + H_2O = C_6H_5COH + 2HC_2H_3O_2.$$

It is therefore better after placing the substances together, and after heating for a short time, to add a little water at intervals. The benzaldehyde then distils over together with acetic acid. The distillate, now strongly acid, is neutralized by sodium carbonate, and allowed to stand, then redistilled; or the benzaldehyde may be separated from the solution of sodium carbonate by decantation and repeatedly washed with water until pure. Another method is to treat the neutralized distillate with solution of acid sodium sulphite, the aldehyde compound thus formed

$$C_6H_5CH{\cdot}OH{\cdot}SO_3Na$$

being decomposed by solution of sodium carbonate and freed from water by decantation.

In the preparation of benzoic acid a similar method is employed. The benzotrichloride (trichloromethylbenzene) is first heated over a water-bath with two molecular weights of glacial acetic acid in the presence of zinc chloride. The reaction takes place in two stages. Firstly, the acetic acid acts upon the trichloromethylbenzene, forming benzoic chloride, thus—

$$C_6H_5CCl_3 + CH_3COOH = C_6H_5COCl + CH_3COCl + HCl.$$

Then, secondly, the benzoic chloride acts upon more acetic acid, forming benzoic acid and acetic chloride, thus—

$$C_6H_5COCl + CH_3COOH = C_6H_5COOH + CH_3COCl.$$

After heating the retort for some time over the water-bath it is removed and any undecomposed acetic acid driven off by increasing the heat. The dark coloured residue in the retort is now treated with warm soda solution until alkaline, care being taken to avoid large excess of alkali. The precipitated zinc hydrate being removed by filtration and the filtrate evaporated to a low bulk, the benzoic acid is liberated from the benzoate of soda contained in the filtrate by acidulating with hydrochloric acid. Zinc oxide may be substituted for zinc in the above process.

This process is very satisfactory when once the trichloromethylbenzene has been obtained. This, however, is somewhat troublesome and tedious to prepare, a small quantity of toluene taking several days to chlorinate. It must also be practically free from the dichloromethylbenzene, otherwise the product will be contaminated with benzaldehyde and secondary reactions will also occur by which the yield of benzoic acid is considerably diminished. This difficulty overcome, the process bids fair to rival successfully all other methods for the artificial preparation of benzoic acid.

BLACK HELLEBORE ROOT.*

BY A. HERLANDT.

The rhizomes of *Helleborus niger* and *H. viridis* present in their external appearance a great similarity to those of other Ranunculaceæ, such as *Actæa spicata* and *Adonis vernalis*, and also, when in fragments or fine powder, in respect to odour and in a certain degree to taste, to the root of *Polygala Senega*. As the microscopic examination of rhizoma hellebori nigri reveals no characteristic peculiarities,—neither starch granules of a definite form, nor stone cells,—chemical reactions must be utilized for its recognition. The peculiar constituents of the two above-mentioned hellebore roots are two glucosides, helleborein and helleborin, which upon treatment with acids split up into helleboretin or helleboresin and sugar respectively. The blue-violet helleboretin can be used both pharmaceutically and forensically for the recognition of the rhizome.

If the comminuted rhizome of *Helleborus niger* be exhausted with boiling water, and the filtered decoction, after the addition of one-third of its volume of hydrochloric acid, be boiled, the clear liquid at first becomes quickly turbid and takes a peculiar violet colour. After cooling, a separation of blackish flocks takes place, and these, when washed upon a filter with ether, to remove yellow fatty and resinous matters, are of an intense and permanent violet colour.

The same result is obtained with the water in which the rhizome of black hellebore has been macerated. In both cases if the residue left on the filter be washed with alcohol, the alcohol acquires a violet colour, and leaves upon evaporation an amorphous greenish-violet substance, which is impure helleboretin. In the case of the rhizome of *Helleborus viridis*, the colour, after the action of the hydrochloric acid, comes out at first more greenish, probably because a larger quantity of fatty and resinous substances are present in it.

The rhizome of *Actæa* and the roots of *Polygala Senega* give, when treated in the same manner, no similar reaction, which would probably be the case with all drugs that do not contain helleboretin.

This reaction is obtained even with the use of five centigrams of rhizoma hellebori nigri. If it be cut into thin pieces, boiled with 10 c.c. of water, the decoction filtered and again boiled with one-third its volume of hydrochloric acid, the almost colourless liquid becomes after a few minutes turbid and bluish. If after cooling it be shaken with about half its volume of ether, a definite and permanent layer of blue-violet flocks forms between the two liquids. If the mixture be allowed to stand, the helleboretin dissolves gradually in the water, imparting to it an amethyst colour, whilst the ether remains colourless. Upon rendering the mixture alkaline by the addition of ammonia, the violet flocks become dirty yellow, but resume their original colour upon acidulating the liquid with hydrochloric acid. If sulphuric acid be used instead of hydrochloric acid in this reaction, the results do not appear so distinctly.

If instead of the rhizome an equal quantity of the rootlets be used, scarcely any traces of helleboretin can be distinguished, a point of some importance if, as the author appears to think, helleboretin is the active principle of the drug.

According to Chevallier there have been several cases of poisoning by black hellebore, and amongst others, one where two grams caused the death of an adult in eight hours; the evidence of the two following experiments that the helleboretin reaction can be used for chemical purposes will therefore be of interest.

In the first experiment 2 grams of finely chopped black hellebore rhizome was mixed with 100 grams of calves' liver, the mixture boiled with 200 c.c. of water, the decoction filtered, again boiled with hydrochloric acid, allowed to cool and filtered. The residue in the filter gave the helleboretin reaction most distinctly.

In a second experiment the decoction from 2 grams

* *Pharmaceutische Zeitung*, xxvii. 99.

of rhizome was mixed with 200 c.c. of beer. A portion of the mixture boiled with one-third of its volume of hydrochloric acid, allowed to cool and shaken with ether, gave, not violet, but dark brown flocks, showing that the foreign colouring matters in the mixture hindered the purity of the helleboretin reaction. The decoction, containing beer, was therefore precipitated with a solution of lead acetate and filtered, excess of lead separated by means of sodium phosphate, the liquid filtered and evaporated to one-half and precipitated with excess of tannic acid. The precipitate was decomposed with lead oxide in excess, the mixture then evaporated to dryness, and again taken up in boiling alcohol. The aqueous solution boiled with hydrochloric acid, cooled, and shaken with ether gave the helleboretin blue-violet flocks at the line of separation between the two liquids. The alcoholic solution left upon evaporation a yellowish-white residue formed of microscopic crystalline cauliflower-like aggregations, which were immediately coloured dark brown by concentrated sulphuric acid and were not altered by potassium bichromate. The alcoholic solution when diluted and shaken with ether gave a slight white precipitation at the line of separation between the two liquids.

THE ASSAY OF SPIRITUS ÆTHERIS NITROSI.*

BY PROFESSOR J. F. EYKMAN, OF TOKIO.

The so-called spiritus nitri dulcis is one of those remedies the normal constituents of which are not definitely ascertained, and for the assay of which no accurate method is known. Although the spirit is described in many chemical works as a simple solution of ethyl nitrite in alcohol, still none of the Pharmacopœias has a process according to which the resulting preparation would consist solely of ethyl nitrite and alcohol. Even when following the directions of the British and United States Pharmacopœias, where the use of copper prevents as much as possible the production of by-products, the product will never be entirely free from the latter. These by-products, mostly produced by oxidation of the alcohol, and among which are, primarily, aldehyde and acetic ether, and secondarily, common ether, ethyl formate and oxalate, cyanogen compounds, etc., occur in larger quantities when following the process of the Netherlands and German Pharmacopœias, where the alcohol itself serves as a means of reducing the nitric acid. Even when prepared according to the Codex Medicamentarius (Pharm. Gall.), the spirit contains a series of these by-products, among which are also found some less volatile ones, as glyoxal, glyoxylic acid, oxalic, malic, saccharic acids, etc. A difference in mode of preparation, however, not only alters the kind and quantity of by-products, but also the percentage of ethyl nitrite. Even when following one and the same process, a slight alteration in the *modus operandi* may essentially alter the qualitative composition and the percentage of ether. From this cause, as well as from the readiness with which ethyl nitrite changes by age, particularly in consequence of the considerable percentage of water in the spirit, or of exposure to light in only partly filled or not securely stoppered vessels, it will be understood how different samples of the spirit can show such different properties, particularly in the percentage of the ether, which is occasionally only present in traces, and sometimes even entirely absent.

It is to be regretted that not every Pharmacopœia demands the spirit to have a definite composition and a constant percentage of ethyl nitrite.

The Netherlands and German Pharmacopœias mention no such requirements. It is true both of them mention a definite specific gravity; but this is of little account so far as the percentage of ether is concerned, since both water and ethyl nitrite alter the specific gravity of alcohol in the same direction, namely, by increasing it. Even a greater or lesser amount of oxidation products, as aldehyde, is ignored by both Pharmacopœias, nor do they mention any method by which the presence of ethyl nitrite could be detected.

More detailed and exact in the description and properties are the British and United States Pharmacopœias. The latter requires that the spirit should contain 5 per cent. "of its peculiar ether," but gives no method for assaying it. On the other hand, the British Pharmacopœia says: "If it be agitated with twice its volume of saturated solution of chloride of calcium in a closed tube, 2 per cent. of its original volume will separate in the form of an ethereal liquid,* and rise to the surface of the mixture.

It is clear that this test can only be applied to a spirit prepared according to the British Pharmacopœia, and cannot be used as a method of testing such as are prepared according to other processes, for instance, those of the Netherlands or German Pharmacopœias. In no case can the percentage of absolute ethyl nitrite be determined from the amount of the ether separated by calcium chloride, because the latter separates aldehyde, acetic ether, ether, etc., likewise. Besides, a preparation spoiled by age may be so manipulated by the addition of acetic or ordinary ether that it may respond to the above test without containing the required percentage of the true ether.

The different samples of spirit of nitrous ether, which have been examined in great number here, generally separate *nothing* when shaken with 2 volumes of a concentrated solution of calcium chloride. A few times from 2 to 5 per cent. was separated, and once 12 per cent., which latter should correspond to 20 per cent. of ethyl nitrite. These differences induced me to examine whether the layer separated by calcium chloride should always be regarded as ethyl nitrite. But the methods which, so far as I know, exist for the assay of ethyl nitrite in spiritus ætheris nitrosi all depend upon its decomposition (saponification) with potassa, and the assay of the resulting potassium nitrite,† and seem to me to yield unsatisfactory results, particularly when much of the above-mentioned by-products are present. I endeavoured, therefore, to find a process in which these by-products would not seriously interfere, and I believe that I have succeeded in finding one, as will be seen from the following description and analytical data.

In general, my method agrees with those proposed by Schloesing, Schulze, Wulfers, Reichardt, Tiemann, and others for the assay of nitric acid in well-water, etc. It depends on the determination of the volume of nitric oxide gas (NO), which is produced by decomposing ethyl nitrite by a ferrous salt, and is driven over and collected by distillation in an atmosphere free of oxygen.

The accompanying figure shows the apparatus used by me for my analysis. A is a flask of about 150 cubic

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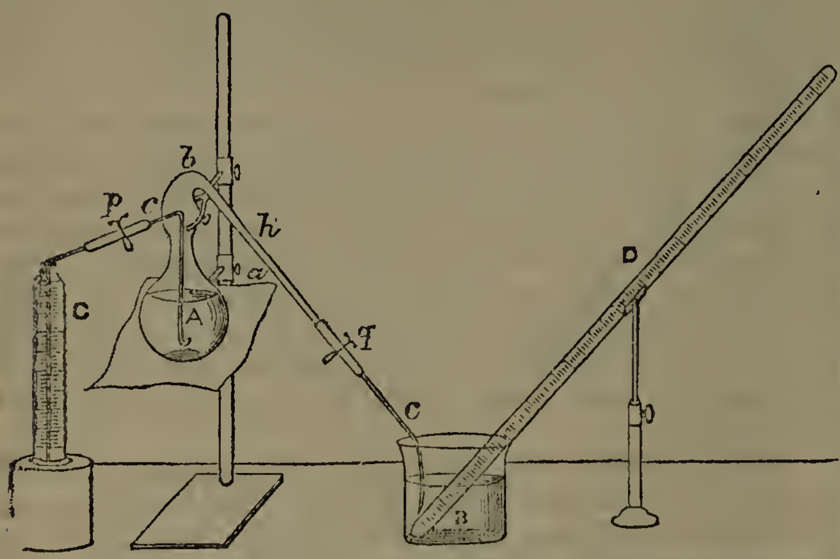
* Abstract of a pamphlet, entitled 'On Spiritus Ætheris Nitrosi.' Reprinted from *New Remedies*, May, 1882.

* A portion of it remains in the chloride of calcium solution. In Parrish's 'Treatise of Pharmacy' (1874), I found 4 per cent.; Tanner (*Jahresber. f. Pharmacog.*, 1871), Smith ('Commentary on the British Pharmacopœia') and others have 8 per cent., from which it appears that the preparation as officinal in England should contain 10 per cent. of the ether.

† In Hoffmann's 'Manual of Chemical Analysis,' a method is described, which consists in decomposing with potassa, diluting with water, and titrating the potassium nitrite, after acidulating with sulphuric acid, by means of solution of potassium permanganate of known strength, until this is no longer rendered colourless.

Rosenbladt recently published (*Zeitschr. f. anal. Chem.*, xvii., Heft 3) a method in which the spirit is saponified by alcoholic potassa in a closed tube, the alcohol driven off afterwards by evaporation, and the residue heated with a concentrated solution of chloride of ammonium in an apparatus filled with carbonic acid gas. From the volume of nitrogen given off, the quantity of ethyl nitrite is determined.

centimetres capacity. Through its neck passes a narrow (1 to 1·5 millimetres in bore) but thick-walled glass tube,



of which the leg inside the flask reaches nearly to the bottom of the latter, and is there curved over in nearly a right angle.*

The leg *c* is about 3 centimetres long, is joined by means of a short rubber tube, tied with cord, with a thin tube reaching to the bottom of the measuring cylinder C. Also the tube *c* is connected in a similar way with *h*, by means of a stout rubber tube, likewise tied with cord, of narrow diameter, and is curved at its lower end.

The other parts of the apparatus need no description. The beaker B and the measuring tube D are filled with soda solution of about 1·1 to 1·15 specific gravity. Instead of freeing the soda solution from oxygen by boiling, as is directed by Tiemann, I mixed it with a little solution of ferrous sulphate, in a closed flask, and poured the solution off after the ferric hydrate had settled.

Finally, there is required for the analysis a solution of a ferrous salt, acidulated with a little sulphuric acid, containing from 250 to 300 gm. of crystallized ferrous sulphate or 350 gm. of Mohr's salt. For shortness' sake, this solution will be indicated, in the following, by the letters *F. S.* Ferrous chloride and hydrochloric acid, which are preferable in the analysis of nitrates, are unsuited here, among other reasons, to prevent the formation of ethyl chloride, which would be produced by them when sweet spirit of nitre is distilled in their presence.

Before the tube *c* is dipped into the soda, the clamps *p* and *q* are to be opened and some of the F. S. (ferrous solution) contained in a beaker, which is put in place of the measuring cylinder shown in the cut, is made to enter the flask A. This may be easily effected by suction at the tube *e*, or the clamp *p* may be opened, and that at *q* be closed, and the flask be warmed until enough air has been expelled, when the F. S. will be sucked up into the flask on withdrawing the flame. After the flask has been about half filled with the F. S., *p* is closed, while the tube *c d* is still filled with liquid, and *q* is opened. The flask is now heated until the contents are at a brisk boil, when the end of the tube *c* is dipped into the soda solution and the boiling continued until no more bubbles of gas escape. As soon as this is the case, *p* is opened, and *q* is closed. This causes the soda solution to rise in the tube *c* up to the pinchcock, and, at the same time, the liquid still contained in *c d* is driven back into the beaker. During this last-named proceeding, the heat is moderated and regulated by the occasional withdrawal of the flame, so that the liquid recedes evenly and completely. About 5 to 10 cubic centimetres always remain in the flask, because the end of the tube does not reach completely to the bottom.

* As I had no flask of sufficiently fusible glass, I did not succeed in fusing the upper part *a b* to the flask, although the cut shows the latter to be one piece. I joined both portions with a thick rubber ring tied with twine.

Finally steam is given off; the lamp is then to be withdrawn, and the clamp *p* closed, whereupon the liquid is drawn up, from the beaker, into the tube *d* up to the clamp. The apparatus is now ready for a series of analyses. These are executed as follows:—

While the apparatus is deprived of air, 15 c.c. of F. S. are transferred to a narrow measuring cylinder (C) holding about 25·5 c.c. and graduated to 25 c.c. Next, 5 c.c. of dilute sulphuric acid are added, and, finally, 5 c.c. of the sweet spirit of nitre to be assayed.*

The cylinder, which is now almost full, is well closed, shaken a few times, and then allowed to stand for about five minutes. About 10 to 15 c.c. of F. S. is now allowed to pass into the flask, by opening the clamp *p*, and afterwards the mixture in the measuring cylinder, taking care to stop the flow when the level of the liquid approaches the bottom to prevent air from entering the flask. To the remnant a little F. S. is added, and nearly the whole of it again allowed to pass into the flask. This manipulation is repeated, finally substituting water for F. S., until the contents of the tube *c d* are filled with colourless water. The flask then contains about 70 c.c. of liquid.

After the measuring tube, filled with soda solution, has been immersed in the beaker B, the flask is heated, and, as soon as the rubber tube above the clamp *q* begins to bulge a little, *q* is slightly opened, taking care to immediately close it again if the soda solution should show inclination to ascend the tube further. This is to be repeated until the liquid is completely depressed, when the clamp *q* may be entirely opened. The developed nitric oxide (NO) gas is collected in the measuring cylinder, and the boiling is continued as long as gas-bubbles are given off; about five minutes' boiling is sufficient. After the evolution of gas ceases, *p* is opened and *q* closed. The contents of the flask then pass back into a beaker, and the apparatus is again ready for a fresh assay. Every analysis consumes about ten to fifteen minutes.

The collected gas is now to be treated as follows: By means of a capsule placed under the orifice, the measuring cylinder is transferred to a tall cylinder filled with cold water. The tube should be somewhat inclined so that the soda solution may easily run out of the tube and be displaced by water, without mixing with it. The tube is now to be closed with the finger, and by inclining it, the inner wall will be wetted by the water, so as to wash down any adhering soda solution. The tube is then entirely immersed in water. After the lapse of an hour, it is carefully lifted up until the water outside and inside of the tube occupies the same level, and the volume of gas then read off. The temperature of the water and the barometric pressure having been taken, the quantity of ethyl nitrite is calculated by aid of the following formula:—

$$\frac{V}{S \times a} \cdot \frac{H-e}{273+t} \cdot 0{\cdot}1207 = \text{per cent. of ethyl nitrite.}$$

(V represents the number of cubic centimetres of gas read off, H the barometric pressure in millimetres, e the tension of aqueous vapour at the observed temperature, S the specific gravity of the sweet spirit of nitre, a the number of cubic centimetres of the spirit used for assay, and t the observed temperature.)

For the purpose of controlling the correctness of this method, the following tests were made: The suitableness of the apparatus was first ascertained by distilling a weighed quantity of pure potassium nitrate, dissolved in a little water, with a saturated solution of ferrous chloride and hydrochloric acid. After the mixture of potassium nitrate and ferrous chloride had been sucked up, hydrochloric acid was used, in place of water, to wash the last remnants up. The following are the results:—

* If the spirit contains very much ether, take 17 c.c. of F. S. and 3 c.c. of the spirit; if it contains very little, take 10 c.c. of F. S. and 10 c.c. of the ether. The quantity of NO gas which is given off should be so adjusted that 20 to 30 c.c. of the measuring tube are still filled with soda solution.

Potassium nitrate used.	Yielded nitric oxide.	At temperature.	Barom. pressure.	Potassium nitrate found.
0·060	13·3 c.c.	7° C.	768 mm.	0·0588
0·120	26·4 „	9° C.	768 „	0·1159
0·120	26·55 „	9° C.	768 „	0·1166
0·1483	34·0 „	11·5° C.	761 „	0·1459

On comparing these results with those obtained by Eder,* who used Tiemann's apparatus,† it wlll be found that they entirely agree with them. The apparatus employed by me, however, has two advantages over that of Tiemann, namely:—1. By avoiding the use of a doubly-perforated rubber-stopper, there is greater assurance of the complete closure of the apparatus, and, therefore, a greater certainty of the correctness of every analysis. 2. A much smaller amount of time is required, since the apparatus is immediately again ready for a fresh analysis. It is, therefore, also much to be recommended for the execution of a series of *nitric acid* determinations.‡

To ascertain the influence exercised by the above-mentioned substances, *i.e.*, alcohol and its oxidation products, upon sweet spirit of nitre, nitric oxide gas, developed by heating potassium nitrite with ferrous sulphate, was passed into a solution of ferrous sulphate. Three separate portions of 10 c.c. of this solution, always freshly prepared, were distilled—the first by itself, the second with alcohol, and the third with a mixture of alcohol and aldehyde. The latter was obtained by distilling alcohol with potassium bichromate and sulphuric acid. The distillate, after being neutralized, is rectified and mixed with a little alcohol. The resulting liquid contained, besides other oxidation products, so much aldehyde that, after diluting with twenty times the volume of alcohol, a stronger reaction for aldehyde was obtained by heating with potassa than is found in strongly decomposed spirit of nitrous ether. The following figures were obtained:—

Without alcohol or aldehyde mixture.	With 10 c.c. of alcohol of 90 per cent.
I. 24·4 c.c. at 6° C. and 767 mm.	24·7 c.c. at 6° C. and 767 mm.
24·6 c.c. at 6° C. and 767 mm.	24·2 c.c. at 6° C. and 767 mm.
II. 18·6 c.c. at 6° C. and 767 mm.	18·8 c.c. at 7·5° C. and 767 mm.

Without alcohol or aldehyde mixture.	With 10 c.c. of alcohol and ½ c.c. of aldehyde mixture.
III. 22·6 c.c. at 7° C. and 766 mm.	22·0 c.c. at 7° C. and 766 mm.
22·0 c.c. at 7° C. and 766 mm.	22·2 c.c. at 7° C. and 766 mm.
IV. 31·2 c.c. at 8° C. and 768 mm.	30·7 c.c. at 8° C. and 769 mm.

These figures show that alcohol and aldehyde have but little influence upon the eliminated nitric oxide. I now prepared a small quantity of ethyl nitrite in order to ascertain whether the reaction took place quantitatively according to the following scheme:—

$$2C_2H_5.NO_2 + 2FeSO_4 + H_2SO_4 =$$
ethyl nitrite + ferrous sulphate + sulphuric acid

$$= Fe_2(SO_4)_3 + 2C_2H_5.OH + 2NO.$$
ferric sulphate + alcohol + nitric oxide

The ethyl nitrite was obtained by distilling a mixture of alcohol, sulphuric and nitric acids with copper. The mixture was heated to 71° to 75° C.; the vapours passed first through an empty flask, were next washed with a solution of calcium chloride, and afterwards condensed in a Liebig's condenser. The distillate was caught in a receiver cooled with ice, and afterwards three times shaken with about five times its volume of water. The separated ether having been allowed to stand a few days in contact with unslaked lime, it was then distilled in a fractional distillation apparatus with Linnemann's tube. The portion passing over at 19° C. was again shaken with ten volumes of water, the separated ether again dried over lime, and once more fractionated. This gave a product boiling at 18° C. and 768 mm., which was used for the following assays.

I. 2·4695 gm. were dissolved in 90 per cent. alcohol, to measure 100 c.c. Five c.c. of this solution, corresponding to 0·12347 gm. of the pure ether ($C_2H_5.NO_2$), yielded—

a. 37·75 c.c. NO, at 15° C. and 762 mm.
b. 37·68 „ „ „ „

corresponding to 0·11843 gm. of the ether, thus showing a loss of 0·00504 gm. At one time the gas was collected over mercury. After allowing ferrous chloride to pass up through it, there remained unabsorbed, at 10° C. and 762 mm., 0·45 c.c.

II. 1·2365 gm. were dissolved in 90 per cent. alcohol, to measure 100 c.c. Five c.c. of this solution, corresponding to 0·061575 gm. of the pure ether, yielded—

a. 19·2 c.c. NO, at 13° C. and 759 mm.
b. 18·95 c.c. „ „ „ „
c. Mixed with 1 c.c. of aldehyde mixture, 19 c.c. NO, at 13° C. and 759 mm.
= 0·05993 gm. of the ether, showing loss of only 0·0017 gm.

III. 5·993 gm. were diluted with 90 per cent. alcohol to 250 c.c. portions of 10 c.c. each, of this solution, were analysed according to Hoffmann's and Rosenbladt's method, and one portion of 3 c.c. was analysed according to my own method (the results are calculated for 10 c.c. to permit ready comparison with the others). Here are the figures:—

Method.		Amount of ether taken.	Temperature C°.	Pressure mm.	Consumed permanganate *	Yielded gas in c.c.	Amount of ether found.	Loss.
Hoffmann's	1	0·23971	—	—	25·4c.c.	—	0·204	0·0357
	2	0·23971	—	—	21·7c.c.	—	0·175	0·0647
Rosenbladt's	3	0·23971	8°	752	—	58·3 N_2	0·1888	0·0509
	4	0·23971	8°	752	—	57·8 N_2	0·187	0·0527
	5	0·23971	9°	752	—	49·8 N_2	0·161	0·0787
	6	0·23971	10°	761	—	68·8 N_2	0·211	0·0287
Eykman's	7	0·23971	6°	764	—	21·55 NO	0·2372	0·0025
	8	0·23971	6°	764	—	21·9 NO		

The last series of assays was repeated, with the addition of 25 per cent. of aldehyde mixture when using my own method, and only 10 per cent. with the others. The results were:—

a. Hoffmann's Method.

Ten c.c. of the alcoholic solution and 1 c.c. of the aldehyde mixture consumed 55 c.c. of the permanganate, and still the latter lost its colour.

* *Zeitschr. f. anal. Chem.*, xvi., 300.

† W. Kubel, *Anleitung zur Untersuchung von Wasser.* Zweite Aufl. v. Tiemann.

‡ To assay the nitric acid in cuprum aluminatum, 0·25 gm. are dissolved in a few c.c. of water, and distilled with a concentrated solution of ferrous chloride or of Mohr's salt (ammonio-ferrous sulphate) in hydrochloric acid.

* 1 c.c. of permanganate solution corresponds to 0·008052 gm. of pure ethyl nitrite.

b Rosenbladt's Method.

The same mixture yielded, at 10° C. and 763 mm. pressure, the following quantities of nitrogen gas:—

	Pure ether.	Loss.
a. 40·8 c.c. correspond to	0·1312	0·1085
b. 39·3 „ „	0·1260	0·1137
c. 21·8 „ „	0·0700	0·1697
d. 24·2 „ „	0·0778	0·1619

c. Eykman's Method.

A mixture in the same proportion at 8° C. and 765 mm., yielded—

	Pure ether.	Loss.
a. 21·4 c.c. correspond to	0·2331	0·0066
b. 21·7 „ „	0·2331	

Calculated per 100 c.c. of the solution, or 2·3971 gm. of the pure ether, the loss incurred by the three methods is, therefore, as follows:—

	Without aldehyde.	With aldehyde.
Hoffmann . . .	15–27 per cent.	? ?
Rosenbladt . . .	12–32 „	45–70 per cent.
Eykman	1·5–4 „	2·5 „

From these results I am justified in believing that neither Hoffmann's nor Rosenbladt's methods are useful processes on account of the interference of the oxidation products of alcohol.

I append a selection of analyses of spirit of nitrous ether, taken from a number executed by my process.

Prepared according to Pharmacopœia.	Sp. gr.	When shaken with 2 vols. sol. of $CaCl_2$, there is separated.	Result of analysis upon 5 c.c.	Per cent. of pure ether.
1. Netherl. (fresh).	0·845	nothing.	20·2 c.c. NO at 8° and 769 mm.	1·56
2. Netherl. (fresh).	0·844	nothing.	26·4 c.c. NO at 9° and 769 mm.	2·04
3. Netherl. (fresh).	0·851	nothing.	32·0 c.c. NO at 10° and 769 mm.	2·44
4. Netherl. (old)	0·856	nothing.	4·9 c.c. NO at 8° and 769 mm.	0·37
5. U. S. (fresh).	0·837	—	41·2 c.c. NO at 8° and 769 mm.	3·22
6. U. S. (fresh).	0·838	nothing.	24·4 c.c. NO at 6·5° and 769 mm. 24·6 c.c. NO at 6·5° and 769 mm.	1·92
7. U. S. (old)	0·842	nothing.	17·6 c.c. NO at 8° and 769 mm.	1·37
8. Brit. (fresh).	0·845	p.c.p.c. 2=10 ether.	38·1 c.c. NO at 6° and 769 mm.	2·94
9. ?	0·855	4=12 „	44·9 c.c. NO at 9° and 765 mm.	3·4
10.	0·856	12=20 „	48·2 c.c. NO at 6° and 771 mm.	6·2

It also appears that the ether which is separated from the spirit by shaking with two volumes of a saturated solution of chloride of calcium consists only *in part* of ethyl nitrite. From about 50 c.c. of the latter separated by calcium chloride, I succeeded in extracting a few c.c. of pure acetic ether and a little ether. The liquid had not entirely distilled over when it had reached the boiling point of alcohol; the largest part distilled at above 25° C., and only a few c.c. could be collected at a temperature of 18° C.

THE CONSTITUTION OF ALBUMENOIDS.*

The following passages are taken from an interesting report upon albumenoid matters which has recently been presented by M. Dumas to the Academy of Sciences, based upon a communication from M. Béchamp.

Among the most interesting and least known of organic substances are those which are designated under the common name of albumenoid or gelatinigenous matters, which are either liquid and coagulable, as white of egg, blood serum, and the fibrous principle of the flesh of animals, or tissues that may be converted into gelatine, as well as gelatine itself. Not being volatile or crystallizable they are most difficult to define, and just as it might be believed that we had to do with a well characterized species the substance proves to be a mixture of two or more different bodies.

* *Journal de Pharmacie*, [5], vi., 8.

The distinctive specific properties of these bodies are therefore not yet well known; there are obscure points in respect to their elementary composition; the products resulting from the action of energetic reagents upon them are complex, whilst all the formulæ by which it has been attempted to represent their composition have proved so complicated that it is difficult to lay hold of the bond connecting them with the ordinary equations of organic chemistry which have been studied with success in recent years. Such considerable efforts have, however, been made, and science has been for some time past enriched with results so worthy of attention, that the not very distant discovery of the true constitution of these substances,—which appear to be direct instruments of life,—may be considered possible and even probable, as well as the precise definition of their specific constituents.

Although these matters do not crystallize or volatilize or form well-defined combinations with bases or acids, they possess one character which is constant and distinctive, and that is the action that bodies of this nature exercise upon the plane of polarized light. In studying various albumenoid matters under this aspect M. Béchamp has succeeded in separating them into species which, if not absolutely defined and comparable to those represented by volatile or crystallizable substances, at least present the results of the first serious attempt towards a regular classification of these interesting products.

In order to appreciate the importance of this inquiry it is sufficient to recall the fact that the organs of all animals and the liquids bathing them are formed of or contain such matters, and that if they do not constitute the preponderating materials in the tissues and juices of plants, their presence in them does not seem to be less general or less essential, especially at the commencement of cell formation. If it be added that analyses of these substances and their interpretation have led chemists to admit that their molecule contains not less than from five to six hundred atoms of carbon, hydrogen, oxygen or nitrogen, it will be understood what a distance separates these bodies from those much less complex ones, the study of which has served as a foundation for the doctrines upon which systematic organic chemistry rests.

The first question to resolve in connection with this group of bodies consists in breaking up the mixtures in which they occur in nature and isolating those individuals possessing fixed and sufficiently fundamental properties to warrant their being considered specific and essential.

White of egg contains at least three bodies: one precipitable by subacetate of lead; a second by ammoniacal subacetate of lead; and a third which is not coagulable by heat, and is soluble in water and insoluble in alcohol, by which means it is separable from an aqueous solution. The first two of these substances present the general characters of albuminoid matters; the third belongs to the class of ferments and liquefies starch.

The ferment discovered in the white of egg by M. Béchamp explains some of the phenomena which occur during incubation. Its presence there caused him to look for it in other albuminoid products, and a general idea of his work may be given by saying that he has succeeded in breaking these up into two or three distinct substances, possessing the properties of albumenous products, and a well defined ferment. The question arises, for what purpose are all these albuminous liquids accompanied by these ferments? What relation exists between the abundance of coagulable animal matter, destined apparently to furnish materials for the building up of organs, and the small quantity of these ferments the presence of which appears to indicate the approaching destruction of the unstable compounds with which they are associated? Whence do these ferments come, what becomes of them, and what part do they play? Such questions are certainly of considerable interest; for these ferments are observed in the serum of the blood of all animals, in the white and the yelk of eggs, and in milk; that is in all liquids destined for the formation or reparation of the organs of animals.

Long ago, Thenard, recognizing the singularly destructive action exercised upon peroxide of hydrogen by certain bodies, such as divided silver, was led to compare their manner of action in this case with that of ferments. In fact the analogy is striking between beer yeast, which in the presence of sugar destroys it and converts it into alcohol and carbonic acid, and fibrin, which converts peroxide of hydrogen into oxygen and water. Neither beer yeast nor fibrin appears to operate in virtue of a chemical action or it would have a part to play. But yeast operates in virtue of a vital phenomenon: would this be the case with fibrin? Of this we are ignorant, and although our ideas upon the subject of ferments have been much modified since the investigation of peroxide of hydrogen by Thenard, we are not yet in a position to explain how fibrin decomposes peroxide of hydrogen apparently without borrowing anything from it or yielding anything to it.

This question, the interest of which has not escaped physiologists, has been advanced a step by M. Béchamp. The fibrin of the blood and the oxygen condensed in the globules may possibly have a part to play in the complex phenomena of respiration allied to this singular action upon peroxide of hydrogen which no other animal matter exhibits. M. Dumas states that he himself formerly sought unsuccessfully to ascertain whether arterial blood contained peroxide of hydrogen, but he would not be surprised if some more able experimenter were to detect its presence.

When fibrin is treated with dilute hydrochloric acid it swells and the greater portion of it dissolves; but as recognized by M. Bouchardat there is always an insoluble residue. M. Béchamp has demonstrated that it is in this residue that the decomposing action in respect to peroxide of hydrogen is found and not in the soluble portion that is removed by hydrochloric acid.

The granular substance insoluble in hydrochloric acid is still an albumenoid matter, possessing the general properties of albumenoids. When heated to boiling in water it loses its decomposing power upon peroxide of hydrogen. If dried in a vacuum in the cold it, on the contrary, retains the power. The same happens when it is treated with alcohol and ether; a little fatty matter is removed without modifying its decomposing power. When this singular substance has been well prepared its action upon peroxide of hydrogen is as rapid as that of the metallic oxides.

It may be mentioned that in a subsequent communication to the Academy* Messrs. Bert and Regnard confirm M. Béchamp's statement that the power of decomposing peroxide of hydrogen resides in the portion of fibrin not dissolved in dilute hydrochloric acid. They further state that if fibrin be converted into peptone by artificial digestion it is no longer capable of decomposing peroxide of hydrogen, but that this property is not affected by putrefaction. Another observation of these experimenters, that in every case an organized ferment, such as beer yeast, is immediately destroyed by contact with peroxide of hydrogen, whilst soluble ferments, such as diastase and the gastric and pancreatic juices, are not affected by it, may give a clue to the nature of the ferment associated with fibrin.

The memoir of M. Béchamp contains the results of his attempts to separate definite substances from various albumenoid matters, and enumerates the various ferments that he has found associated with them as well as their properties.

* *Comptes Rendus*, xciv., 1382.

SULPHOPHENATE OF QUININE.*

BY S. ZINNO.

The author first discusses the question as to whether "sulphophenate" or "phenosulphate" is the better name for this salt, and decides in favour of the former, for the more stable and important of the atomic groups forming the double acid is the sulphuric molecule. The acid from which this salt is formed is a substitution product of sulphuric acid in which one of the hydrogen atoms is replaced by a molecule of phenyl, thus $\left.\begin{matrix}H\\C_6H_5\end{matrix}\right\} SO_4$.

This salt appears to have been first prepared by Prota-Giurleo and analysed by Signor Zinno in 1870, although Rademaker is generally stated to have been the discoverer. It is a true chemical compound and possesses all the chemical and physical characteristics of a definite body. It contains 52 per cent. of quinine, 20 per cent. of sulphophenic acid, and 28 per cent of water of crystallization.

Sulphophenic acid is made by treating phenol with excess of strong sulphuric acid, allowing the mixture to remain for twenty-six hours. It is then diluted with water and saturated with barium carbonate, filtered and evaporated, the resulting barium salt being purified by recrystallization from alcohol; it is then decomposed by sulphuric acid, and the liberated sulphophenic acid added to an equivalent proportion of the alkaloid. Or the crude acid may be saturated with carbonate of lead, filtered, and the resulting solution of sulphophenate of lead decomposed with quinine. The salt is very difficult to crystallize and should be dispensed in the form of an accurately titrated solution.

The salt is being much used in Italy in medical practice, and its efficacy is highly spoken of by the author.

THE PREPARATION OF SYRUPS FOR AERATED BEVERAGES.†

In the preparation of syrups, which are solutions of sugar, more or less strong according to the object for which they are used, care should be taken to employ only the best refined sugar, and either distilled or filtered rain water, as they will be rendered much less liable to spontaneous decomposition, and become perfectly transparent without the trouble of clarifying. When, however, impure sugar is employed, clarification is always necessary. This is best done by dissolving the sugar in the water or fruit juices cold, and then beating up a little of the cold syrup with some white of egg and one or two ounces of cold water, until the mixture froths well; this must be added to the syrup in the boiler, and when the whole is frisked up to a good froth, heat should be applied, and the scum which forms removed from time to time with a clean skimmer. As soon as the syrup begins to simmer it must be removed from the fire and allowed to stand until it has cooled a little, when it should again be skimmed, if necessary, and then passed through a clean flannel. By using refined sugar, however, all this trouble of clarification can be avoided.

When vegetable infusions or solutions enter into the compositions of syrups, they should be rendered perfectly transparent by filtration or clarification, before being added to the sugar.

The proper quantity of sugar for syrups will, in general, be found to be two pounds avoirdupois to every pint of water or thin aqueous fluid. These proportions allow for the water that is lost by evaporation during the process, and are those best calculated to produce syrup of proper consistence and possessing good keeping qualities. They closely correspond to those recommended by Guibourt for the production of a perfect syrup, which, he says, consists of 30 parts of sugar to 16 parts of water.

In the preparation of syrup it is of great importance to employ as little heat as possible, as a solution of sugar

* From the *Annali di Chimica*, lxxiv., 282.
† From the *Chicago Confectioner*.

even when kept at a temperature of boiling water, undergoes slow decomposition. The best plan is to pour the water (cold) over the sugar, and to allow the two to lie together for a few hours, in a covered vessel, occasionally stirring, and to apply a gentle heat, preferably that of steam or of a water-bath, to finish the solution. Syrups are sufficiently boiled when some taken up in a spoon pours out like oil, or a drop cooled on the thumb nail gives a proper thread when touched. When a thin skin appears on blowing the syrup, it is judged to be completely saturated. These rude tests, however, often lead to errors, which might be easily prevented by employing the proper proportions, or determining the specific gravity by immersing in the syrup one of Baumé's saccharometers or syrup gauges, as indicated in the following table:—

Sugar in 100 parts.	Sp. Gr.	Deg. Baume.
0	1·000	0
5	1·020	3
10	1·040	6
15	1·062	8
20	1·081	11
25	1·104	13·5
30	1·128	16·3
35	1·152	19
40	1·177	21·6
45	1·204	24·5
50	1·230	27
55	1·257	29·5
60	1·284	32
67	1·321	35

A fluid ounce of saturated syrup weighs 577½ grains; a gallon weighs 13½ pounds; its specific gravity is 1·319 to 1·321 or 35° Baumé; its boiling point is 221° F., and its density at the temperature of 212° is 1·260 to 1·261, or 30° Baumé. The syrups prepared with the juices of fruits mark about two or three degrees more on Baumé's scale than the other syrups. According to Ure, the decimal part of the number denoting the specific gravity of a syrup multiplied by twenty-six gives very nearly the number of pounds of sugar it contains per gallon.

The preservation of syrups, as well as of all saccharine solutions, is best promoted by keeping them in a moderately cool, but not a very cold place. Let syrups be kept in vessels well closed, and in a situation where the temperature never rises above 55° F. They are kept better in small than in large vessels, as the longer a bottle lasts the more frequently will it be opened, and the syrup consequently exposed to the air. By bottling syrups while boiling hot, and immediately corking down and tying the bottles over with a bladder, perfectly air-tight, they may be preserved even at a summer heat for years, without fermenting or losing their transparency.

The candying of syrups may be prevented (unless the syrup be over-saturated with sugar) by the addition of acetic or citric acid, two or three drachms per gallon. Confectioners add a little cream of tartar to the syrup to prevent granulation. Syrups may be effectually prevented from fermenting by the addition of a little sulphite of potassa or lime; also by the use of salicylic acid in small quantities. Fermenting syrups may be immediately restored by exposing the vessel containing them to the temperature of boiling water. The addition of a little spirit is also good, say about ten per cent.

A solution of sugar prepared by dissolving two parts of double refined sugar in one of water, and boiling this a little, affords a syrup which neither ferments nor crystallizes.

The basis of most mineral water syrups is simple syrup, which is prepared by adding sixteen pounds finest white sugar and the whites of four eggs to one gallon of water; stir until all the sugar is dissolved; simmer over a gentle heat for two or three minutes; skim well and strain through a fine flannel bag.

The best way to keep fruit syrups from fermenting is by bottling while hot, into suitable bottles or larger vessels, and to prevent access of air. This is the principle, and it may be carried out in various ways. For instance, fill the syrup while hot in quart bottles, previously warmed, and fill them almost full. Cover or cork the bottles temporarily until the syrup cools a little and contracts in volume; then, having heated a small quantity of the syrup, refill the bottles, cork them securely and wax them.

A great variety of syrups are made by the addition of proper flavouring ingredients to simple syrup; but in other cases, especially when the juices of fruits are employed, the syrup is not first prepared and then flavoured, but the processes go hand-in-hand. In such instances specific instructions will be given. It is always advisable, when fresh fruit can be obtained, to use it in preference to the essence. One general recipe, which answers for nearly all fresh fruit, is as follows: Use nothing but the very best fresh fruit, which must be freed from stocks, etc., and crushed with a wooden instrument (not metal); when well mashed, let it stand in a room of even temperature (about 68° F.) for four days, which will give sufficient time for fermentation to take place; press out the juice from the fruit and let it settle in a cool cellar for two days, after which five pounds of the clear juice is to be simmered with nine pounds of loaf sugar; while warm, strain through flannel. The colour may be improved by a solution of some colouring agent.

It is advisable to add to the fresh fruit before setting it for fermentation, about 2 pounds of powdered loaf sugar for every 100 pounds of fruit. When cold it is ready for bottling. Cleanliness should be strictly observed in all the utensils used. When bottling for storing, skim the top off any floating matter from the syrups in the large pan, and see that no residue at the bottom goes into the bottles. Most of the syrups not made of fruit, may have a little mucilage of gum arabic added, in order to produce a rich froth. The following recipes comprise syrups made from the fruit, and also from essences. These may be varied to suit taste and requirements. A variety of syrups have been brought into use by adding the various wines, such as claret, hock, sherry, etc., to simple syrup; others, by the addition of spirits, as milk punch, by adding to vanilla cream Jamaica rum and nutmeg. Almost any syrup may be made by the addition of a sufficient quantity of flavouring essence to simple syrup; but these artificially prepared syrups are inferior to those made from fresh fruits.

Red Colouring for Soda Water Syrups.—The most convenient is probably tincture of cudbear, as it affords a good, substantial, and natural-looking colour miscible with syrups without cloudiness. It may be made as follows:—Two to 4 ounces powdered cudbear, 1 pint diluted alcohol. Exhaust by maceration or displacement. Used alone, the tincture gives a shade of red closely imitating the colour of raspberries or currants. For deeper red, like blackberries, the addition of some caramel is all that is necessary. The strawberry colour is best imitated with tincture of cochineal. *Aniline red,* owing to its cheapness, is often used for colouring syrups, but it produces a glaring, artificial-looking bluish-red, and is liable to the objection that it sometimes contains arsenic.

Ambrosia Syrup.—A mixture of equal parts of vanilla and strawberry syrups.

Apple Syrup.—Proceed with apples as for pine-apple syrups.

Banana Syrup.—Proceed with bananas as for pine-apple syrups.

Blackberry Syrup.—Prepared from ripe fruit the same as raspberry syrups. Blackberry syrup is improved by adding 1 ounce best French brandy to each quart.

Capillaire Syrup.—Nine pounds loaf sugar, 5 pounds orange-flower water. Boil till the sugar is dissolved and the syrup is clear; while hot, strain through flannel add to the cool syrup 2 drachms of tartaric acid, previously dissolved in 8 ounces of the strongest orange-flower water; lastly add 4 ounces of the best Rhine wine.

Cream Syrup (2).—One pint condensed milk. One pint water. One and one-quarter pound sugar. Heat to boiling and strain. This will keep for over a week in a cool place.

Cream Syrup—Imitation.—Make an emulsion with 3 ounces fresh oil of sweet almonds, 2 ounces powdered gum arabic and 2 ounces water; then dissolve 1 pound white sugar by gentle heat, strain, and when cool, add the whites of two eggs. It should be put up in small bottles, well corked, in a cool place. This is not only an excellent imitation and substitute for cream syrup, but will keep for a considerable time.

Currant Syrup (1).—Six pints simple syrup. Two pints water. Two ounces tartaric acid. Three drachms fruit essence. Mix; colour with liquid carmine for red currants, and with burnt sugar, for black.

Currant Syrup (2).—One pint red currant juice. One gallon simple syrup.

Grape Syrup.—One half pint brandy. One ounce tincture of lemon. One gallon simple syrup. Tincture red saunders, 1 quart.

Ginger Syrup.—Six pints simple syrup. Two pints water. One ounce tartaric acid. Two ounces ginger. Burnt sugar to colour.

Ginger Syrup (2).—Four ounces extract Jamaica ginger. One gallon syrup. Shake well. A few drops of tincture curcuma to colour.

Ginger Syrup (3).—Nine pounds loaf sugar. Five pounds water. Twelve ounces essence ginger. Four ounces Rhine wine. Boil sugar and water until dissolved and clear; when cool, add ginger and wine. Mix well and let settle.

Imperial Syrup.—Equal parts of raspberry and orange syrups.

Lemon Syrup.—Grate off the yellow rinds of lemons, and beat it up with a sufficient quantity of granulated sugar; express the lemon juice; add to each pint of juice 1 pint of water, 3½ pounds granulated sugar, including that rubbed up with the rind; warm until the sugar is dissolved and strain. Under no circumstances must the syrup be allowed to boil, and the less heat that can be used to effect the complete solution of the sugar the better will be the syrup.

Lemon Syrup (2).—Add to 1 gallon simple syrup when cold, 20 drops fresh oil lemon and ½ ounce citric acid, previously dissolved in 3 ounces water; mix by shaking well in a bottle; add 4 ounces gum solution, made by dissolving 2 ounces of fine white gum arabic in 2 ounces warm water.

Lemon Syrup (3).—Six pints simple syrup. Two pints distilled water. Two ounces essence lemon. Two ounces citric acid, dissolved in boiling water. Mix, and, if required, colour with saffron.

Maple Syrup.—Three and one-half pounds maple sugar. One quart water. Dissolve, and, if desired, add a small proportion of gum solution to produce a rich froth.

Milk Punch Syrup.—To 1 pint heavy syrup add one-half pint each of brandy and Jamaica rum; flavour with two teapoonfuls of an extract prepared by macerating 2 ounces of ground nutmegs in 8 ounces of alcohol. The syrup is first to be poured into the glass in the proper quantity, and ordinary cream syrup added before drawing the soda water.

Mulberry Syrup.—Made from the fruit, the same as strawberry, and acidulated slightly with a solution of citric acid. It may also be made from the fruit essence in the same manner as for strawberry, using about half the quantity of tartaric acid.

Nectar Syrup (1).—One ounce extract vanilla. One ounce extract rose. One ounce extract lemon. One ounce extract bitter almonds. Mix and add 1 gallon simple syrup; colour pink with cochineal.

Nectar Syrup (2).—Mix 3 parts vanilla syrup with 1 each of pineapple and lemon syrups.

Orange Syrups.—These may be made from the fresh fruit or from the essence in a similar manner as for lemon syrups. Orange syrups may be coloured slightly with tincture of saffron or of turmeric.

Orgeat Syrup (1).—One half pint of cream syrup. One half pint simple syrup. One pint vanilla syrup. Five drops oil bitter almonds.

Orgeat Syrup (2).—Beat to an emulsion in a mortar 8 ounces blanched sweet almonds and 4 ounces bitter ones, adding a little water; when smooth add 3 pints water; mix and strain; dissolve in this without heat 6 pounds sifted white sugar, and 4 ounces fresh orange-flower water.

An excellent imitation of orgeat syrup is made by flavouring cream syrup, made with eggs and milk, with a few drops of oil of bitter almonds.

Pear Syrup.—Proceed with pears as for pineapple syrups.

Pineapple Syrup (1).—Take a convenient number of the fruit; pare and mash them in a marble or porcelain mortar, with a small quantity of sugar; express the juice; for each quart of juice take 1½ pint of water, and 6 pounds of sugar; boil the sugar and water, and add the juice; remove from the fire; skim and strain.

Pineapple Syrup (2).—Six pints simple syrup. Two pints distilled water. One ounce tartaric acid. One drachm essence pineapple. Saffron to colour.

Pineapple Syrup (3).—Proceed as for raspberry (4); but the hard nature of this fruit requires pounding with a heavy chump of wood (not metal) in a tub with a strong bottom; when well mashed it will require great pressure to extract all the juice from this fruit; a cider press will answer the purpose; add 14 pounds of sugar to a gallon of juice and a little pure acetic acid; put it on a slow fire, and stir until the sugar dissolves; when cold, bottle and tie down.

Raspberry Syrup (1).—Take fresh berries and inclose them in a coarse bag; press out the juice, and to each quart add 6 pounds white sugar and 1 pint of water; dissolve, raising it to the boiling point; strain; bottle and cork hot, and keep in a cool place. Raspberry syrup is improved by adding 1 part of currants to 4 parts of raspberries.

Raspberry Syrup (2).—Five quarts raspberries. Twelve pounds white sugar. One pint water. Sprinkle some of the sugar over the fruit in layers, allowing the whole to stand for several hours; express the juice and strain, washing out the pulp with the water, add the remainder of the sugar and water; bring the fluid to the boiling pint, and then strain. This will keep for a long time.

Raspberry Syrup (3).—Six pints simple syrup, 2 pints water, 2 ounces tartaric acid, 2 ounces essence raspberry. Colouring sufficient. Colouring for raspberry, blackberry, etc., syrups may be made by boiling 1 ounce cochineal with half a teaspoonful cream of tartar; filter.

Raspberry Syrup (4).—Take any quantity of fully ripe fruit; free them from stalks; place them in a tub and crush them with a wooden spatula; after they have been mashed, let them remain for three or four honrs, and strain the crushed berries through a strong flannel bag or strainer into a suitable vessel. Dissolve ½ ounce citric acid in 3 ounces water, and add this quantity to each gallon of juice; mix 14 pounds of broken sugar to every gallon of juice; put on a slow fire and stir until all the sugar is dissolved (not boil); take off the fire, and when cold, bottle and cork for future use. If too thick when cold, it may be brought to a proper consistency by the addition of water.

Raspberry Syrup—Imitation.—Three ounces bruised orris root. Two ounces acetic acid. One ounce acetic ether. One pint of alcohol. Cochineal to colour. Mix and allow to stand a few days; filter, and use to flavour simple syrup.

Rose Syrup.—One gallon simple syrup, 1 ounce essence rose. Colour pink with prepared cochineal, and acidulate lightly with a solution of citric acid.

Sarsaparilla Syrup (1).—One gallon simple syrup. Two ounces essence sarsaparilla. Colour with caramel.

Sarsaparilla Syrup (2).—One gallon simple syrup. Essence sarsaparilla q. s. One ounce powdered extract licorice. Fifteen drops oil of sassafras. Fifteen drops oil of wintergreen. Ten drops oil of aniseed. Stir the oils with the powdered licorice; add a portion of the syrup; stir smoothly, and mix the whole together by agitation.

Sherbet Syrup.—Mix equal parts of orange, pineapple, and vanilla syrups.

Sherry Cobbler Syrup.—To 1 pint good sherry add an equal measure of heavy simple syrup, and one lemon cut in very thin slices. Allow the syrup to stand a few hours; strain through a sieve, and bottle for use.

Strawberry Syrup (2).—Proceed as for raspberry syrup (4); but the fruit being more stubborn will require a good beating with the spatula to mash them; when they have stood three or four hours strain and press the juice out by squeezing the strainer between the hands; add to the juice the same quantity of citric acid; dissolve in each gallon 14 pounds of loaf sugar; simply warm the juice sufficiently to dissolve the sugar; take from the fire, and when cold bottle and cork till required.

Vanilla Syrup (1).—One gallon simple syrup. One ounce extract vanilla. One-half ounce citric acid. Stir the acid with a portion of the syrup; add the extract of vanilla; mix.

Vanilla Syrup (2).—Four pints simple syrup. Two ounces extract of vanilla.

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Continued from page* 50.)

TINCTURA SAPONIS VIRIDIS (*Tincture of Green Soap*).

Green soap	1
Alcohol	1
Spirit of lavender	1

Dissolve the soap in the alcohol, add the spirit, and filter.

LIQUOR PHOSPHORI ÆTHEREUS (*Ethereal Solution of Phosphorus*). [Solutio Phosphori Ætherea.]

Phosphorus, powdered (see before, p. 26)	1
Ether	200

Pour the ether in a flask provided with a well-fitting stopper; add the phosphorus, close well and macerate, occasionally shaking, for three or four days, or until no more undissolved phosphorus remains. Pour the clear liquid into small vials, which must be completely filled and kept in a cool and dark place.

SPIRITUS COCHLEARIÆ COMPOSITUS (*Compound Spirit of Cochlearia*).

[Cerevisia antiscorbutica Sydenhami—Sydenham's antiscorbutic Beer.]

Cochlearia, fresh flowering herb	72
Curled mint, dried and cut	6
Sage, dried and cut	6
Orange peel, dried and cut	8
Nutmeg, bruised	1
Alcohol (stronger)	36
Water	250

Macerate during one day and distil until the distillate has specific gravity of 0·960 to 0·980.

SPIRITUS MELISSÆ COMPOSITUS (*Compound Spirit of Melissa*).

Melissa, dried and cut	8
Lemon peel, fresh, cut	2
Nutmeg, bruised	2
Coriander, bruised	2
Cloves, bruised	1
Cinnamon, bruised	1
Alcohol	55
Water	70

* From *New Remedies*, April, 1882.

Macerate during one day and distil off 72 parts. The specific gravity of the distillate should be 0·906.

SPIRITUS POLY-AROMATICUS (*Pharm. Belg.*) (*Polyaromatic Spirit*).

[Fioraventi's Balsam.]

Cloves, bruised	1
Nutmeg, bruised	1
Cinnamon bruised	1
Ginger, bruised	1
Myrrh, in coarse powder	2
Galbanum, in coarse powder	2
Storax	2
Laurel berries	3
Turpentine	4
Alcohol	98
Water	334

Macerate during one day and distil off 108 parts. The specific gravity of the distillate should be 0·900.

SPIRITUS TRAUMATICUS (*Pharm. Neerl. I.*) (*Wound Spirit*). [Aqua vulneraria.]

Sage	1
Melissa	1
Thyme	1
Marjoram	1
Rosemary	1
Lavender	1
Alcohol	20
Water	220

Macerate during one day and distil off 75 parts. The specific gravity of the distillate should be 0·975.

SPIRITUS VALERIANÆ COMPOSITUS (*Compound Spirit of Valerian*).

Valerian, bruised	9
Lovage seed, bruised	3
Pennyroyal, cut	2
Savin, cut	1
Alcohol	35
Water	35

Macerate during one day and distil off 30 parts.

SPIRITUS VULNERARIUS RICORDI (*Ricord's Wound-Spirit*).

Thyme, common (*Th. vulgaris*)	1
Origanum	1
Melissa	1
Peppermint	1
Marjoram	1
Rosemary	1
Sage	1
Wild thyme (*Th. Serpyllum*)	1
Hyssop	1
Wormwood	1
Rue	1
Tansy, in seed	1
Chamomile, Roman	1
Lavender	1
Alcohol	48

Macerate during one day and distil until the distillate has a specific gravity of 0·873.

SPONGIA CERATA (*Waxed Sponge*).

Dip soft, fine sponges, cleaned by beating and washing, and afterwards dried, into melted wax.

When they are thoroughly soaked, press them between warm plates.

SPONGIA PRÆPARATA (*Prepared Sponge*).

Wrap soft, fine sponges, cleaned by beating and washing, while still moist, with twine, so that the turns of the latter touch each other and the sponge be reduced to its smallest possible volume. Fasten the ends and let the compressed sponge dry.

SYRUPUS ÆTHERIS (*Syrup of Ether*).

Ether, stronger	1
Alcohol, stronger	1
Syrup	15

Mix the ether with the alcohol, then add the syrup, and mix by agitation.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, JULY 22, 1882.

REPORT ON AN EXPLOSION IN A DRYSALTER'S WAREHOUSE.

In the early part of last year an explosion occurred on the premises of Mr. Riley, a drysalter and manufacturer of albumen, at Castleton, near Manchester, by which two persons lost their lives and another was seriously injured. According to the accounts given at the time in the newspapers and by Mr. Riley himself, it was represented that chlorate of potash had exploded in consequence of sparks—produced by an iron-hooped cask striking a wall—falling upon some of that salt scattered on the floor. This explanation of the accident was obviously improbable, since chlorate of potash is in itself perfectly harmless and free from any liability to explode even when exposed to considerable heat; but nevertheless the idea that the chlorate had exploded so far gained credence in the locality that after the accident some of the carriers hesitated to carry chlorate of potash on account of the supposed danger attending it.

The somewhat mysterious nature of this accident was considered to demand investigation, and consequently Captain Cundill, R.A., one of the inspectors of explosives, was instructed by the Home Office to inquire into the circumstances attending it. His report has recently been presented and some account of it will, we think, be interesting to our readers, besides being useful in affording an illustration of the way in which accidents may take place in such a warehouse as that of Mr. Riley. From Captain Cundill's examination of the premises, and of the stock contained in them, he came at once to the conclusion that the accident could not have occurred through the agency of any of the ordinary explosives, as the effects and visible remains of the explosion were totally different in character from those which gunpowder, gun cotton, nitroglycerine compounds, fulminates, etc., would infallibly show. Thus the idea that explosives, in the ordinary sense of the word, were illegally manufactured or stored by Mr. Riley, or introduced into his store by some one, with the design of injuring him, was entirely disposed of. Some of the results were partly consistent with the theory that an escape of gas, accidentally fired, had caused the explosion. But no importance could be attached to this view for several reasons. Search was made for picric acid or some of its salts among the stock, as they are articles used in dyeing and known to be dangerously explosive; but no trace of these materials could be found, and all the substances constituting the stock were found to be such as were in themselves perfectly harmless and free from explosive properties when pure and unmixed. However, two of these substances, viz., chlorate of potash and the yellow prussiate of potash, when mixed together, do form an explosive material of a somewhat energetic character, and they are constituents of what is known as white gunpowder. A very rough mixture of these two substances in approximately equal proportions, when ignited with a match, burns with considerable rapidity, much resembling ordinary firework composition, evolving a large amount of whitish smoke and leaving a considerable residue of a slaggy nature.

In the explosion at Castleton it was proved that there was no loud or sharp sound accompanying it, such as would be caused by gunpowder or ordinary explosives, but only a loud hissing like letting off steam, a low rumble and a noise like the "unloading of a cart of coals." There was a very large quantity of thick smoke evolved, described as grey or yellowish, and by one witness as very choking; but there was no violent local disruptive action, as evidenced by the absence of any shattering effects on the structure of the warehouse or on the persons within it, and by the fact that none of the packages of stock in the neighbourhood of the seat of the explosion were at all broken. These contained albumen, chlorate of potash, yellow prussiate of potash, and a little bone black; all separate and unmixed. On the walls, however, there were large quantities of slag or *débris* of the explosion and the floor was covered with a similar mass round the spot where the explosion took place. Some of this slag was submitted to analysis by Dr. Dupré, who found it to consist of yellow prussiate, chloride of potassium, chlorate of potash, carburet of iron and carbonate of potash. Hence, Captain Cundill infers that the cause of the accident was the ignition of a crude mixture of chlorate and yellow prussiate of potash, and he considers that this view furnishes a key to the otherwise puzzling statement of Mr. Riley that it was the chlorate of potash that exploded.

Two other questions then arise, how was the mixture made and how was it ignited? According to the evidence of Mr. Riley and his son, a spark was seen to fly from the cask hoop when it struck the wall, and there was some white powder on the floor, and on the day of the accident two kegs of "potash" had been brought into the store. An invoice for "one cask ground yellow prussiate and one cask pulv. chlorate potash" was also found among Mr. Riley's papers, bearing the date of the previous day. From the facts above mentioned, there can be little or no doubt that the explosive mixture was in considerable quantity on the floor, and not in any package, for the most careful search failed to disclose any fragments of a burst barrel or box. Moreover, the most severe burns on young Riley were on the lower part of his legs, as might be expected from the sudden outburst of a body of flame on the floor, and while the mass of slag was found on the very spot where the various brands of albumen were usually mixed in the ordinary course of business, there were found standing close by two open kegs of the prussiate and chlorate, from both of which a considerable part of their contents had been taken. From these circumstances it is inferred that either Mr. Riley was mixing the two salts experimentally, or in obedience to an order for the delivery of such a mixture, or that he mixed them purely by accident, thinking all the while he was dealing with chlorate of potash or with prussiate of potash alone. Both salts are largely used in dyeing, but there is abundant evidence to show that they are, as a rule, never mixed together in the dry state. Whatever may be conjectured as to the possibility of Mr. Riley having been mixing the salts experimentally, it is very improbable that he was doing so as a regular part of his business, and Captain Cundill inclines to the opinion that the mixing was in some way quite accidental. It is *à priori* very unlikely that this was done by the wholesale chemists who supplied the ground salts, and in addition there is the fact that no exploded package was traced. As regards accidental mixture, it must be remembered that though the ground salts are sufficiently different in appearance to be easily distinguishable in a good light they might be mistaken in a dim light such as there would be in the warehouse where the explosion took place.

However the mixture came on the floor there is little doubt that it was there, and its ignition by the spark from the iron-hooped barrel which Mr. Riley and his son were moving out of the way is readily intelligible. But since the mixture of chlorate and prussiate can be exploded by percussion and friction it is, moreover, not improbable that the mere rolling or perhaps dragging of the cask, or the movement of the feet over some portion of the mixture, exploded it so that the fire was communicated to the main body of the mixture.

This view of the case is in conformity with the verdict of the coroner's jury of "accidental death;" but Captain Cundill does not omit to point out in his report how the Explosives Act, 1875, would bear upon accidents resulting from explosion of a mixture of chlorate and prussiate. In cases where the mixture was made purposely for use as an explosive in the ordinary sense, it would come within the provisions of the third section of the Act, and the mixture would be classed under division 2 of class 4, so that if Mr. Riley's case had been of this kind he would have been guilty of illegal manufacture or storage of an explosive. If, however, the mixture were made purposely with a view to its use in dyeing or other manufacturing operations, this would not have been the case; but Captain Cundill thinks it would become a question whether provision should not be made, in the interests of public safety, for bringing the practice within the scope of the Act under the powers conferred by section 104, providing for the extension of the Act to any substance or process liable to dangerous explosion.

PHARMACY ACT PROSECUTION.

A case of prosecution for the illegal sale of a preparation of opium, reported at page 78, has been decided upon in a manner which a correspondent regards as "creditable," though we cannot quite agree with him. Of course we cannot vouch for the accuracy of the report in the local paper from which our extract is taken; but accepting that as it stands, there is, we think, equal grounds for satisfaction and regret. It would seem that we may congratulate ourselves on the fact that the police authorities who acted as prosecutors and the magistrates who heard the case were impressed with the idea that the trade in drugs and medicinal preparations should not be carried on by any persons but those qualified to do so by registration. That this is very sound as an abstract principle we readily admit; but unfortunately it is not quite in accordance with the law as it exists, and until that becomes the case it is desirable that prosecutions for infringement of the Pharmacy Act should be conducted in strict conformity with the provisions of that statute. There is the greater reason to regret any deviation from such a course since it happens that in regard to the majority of cases of infringement of that Act we must chiefly look to the application of the seventeenth section for a remedy and rely upon the properly directed action of the police and other local authorities for the stoppage of practices which are in every way objectionable. Surely in cases of this kind recourse might usefully be had to the local secretaries of the Pharmaceutical Society for instruction and advice as to the proper mode of instituting prosecutions.

RECIPROCITY IN PHARMACEUTICAL QUALIFICATION.

The May number of the Australian Supplement of the *Chemist and Druggist*, published under the direction of the Pharmaceutical Society of Victoria, contains an article in reference to the reply of the Registrar of the British Society to the request that the Council should take into consideration the conditions under which the Victorian certificate of competency as a pharmaceutical chemist might become interchangeable with that of the British Society. Our readers will probably remember that this reply was to the effect that there are no statutory provisions in the Pharmacy Act of Great Britain empowering the Registrar to place any name on the register except in the ordinary way on production of certificates of skill and competency, signed by the respective boards of examiners appointed by the Council of the Society and approved by the Privy Council. It is admitted to be only right that the leaders and authorized guardians of pharmaceutical education in England should carefully guard their diplomas against deterioration, but at the same time some degree of disappointment appears to be felt that the proposal to establish an interchange of certificates was not entertained. On reflection, however, we trust that it will be seen how difficult would be the maintenance of a proper standard of competency if the suggested acceptance of certificates were to be acceded to, while there was no corresponding interchange of control over the education and examinations. Moreover, the recognition of certificates from one colony would be a ground for admitting it with others, and thus greater harm than good might be done.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held on Thursday, July 20, 1882, the report of the College of Preceptors on the examination held on July 4 was received.

Three hundred and seventy candidates had presented themselves for examination, of whom *one hundred and eighty-one* had failed. The following *one hundred and eighty-nine* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

(Arranged alphabetically.)

Airey, George Richard ....Birkdale.
Allan, Alexander ....Aberdeen.
Allen, John Sutcliffe ....Biggleswade.
Askew, John Robert ....Carnforth.
Baker, Joseph Aloysius ....Manchester.
Banyard, John Albert.............Anerley.
Barker, Frederick William......London.
Bayes, William Thomas ....Leamington.
Beanland, John Milner ....Keighley.
Beck, John Wilson ....Morecambe.
Bennett, Albert ....Leeds.
Bishop, George Henry............Southampton.
Bisset, James ....Burntisland.
Bolton, Richard Lee ....Leith.
Bond, Alfred.......................Camborne.
Boon, James ....Pathhead.
Boor, Harry Herbert ....Spalding.
Bottom, Frederic Charles ......Sheffield.
Brown, Arthur ....Loughborough.
Cain, James Harold..............Douglas.
Capell, James Ralph ....Kettering.
Cawley, Francis ....London.
Cheesman, Henry.................Barton-on-Humber.
Chaston, William Robert ......Norwich.
Clark, George Alexander ......Portsoy.
Clarkson, Joseph ....Skipton-in-Craven.
Coates, Thomas Henry ....Chesterfield.
Coggin, Archibald H. G..........Ware.
Coldicott, Thomas Rowlands ...Stafford.
Cook, George Ellis ....Arbroath.
Cope, William James ....Longton.
Coull, William M. ....Arbroath.
Coutts, William Alexander......Pathhead.
Cowan, Frank ....Rochester.
Cowpe, John William ....Manchester.
Cox, Frederick Hudson ....Southampton.
Crooks, Joseph ....New Shildon.
Cross, Thomas ....Sunderland.
Cumberbirch, William............Wilmslow.
Cumming, John ....Portsoy.
Davies, John William ....Taunton.
Davison, James Richardson ...Alnwick.
Dawson, Thomas ....Currie.
Desborough, Newton D. ....Stamford.
Donaldson, James ....Irvine.
Dougall, William Braidwood ...Aberdeen.
Down, Elgar ....Barnstaple.
Dowswell, Charles W.............Tewkesbury.
Dyer, William Bury...............Halifax.
Ebbetts, Robert James ....Hanworth.
Enoch, Albert John...............Newmarket.
Evans, Daniel Ashton ....Llanbrynmair.
Evans, Robert ....Bala.
Eyles, John Robert ....Newbury.
Fieldsend, Arthur ....Penistone.
Fox, William Arthur ....Cleckheaton.
Franklin, Alfred James ....Brighton.
Fraser, James Leslie ....Inverness.
Frost, William Tite ....Northampton.
Gaddes, William ....Brampton.
George, William Arthur.........Pentre.
Gidden, Harry William ....Southampton.
Goddard, Henry Edward ......Great Yarmouth.
Godwin, William Charles ......London.
Golightly, John William.........Durham.
Goss, George ....Ipswich.
Gourlay, Henry Hamilton ......Lytham.
Grant, Alexander..................Blairgowrie.
Grant, Arthur T., Jun............Helston.
Greenhalgh, William Henry ...Rotherham.
Hadden, Alexander ....Aberdeen.
Hampson, William ....Leigh.
Hanslow, Charles Edward ......Woodford.
Harradine, Holben M.............London.
Harris, William C. ....Perth.
Harsant, Alfred Henry ....Rochester.
Hartley, Joseph Henry ....Mirfield.
Harwood, Samuel..................South Shields.
Hatton, Henry John ....Warrington.
Hawkins, Lewis Walter ....London.
Haynes, Alexander ....Fleetwood.
Head, George ....Bridgnorth.
Hemming, Francis Harry ......Nottingham.
Herbert, Sydney Reeves.........Cockermouth.
Higgins, Charles Alfred ....Manchester.
Hindmarch, Thomas F. ....South Shields.
Honiatt, Albert Thomas.. ......Hereford.
Honman, Alfred Taylor .... London.
Hughes, Thomas Edward ......Newtown.
Humphreys, Henry ....London.
Jackson, Urban Arthur ....Manchester.
Jackson, Thomas Booth ....Manchester.
James, Penry Foster ....Pentre.
Jarvis, James Henry ....Hastings.
Jenkins, John ....Pembroke.
Jenson, Alex. Benjamin ....Birmingham.
Johnson, Frederic..................London.
Johnson, Frederick Wm. ......Bath.
Johnson, Henry ....London.
Johnstone, William ....Lochmaben.
Jones, John ....Llandovery.
Jones, Thomas Walter ....St. Asaph.
Jones, William Thomas ....Carmarthen.
Kennerley, Francis Randle.......Congleton.
Kershaw, Sam ....Heckmondwike.
Knowles, Joseph William ......Thorne.
Lack, Edward Ernest ....Cromford.
Lamplough, James William.....London.
Langbourne, Walter Charles....Whitby.
Lewis, Gwilym ....Pontypridd.
Llewellyn, Thomas Richard.....Pontypridd.
Lowe, Osmond Henry ....Maidenhead.
Lucraft, William Henry.........Broad Clyst.
McKay, James Alexander ......Dufftown.
McKenzie, William Graham....Edinburgh.
McKie, Robert.....................Blackburn.
Mallett, Henry Philip............Norwich.
Martin, Mallard ....Staveley.
Matthews, Arthur Herbert......St. Neots.
Merson, George ....Fraserburgh.
Miner, Major Thomas.............Walsall.
Moody, William Morton ....Salisbury.
Morley, Charles ....Beverley.
Morris, John.......................Birkenhead.
Morris, Richard Clayton.........Welshpool.
Mumford, Sydney H. ....Cambridge.
Myers, Benjamin ....London.
Ness, Thomas ....Edinburgh.
Nicolle, Louis James ....Guernsey.
Oxen, David Hunter ....Tynemouth.
Palmer, Charles Lewis............Grimsby.
Palmer, William ....Newport, I. W.

Parkinson, William	Blackburn.
Payne, Joseph Hind	Wainfleet.
Pelham, Sydney	Basingstoke.
Penny, John	Workington.
Pepperdine, Lemuel S.	Lincoln.
Pettigrew, James	Glasgow.
Phillips, John Cornelius	Bath.
Pickering, Richard	Blackburn.
Pickup, John	Blackpool.
Pitt, Francis Henry	Bristol.
Price, Walter	London.
Procter, Robert Ashton	Scarborough.
Puckrin, Thomas Edward	Whitby.
Rae, Alexander David	Aberdeen.
Rees, Colin Atkins	Dartmouth.
Reid, Alexander	Aberdeen.
Reid, David	Bathgate.
Rennet, David	Aberdeen.
Richards, David Edwin	Crosswell.
Richards, John	Llangadwaladr.
Richardson, George Lowas	Appleby.
Robinson, Wm. Shakespeare	Birmingham.
Sandbrook, John	Market Drayton.
Saville, Charles	Leeds.
Searle, William	London.
Sinclair, Robert Hodge	Dunfermline.
Skipworth, Bertram George	Grantham.
Skirrow, Alfred Rhodes	Skipton-in-Craven.
Smith, Charles B.	Potton.
Solomon, Walter Bernard	Birmingham.
Sowden, George	Spilsby.
Stanley, James	Bulwell.
Stapleton, Frederick William	Shefford.
Steward, Charles	Kirkcaldy.
Stewart, James	Kirkintilloch.
Sutherland, Donald	Aberdeen.
Swan, William	Dundee.
Tait, Thomas	Berwick.
Talintyre, Willliam John	Stockton-on-Tees.
Taylor, George Harry	Birmingham.
Taylor, Josiah Ellison	Stalybridge.
Theckston, James	Ulverston.
Thomas, William	Swansea.
Thompson, Evelyn	Ilkley.
Tompsett, Walter Hartness	Maidstone.
Toyne, Charles Robert	Hull.
Tredinnick, Richard Nettle	Truro.
Watson, George	Skipton.
Webb, Evan Howell	Carshalton.
Wild, George Herbert	Burnley.
Wilkins, Henry John	Northampton.
Wilkinson, George Henry	Coventry.
Wilkinson, Thomas Henry	Keighley.
Williams, Arthur Llewellyn	Pembroke Dock.
Williams, Richard Parry	Carnarvon.
Wood, James	Nottingham.
Wood, Joseph Arthur	Oldham.

The questions for examination were as follows:—

Time allowed: Three Hours for the three subjects.

I. LATIN.

1. Translate into English:—

(i.) Mons autem altissimus impendebat, ut facile perpauci *prohibere* possent. (ii.) Helvetii legatos de deditione ad eum *miserunt*. (iii.) Petit atque *hortatur*, ut sine ejus offensione animi vel ipse de eo, causa cognita, statuat, vel civitatem statuere jubeat. (iv.) Nihilo secius Cæsar, ut ante constituerat, duas acies hostem propulsare, tertiam opus *perficere jussit*. (v.) De tertia vigilia, T. Labienum, legatum pro prætore, cum duabus legionibus et his ducibus, qui iter cognoverant, summum jugum montis ascendere jubet; quid sui consilii sit, *ostendit*. Ipse de quarta vigilia eodem itinere, quo hostes *ierant*, ad eos contendit, equitatumque omnem ante se mittit.

2. Decline, in full, *opus, duabus legionibus, eodem itinere.*

3. Parse the verbs in italics, and give their principal parts.

4. Translate into Latin:—(i.) He will send an ambassador to Cæsar. (ii.) Three legions were conquered. (iii.) Let us fight bravely, that we be not destroyed. (iv.) They said they would never give up their arms. (v.) He was informed that many tribes had surrendered to the Roman people.

II. ARITHMETIC.

[The working of these examples, as well as the answers, must be written out in full.]

1. Express, in words, the difference between the quotient of 9313702853 by 1987, and the product of 46481 and 936.

2. Reduce to a simple fraction $2\frac{1}{2} \times \dfrac{1}{3\frac{1}{3} + \dfrac{1}{4\frac{1}{4}}}$.

3. Reduce £16·73125 + ·$\dot{3}$ of 7*s.* 6*d.* + 3·785 of 4*d.* to the decimal of £20.

4. Into how many farms, each containing 24 hectars 2 ares 9 centiars, can an estate of 1825 hectars 58 ares 84 centiars be divided?

5. If the rent of a farm of 53 acres 1 rood 6 poles be £100 17*s.* 6*d.*, what would be the rent of another farm containing 17 acres 3 roods 2 poles, if six acres of the latter be worth seven of the former?

III. ENGLISH.

1. Define a Conjunction. How does it differ from a Preposition and Relative Pronoun?

2. Illustrate, by examples, the adjectival and adverbial use of *wide, fast, right.*

3. Give words formed by means of the following suffixes:—*ly, ling, age, dom, ship.* Explain the force of each suffix.

4. Parse fully the following sentence:—

"He that fights and runs away,
May live to fight another day."

5. Write a short composition on *one* of the following subjects:—Self-reliance, The Telephone, "Whatever is, is right;" *or*, give an outline of some Play of Shakspere.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates. Examined.	Passed.	Failed.		Candidates. Examined.	Passed.	Failed.
Aberdeen	17	11	6	Inverness	1	0	1
Birmingham	15	9	6	Lancaster	8	3	5
Brighton	6	2	4	Leeds	24	11	13
Bristol	9	4	5	Lincoln	7	3	4
Cambridge	3	3	0	Liverpool	10	6	4
Canterbury	2	0	2	London	54	25	29
Cardiff	10	4	6	Manchester	31	16	15
Carlisle	9	4	5	Newcastle-on-T.	9	6	3
Carmarthen	11	6	5	Northampton	4	3	1
Carnarvon	6	4	2	Norwich	8	5	3
Cheltenham	4	1	3	Nottingham	10	5	5
Darlington	5	2	3	Oxford	2	1	1
Douglas, I. of M.	2	1	1	Peterborough	5	4	1
Dundee	9	5	4	Sheffield	8	5	3
Edinburgh	22	12	10	Shrewsbury	7	3	4
Exeter	6	3	3	Southampton	9	6	3
Glasgow	10	3	7	Truro	3	3	0
Guernsey	3	1	2	Worcester	2	1	1
Hull	10	4	6	York	9	4	5

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The ordinary monthly meeting was held in the Society's Rooms on Wednesday evening, July 12, Mr. Preston, President, in the chair.

The minutes of the previous meeting having been read and passed, and other business transacted—

Mr. Preston moved that as there was such a small attendance the meeting be adjourned until the second Wednesday in October, and that Mr. Furness be requested to read his paper, of which notice had been given, on that date.

Mr. Furness having agreed to do so, the motion was seconded by Mr. Ellinor and carried unanimously.

Mr. J. Preston, President, and Mr. G. T. W. Newsholme, Honorary Secretary, were appointed delegates to attend the forthcoming Pharmaceutical Conference at Southampton.

Proceedings of Scientific Societies.

SOCIETY OF CHEMICAL INDUSTRY.

The Chemical Technology of the Jute Fibre.*

BY CHARLES F. CROSS.

The introduction of the jute fibre into this country dates back only some twenty-five years, and during the quarter of a century of its application by Europeans it has occupied an increasingly important position in textile manufactures; and having emerged from the sphere of application, viz., that of textile drudgery, to which it was at first limited, and evinced capabilities of a high order, for the more elegant uses of woven fabrics, it is full time that it should be made the subject of accurate technical study. It was my privilege to be entrusted with an investigation of this fibre, and the results of four years' scientific work, together with the practical experience of their application, are my credentials for engaging the attention of the Society upon this important question.

The first applications of jute in Europe were, as I have said, confined to the production of the coarsest materials, such as sacking. In India, on the other hand, this fibre has been from the earliest antiquity manufactured into fabrics second only to cottons in point of fineness; and its relative importance to cotton in India is that of flax and hemp in Europe. In accounting for this fact, we have to take into consideration the conditions under which it is produced in India. Jute, as is well known, is the bast of certain species of *Corchorus*—a family of tiliaceous annuals, isolated from the matured plants (which, during their five months' growth, attain a height of 10 to 12 feet) by a process of retting. The cultivation of the plant, which has hitherto been practically confined to India, chiefly Bengal, is for the most part in the hands of the native tenant-farmers, or ryots. Now, in all bast fibres, which tend to what is known as lignification, the changes by which this is brought about set in at a definite period of growth; in the case of jute they appear to commence at a comparatively early stage of development, but are most pronounced at the period of flowering. In its practical aspect the lignification of jute is the change from the state of elastic thin-walled tubes, which is the structure of the ultimate fibrils, to that of thick-walled cylinders of much diminished pliability, the gain in substance, that is to say, being brought about at the expense of the textile quality of the fibre. The ryots know this but too well. For their own use they harvest the plants early, before the flowering season, and consequently are able to spin and weave the isolated bast into the finest fabrics; for the European market, on the other hand, they allow maturation to proceed much further, and hence the inferior quality of our commercial jute. Whether it would be expedient to secure a supply of the fibre in its finer condition, and to take steps to overcome the difficulties of organizing the native growers to such a production, is a question that should not be left unanswered; but at this opportunity we have rather to confine ourselves to jute as we find it in European commerce. The finer applications which it has received have been the outcome of periods of scarcity of the fibres with which it has had to compete. The Crimean war shortened our supply of hemp, and the American war that of cotton, and in both cases jute was called into requisition as a substitute. The applications of the fibre, however, to which our attention is about to be directed, are those which rather involve its *chemical* technology, and the more recent developments to which its study has led.

The raw fibre, as we obtain it, is composed of the upper five-sixths of the isolated bast, the root end or lower sixth being cut off, generally before shipment, and constituting the commercial article known as jute "cuttings" or "butt," which are a valuable material to the paper-maker. The former occurs in lengths of about 7ft. Its colour varies from brown to silver-grey, the average shade of yarns spun from the higher qualities being yellowish-grey. A certain depreciation in colour occurs in the process of spinning, partly resulting from the admixture of oils (generally a mixture of whale oil and petroleum), added for the purpose of loosening certain resinous constituents by which the fibres are matted together, and partly to oxidation and adventitious dirt. The jute fibre substance has the following properties: The finest fibres into which it is resolved by ordinary mechanical means consist of bundles of microscopic fibrils, each of which is a cylinder with irregularly thickened walls, the thickening often amounting to partial interruption of the central lumen. These bundles offer a smooth cylindrical surface, and to this fact we may refer the high lustre of the fibre, which, I may add, is much increased by bleaching, probably also by reason of increased smoothness resulting from the removal of substances more or less adventitous. Its chemical composition—and on this point I must be very brief—has been the subject of research by myself, in conjunction with Mr. Bevan, and our results, which have been fully published in the *Journal of the Chemical Society*, may be summed up as follows: The fibre cannot be proved to contain cellulose as such, but is made up of a derivative or derivatives of cellulose, to which we have given the general term of bastose, the disposition of these (*i.e.*, if there be several), being such as to give a homogeneous whole, which may, therefore, at least for practical purposes, be considered as a single substance. Cellulose being a member of the carbohydrate series of compounds, bastose represents a transition to what is known as the aromatic group. By the action of chlorine—and the practical importance of this will be at once evident—bastose is converted into a *chlorinated compound*, which has two very striking properties. By the action of sodium sulphite it is converted into a brilliant colouring matter of a magenta shade; and by the action of alkalies it is resolved into insoluble cellulose on the one hand and soluble bodies allied to the astringents or tannins on the other. A somewhat crude illustration may be used here with advantage to convey a clearer practical conception of these points. Cellulose in all its forms has the power of taking up tannin from its aqueous solutions to form insoluble compounds. Upon this property the ordinary process of mordanting cotton is based. When such a compound is treated with chlorine a chlorinated compound is formed in the fibre, which will give the reaction with sodium sulphite before alluded to. Further, such a compound has the power of taking up the aniline and

* Read at a meeting of the London Section of the Society, March 13.—From the *Journal*, April, 1882.

other soluble colours from their solutions, and thus of becoming dyed with fast shades. This property is possessed by the jute substance itself. By the dyer, therefore, jute may be regarded as a cellulose fibre, a portion of which has become intrinsically modified—in and by its growth in the plant—into a tannin-like substance; and this modification, moreover, having taken place homogeneously, it may be regarded as evenly mordanted. This fact is one of great technical importance; for the process of spinning jute is relatively crude, the fibre being only very imperfectly averaged, so that but for this property of dyeing evenly throughout its substance, jute would be an additional trial to the already much tried dyer. There are two other resolutions of the jute substance which must be alluded to as of great practical importance. (1) When large masses of jute are allowed to lie in the damp state, especially in contact with sea water, the fibre substance is split up into two bodies, or groups of bodies, viz.: (*a*) tannin-like substances, and (*b*) acids of the pectic class, this resolution of the fibre being attended by greater or less disintegration, often amounting to its reduction to a friable powder. Not to dwell upon the more purely scientific bearings of this decomposition, which will be found fully discussed elsewhere, its practical importance will be at once recognized; for the susceptibility of a fibre to this radical change suggests its far more general occurrence than would be indicated by extreme manifestations, and hence the possibility that our whole jute supply is more or less deteriorated by the conditions of its preparation and transit to this country. In support of this we have the testimony of practical men as to the superiority in colour and strength of the goods manufactured in the jute mills in India, although the raw material is drawn from the same source which supplies the European markets. I have made experiments in which jute, specially treated with the object of maintaining its chemical integrity, has been exposed for eight months to damp, in darkness—the conditions which it has to encounter in the hold of a ship—and the results were quite satisfactory. It seems to me, therefore, a matter of essential importance that the native industry should be inquired into by a competent individual or commission, with the view to improve as far as possible our raw material by removing the defects of the present system of production and shipment; and further that such a subject were well worthy the practical consideration of the Society of Chemical Industry. (2) Another decomposition of the jute fibre substance, which has special bearings upon its treatment in dyeing and bleaching, is that which is caused by acids, and notably the mineral acids. Again we must pass over theoretical matter, and limit ourselves to a practical sketch. The jute substance is, then, very easily degraded into soluble modifications, under the influence of acids at comparatively low temperatures; and these soluble modifications are resolved at somewhat higher temperatures into bodies of a dark-brown colour, allied to the so-called humus group, on the one hand, and volatile strongly-smelling bodies, furfurol and its allies, on the other. Hence the "tenderness," strong smell, and tendency to discoloration of jute goods in the preparation of which acids have been used without a scientific or empirical recognition of this their destructive tendency. For instance, I know of a case where a manufacturer introduced a cheap serge blue (aniline) for the dyeing of his sack stripes. The dyer found that, to dye a blue shade with this colour, in order to eliminate the red, he had to employ a large quantity of sulphuric acid. Being limited by the necessity of a fixed output, he did not alter his subsequent washing process to meet the new requirements of the case, and the result was that some tons of yarn were totally destroyed, the destruction becoming apparent only when the yarn was wound. It is only necessary to add that the use in his wash-water of 1 pound of sodium acetate to every 56 pounds of yarn was introduced with the result of allowing the colouring matter in question to be used, with no further change of process. This use of sodium acetate to antagonize the influence of acids, which is so commonly practised by calico printers, is especially to be recommended to the jute dyer, as it will be found to prevent the changes alluded to above.

We come now to the most important part of the subject of the treatment of jute which can engage our attention as chemical technologists. As a preliminary to our discussion of the processes by which jute is fitted to discharge its now more elegant offices, I must mention one or two points in connection with the action of bleaching agents upon jute. The raw fibre can be bleached with the greatest ease by means of permanganates, with subsequent removal, by treatment with sulphurous acid, of the manganic oxide deposited in the fibre, and expressing the oxidation which it has undergone. In this process the loss of weight experienced by the fibre is a minimum, generally amounting to from 2 to 3 per cent. Jute yarn is bleached somewhat less readily by these reagents, and the bleaching must be preceded by alkaline treatment for the removal of adventitious matters. The process, although leaving nothing to be desired in point of simplicity and result, is too costly for adoption on the large scale, it being necessary to employ from 2 pounds to 3 pounds of the potassium salt per 56 pounds of yarn, which alone brings the cost over 1*d.* per pound.

For commercial purposes the only agents available are the hypochlorites. Reference to what has been previously stated as to the action of chlorine upon jute will make it evident that its employment in any form upon the fibre must be watched with the greatest care. Any one ignorant of its distinction in chemical composition from the true cellulose fibres would probably treat it with bleaching powder in the usual way, and in such a way as to cause actual combination with chlorine. I myself have seen this more than once, especially in the case of jute cloth, the presence of the chlorine compound being demonstrated by the development of a magenta stain, more or less deep, when the cloth is treated with a solution of sodium sulphite. It is easy to predict the fate of such a cloth in the steam-chest of the printer—the liberation of hydrochloric acid by the decomposition of the compound in question, the development of dark brown-coloured products of decomposition, accompanied by the total disintegration of the fabric. This, too, has occurred on the large scale—often in such a way that the mischief was not detected till the fabrics came to be used; and the result has been to confirm popular prejudice against jute. Another point remains to be noticed, viz., that the jute substance is oxidized by hypochlorite solutions to form compounds which precipitate the soluble calcium salts, and when ordinary bleaching powder is used, therefore, in the bleaching of jute goods, insoluble calcium compounds of these derivatives are often formed in the fabrics. It is easy to see, therefore, how the bleaching of jute by the ordinary empirical method has yielded an inferior product, harsh to the touch, brittle, and strongly smelling; and it should not be more difficult to suggest the rational method of overcoming its defects.

The following brief sketch of a process founded upon the results of the investigation of the chemical composition and properties of the fibre substance will bring into prominence the chief points which have to be observed in the bleaching of jute, so as to conserve its integrity. The process is specially adapted to cloth. Essential details only are given: (1) The goods are scoured in a weak alkaline solution (sodium silicate, or carbonate, or borax, at 70° to 80° C.) (2) From the scouring solution they are transferred to the bleaching liquor—a solution of sodium hypochlorite prepared in the usual way by decomposing bleaching powder with the equivalent quantity of sodium carbonate. The chlorine strength of this solution should not exceed 1 per cent., and the most convenient working strength I have found to be 0·7 per cent., which therefore will require for its preparation a quantity of bleaching powder equal to about 2 per cent. of the weight of the water used for solution. The presence of the soda entirely prevents the formation of chlorinated compounds of the fibre substance. The mechanical details of the bleaching must be left to the judgment of the operator. (3) The goods, after thorough washing, are transferred to cold dilute hydrochloric acid (1 to 2 per cent.), containing a small quantity of sulphurous acid. The object of this treatment is to remove basic substances, the presence of which causes discoloration of the fibre when brought into oxidizing conditions—notably in the printer's steam-chest—and also to eliminate iron compounds, which previously to this treatment would be found to be evenly distributed in small quantity throughout the cloth, and if left would interfere with any subsequent dyeing operations. The cloth thus treated is of a pale cream colour, and is beautifully soft and lustrous. If the cloth is required to be dyed, it may be taken, of course after thorough washing, to the dye beck. If, on the other hand, for printing, it is subjected to an additional process (4), which consists in running it through a solution of sodium bisulphide of 1 to 2 per cent. SO_2 strength, the excess of the solution being removed by mangling, and returned to the bath. The mechanical arrangements of this treatment should be continuous and automatic. The cloth thus treated is allowed to lie some time (two to three hours), and then dried on steam cylinders. During this process sulphurous acid escapes, and the dry cloth will be found evenly impregnated with neutral sodium sulphite. The presence of this salt antagonizes the oxidizing and disintegrating action of the steaming by which the colour mixtures printed on the fabric require to be developed, without, however, interfering with this latter process. This treatment, moreover, causes a marked improvement in the colour of the bleached cloth, and restores the fibre substance to the normal state in which it is not susceptible to change under ordinary atmospheric conditions. The process has been patented and worked with uniform success. It only remains to be stated that the loss of weight experienced by the fabric need not exceed 7 to 8 per cent., with a diminution of tensile strength of about 10 per cent. of the original; these numbers representing the average of long experience; and the entire cost of bleaching, of course under properly regulated conditions, should not and does not exceed 1*d.* per pound.

In conclusion, I would say a few words on the subject of the position of jute in the textile market and the popular prejudices which have to be overcome before it attains the position which belongs to it by right.

The value of the fibre in its stable applications is, of course, sufficiently recognized. What we have to consider are its relations in the more elegant uses of textile fabrics. Woven mixtures, especially of cotton and jute, in which the latter is employed as weft, have of late won for themselves an extensive demand; and the lustrous and woolly character of the jute yarns, together with the bright fast colours which are so easily communicated to them, insure their permanent application to this purpose. Nevertheless, it will be found that the retailers observe a diplomatic reticence, in deference to the prejudices in question, as to the true nature of these goods; and it is the gratuitous character of this which I wish to expose. It has been commonly supposed that inferior silks are inferior by virtue of adulteration with jute; on the other hand, I have never been able to verify this supposition. It is true that in silk dye-houses in this country spun yarns and inferior silks are commonly termed by the men "jute," and this may account for its having become a general byeword in textile industry; but I have been quite unable to account for its origin in this connection, and I have certainly never met a silk dyer who was at all acquainted with the actual jute. Further, the inferiority of silks is so completely accounted for by the well-known practice of "weighting"—the scientific character of which appears to be so complete an answer to the question of its morality—that, in the absence of positive proof, jute may be left out of the question altogether. It is, however, a fact that printed goods, consisting of jute, both of home and foreign production, have been put upon the market in a form attractive enough to the eye, but so greatly "tendered" by the processes to which they have been subjected, and moreover so unpleasantly odorous, as to have earned a very emphatic and proper condemnation; and it is this fact which has done so much to confirm the existing prejudices against jute.

We are now, however, in a position to see that such a result must follow from the ignorant application of processes to this fibre, which had been erected by long experience into the position of the standard method of treating vegetable fibres; that, on the other hand, the distinctive character of the jute fibre substance postulates a very distinctive treatment, such, for instance, as I have endeavoured to set forth in this paper. It is with the view of securing the general recognition of this by practical men, and thus to aid in establishing the jute fibre in its rightful place in textile industry, that I have ventured to direct the attention of the Society to the chemistry of this interesting fibre.

In answer to questions propounded by those who took part in the discussion which followed the paper, Mr. Cross supplied the following additional information:

The chemistry of the fibre and its technological applications were independent of the changes alluded to as occurring during its shipment and transit, *i.e.*, they truly belonged to the normal fibre. In regard to these changes, their *immediate* cause had not yet been ascertained, but they were essentially due to the peculiar chemical constitution of the fibre substance. The brilliant colour reaction described was obtained, though less effectively, by treatment with sulphite after oxidation by chromic acid, as well as after chlorination.

The fibre could be perfectly bleached by confining it over phosphorus in a moist atmosphere, and also by hydrogen peroxide, but these actions are difficult to control. The normal fibre was totally disintegrated and largely converted into soluble products of decomposition of the fibre substance by both water and steam at high temperatures (120° to 130° C.)—even when heated with sodium acetate solution, in an ordinary retort, acetic acid distils—showing that it is decomposed under these conditions, and with formation of acids. The presence of sodium sulphite, in small quantity, has been found to prevent this decomposition, the explanation of its action being probably its well-known relationship to aldehydes, certain of which tend to be formed from jute when under oxidizing conditions.

Jute appears to be the first case of the employment, on the large scale, of a fibre of what may be termed a *non-cellulose* character, in such a way as to involve chemical manipulation; hence the negative experience which resulted from an uninquiring application of methods suitable only for cellulose fibres. Jute is by no means singular in chemical composition; indeed its characteristic constituent seems to be almost as widely diffused throughout the plant world as cellulose itself. Other similar bast fibres may be expected to find their way into the textile industries, and these also will require special investigation and treatment.

Parliamentary and Law Proceedings.

Alleged Poisonous Effects of a Domestic Remedy.

An inquest was held on Saturday, July 15, before Mr. Wightman, coroner, at Sheffield, on the body of Annis Bell, aged nine month.

Elizabeth Bell, the mother of the child, was called, and stated that when seven weeks old the child was ill, and was attended by Dr. Gill for a fortnight. He said she was suffering from bronchitis and inflammation on the brain; since then the child had gradually pined away. On Monday night witness gave her a teaspoonful of a mixture of "oil of almonds and violets," and again on Tuesday morning and at night—three spoonfuls altogether. She purchased a pennyworth of the mixture at the shop of Mr. Stanfield. It seemed to give the child relief, and that was why she repeated the dose. As the child was worse on Wednesday morning, and continued to "screech and whine," she sent for Dr. Gill, and he said he could not account for the condition of the child, and asked what had been given to it. She told him about the mixture, and he replied that it was poison, and she had no right to have given it to the child. He did not believe in such mixtures. The child died on Thursday, and Dr. Gill refused to give a certificate because of the poison that had been given to it. The child was not in a club, and the parents would get no money by its death.

A Juryman asked if the bottle was labelled "poison."

The Coroner said it was not, and his experience of oil of almonds was that there was no need to so label the bottle. The Coroner added that they had now got as far as they could without a *post-mortem* examination, and he put it to the jury whether he should order one or whether they were satisfied with the evidence that had been given. The reason for holding the inquiry was because Dr. Gill had refused to give a certificate, the child having had oil of almonds given to it. His (the coroner's) opinion was that it was an innocent, harmless mixture, and if the mother had given the child the whole of the pennyworth it would not have killed it.

The jury thought there was no necessity for a *post-mortem*, and they expressed themselves very strongly about the doctor, and wished to censure him for refusing the certificate.

The Coroner said he should not like them to do that, as it was a serious thing to censure a doctor.

The jury, however, had their say about it, and then came to a verdict of "Death from natural causes, probably convulsions."—*Sheffield and Rotherham Independent.*

The Sale of Paregoric.

At the Denbigh Borough Magistrates' Court, on Friday, July 6, Elizabeth Roberts, Henllan, was charged by Superintendent Vaughan with having on May 27 sold a quantity of paregoric elixir, being a preparation of opium, without being duly licensed as a dealer in drugs.

Defendant pleaded ignorance of the requirements of the law.

Superintendent Vaughan called a boy whom he sent purposely to the defendant's shop to purchase drugs. The lad stated that Mrs. Roberts had told him to be careful with the elixir, as it was a strong poison. The bottle in which he brought the drug away was not labelled.

Defendant said her late husband was registered to sell drugs.

Superintendent Vaughan had entirely failed to find his name on the register for the last nine years; but he was positive that defendant was not registered.

The Bench explained that the late Mr. Roberts being duly registered his widow would under some circumstances be allowed to sell drugs for some time after his death.

Captain Lloyd Williams (the Mayor not sitting in the case), said the bench considered the case proved, and would deal as leniently as possible with her. She had pleaded ignorance, but ignorance where drugs were concerned was a serious thing. She would be fined 10*s.* and the costs—£1 18*s.* in all.—*Carnarvon and Denbigh Herald.*

Poisoning by Sulphuric Acid.

The Manchester City Coroner held an inquest on Monday, on the body of Clarissa Tomlinson, a widow, 80 years of age. On Sunday night the deceased felt unwell, and expressed a desire to have a glass of port wine. Her son went upstairs for the bottle, and in his absence the old woman took from a cupboard a bottle which she fancied contained wine, and drank a portion of its contents. She was immediately seized with symptoms of poisoning, and an emetic was given her, but she died in a short time. The surgeon who was called in found that the bottle contained sulphuric acid. A verdict of accidental death was returned.—*Manchester Guardian.*

Review.

The Tea Industry in India. A Review of Finance and Labour, and a Guide for Capitalists and Assistants. By Samuel Baildon, author of 'Tea in Assam.' W. H. Allen and Co, Waterloo Place, S.W. 1882.

The author has written a very readable account of the Tea Industry in India, entering largely into the financial aspect of production and disposal, the labour question, and planter's life; and at the same time giving useful information both to speculators and intending cultivators. This latter portion of the subject is evidently the work of one intimately acquainted with practical matters and social details, and no one should venture upon this special industry in the hope of making it remunerative until he has carefully studied Mr. Baildon s observations.

Some idea may be formed of the importance of this branch of commerce by reading the very recent statement by Mr. J. R. Royle, who has an hereditary claim to be accepted as an authority. "It is only forty-four years ago, viz., in 1838, that the first consignment of Indian tea, consisting of the trifling amount of 456 lbs., reached the London market. This consignment sold remarkably well, realizing fancy prices, and thus gave great encouragement to the spread of tea cultivation in India. Since that time, the amount exported from India has gone on almost constantly increasing, until the exports for the official year 1880–81 are returned as amounting to 46,000,000 pounds, having a value of more than £3,000,000 sterling." The time is passed, however, for people to stand beneath the Silver tree in the moonlight, and whistle for the rupees to come down. The princely fortunes of a century ago have become rare things, and money in India, as elsewhere, must be made by steady work and a sufficiency of capital for the start. More particularly is the young adventurer warned not to leave a comfortable home "on spec.," or he will find himself among a crowd of unfortunates who have committed the same error, and generally with disastrous consequences.

The Indian introduction of the tea plant is veiled in fabulous history. Primarily there was but one kind of plant, and it is still almost an open question as to what is the difference between *Thea viridis* and *Thea bohea.*

In India, making either green or black tea depends upon the will of the planter.

All writers on Indian tea allow that there are three classes of the plant, the indigenous, the China, and the hybrid. The China is supposed to be a deteriorated specimen of the pure Indian plant, though centuries of varied cultivation, and even of neglect, have converted it into a distinct variety. Continuous changes have, moreover, assisted in the production of an entirely new plant, the hybrid. Indian tea is now almost entirely of the hybrid class of various degrees, and what little remains of the originally propagated China tea is a scrubby bush.

A good tea climate must be humid, and according to the author Indian tea was in perfection when it luxuriated in the dampness of the jungle, before a more extensive demand dragged it from its retreat and caused it to be grown in localities which were drier because more accessible to light and heat. Mr. Baildon throughout reiterates a statement which will not be palatable to many of his readers, that while Indian tea is intrinsically superior to Chinese, it is too strong to form an unmixed beverage. With certain exceptions, Mr. Baildon contends that this unwelcome opinion must be accepted.

The planters themselves, the author says, do not drink it, and it can never in an unmixed state become an article of general consumption.

Mr. Royle, discussing the same subject, considers the rage for cheap teas, the method of packing and weighing the Indian varieties, and the customs duty, as the hindrances which affect its introduction; and he points hopefully to the opening of new markets in Australia, America and Canada.

Mr. Baildon bases his expectations rather on the score that Indian tea is admirable for the purpose of blending with other, and weaker varieties; and that it is now used universally to fortify Chinese tea. He argues that from the nature of its cultivation, the whole production being under European supervision, and from its comparative scarceness, its prices must rule higher; but should it ever come into general use, that is be consumed in an unmixed condition, the low price at which then it must be offered would not prove remunerative to the planter.

This Indian tea enjoys a wonderful immunity from adulteration, and in that respect is superior to the Chinese, which is tampered with to a sensational extent.

"At a recent exhibition in Sydney, the Chinese teas subjected to a Government analysis were pronounced in many instances to be adulterated with injurious, and in some cases even poisonous matter; while in the Indian exhibits, placed under the same test, not one case of adulteration was recorded" (p. 30). Mr. Baildon may be expected to be enthusiastic about the merits of the special tea which he has set himself to describe; he considers the Indian superior to the Chinese as a growing plant; that as a manufactured article it is infinitely purer, no artificial doctoring having been required to make it presentable; and that a large proportion of the present China imports would be unsaleable without its aid.

Much light is thrown by the writer upon the private working of the tea industry; nothing more promotes success than a good understanding between the planter and the executive of an estate.

Land is not always equally productive; even in India the seasons vary; and hail-storms, blight and cholera are disturbing elements. Mutual forbearance becomes not only a virtue but a necessity; owners must not be too exacting, and planters must make allowance for irritation on account of deficient crops. At all events, owners, agents and speculative companies are advised not to make sudden alterations in their staff, but to adopt President Lincoln's motto, "Do not change horses while crossing the stream."

The chief difficulty for the planter, specially for the inexperienced young Englishman, is not so much want of knowledge of the theoretical cultivation of tea, as want of understanding the management of coolies.

Mortifying as this may seem, book information will avail but little in comparison with skill in directing labour.

Coolies are fond of change, and with great difficulty can be persuaded to remain beyond their stipulated time. They are a willing prey to intriguing speculators on the look out for old hands; and moreover, they are known occasionally to bolt. By no means the least interesting portions of the book are devoted to these causes of perplexity, and they should be well considered before any decided step is taken to exchange orderly English business habits for the supposed higher attractions of life in India.

The author ends his treatise with an elaborate statement as to the better condition of the plantation cooly (*sic*), compared with that of the ryot, or labourer who pays rent to the Government in Bengal and other localities.

"There is absolutely no parallel in the tea districts to that which is officially reported to be the state of affairs in many parts of India" (p. 209). Again. "There are no famine times in tea. The cooly has only to do his work, to receive his pay, grow fat and save money." He has no rent to raise—his house is kept in good repair; and when ill, he has the services of the doctor. The ryot, on the other hand, is ground down by perpetual exactions, legal and otherwise; and as a culminating point of misery, the rent being demanded *before* his crops have ripened, he is held in bondage by the money-lender. It would add greatly to the prosperity of the country, and benefit the planter, if coolies were recruited from the overpopulated districts of Bengal.

It is further proposed by the author that analytical chemists should be appointed to examine and report upon the soils best adapted to the tea industry; and that gardens which are at present unremunerative should be abandoned.

Mr. Baildon has issued a genuine book, which contains much valuable information; while the social aspects of the question are most graphically described.

BOOKS, PAMPHLETS, ETC., RECEIVED.

THE MEDICAL DIGEST, OR BUSY PRACTITIONER'S VADE-MECUM. By RICHARD NEALE, M.D. Second Edition. London: Ledger, Smith and Co. 1882.

THE MEDICAL MAN'S HANDY BOOK. Edited by WILLIAM SHEPPERSON. London: J. and A. Churchill. 1882.

THE STUDENT'S GUIDE TO MATERIA MEDICA AND THERAPEUTICS, in accordance with the British Pharmacopœia. By JOHN C. THOROWGOOD, M.D., etc. Second Edition. London: J. and A. Churchill. 1882.

Notes and Queries.

[729]. TINCT. QUINIÆ AMMONIATA.—As "A Country Chemist" confesses that when he prepares this tincture strictly according to the instructions of the Pharmacopœia, he does not fail to obtain a clear and presentable solution, I must admit my inability to grasp his meaning when he states that there are still some points which have not been cleared up by my communication, published in this column some weeks ago, supplemented as it was in a later issue by some practical remarks from Mr. Smith, of Leamington. Of course, if, as he states, he has made use of "hard water," the reason of the precipitation becomes at once very evident, and, as the Editor very properly suggests, is not due to the presence of quinine at all. Your correspondent is no doubt aware that ordinary "hardened" water contains, amongst other substances, a notable proportion of calcic carbonate, which is held in solution by an excess of carbonic anhydride present in the water. On the addition of the solution of ammonia to this water the dissolved gas is neutralized by the alkali and a minute quantity of soluble ammonic carbonate formed. There being now present no body capable of exerting solvent action on the salt, the calcic carbonate goes out of solution and has, no doubt, been mistaken for precipitated quinine.

J. E. SAUL.

[732]. SPONGES.—What is the method generally used for restoring "flabby" sponges? A. E. R.

Correspondence.

The Future of Pharmacy.

Sir,—You have published a letter from Mr. Hart, of Manchester, reflecting strongly upon the good faith of the Stockport chemists.

He states that by far the larger number of chemists in Stockport do a large trade in supplying not only grocers, etc., but little hucksters' shops, with drugs, pharmaceutical preparations, etc., and upon this statement he draws a series of libellous conclusions.

Now of the twenty-two chemists on the Register in Stockport, there are not more than three who do a wholesale trade; these three are not only chemists and druggists but drysalters and oil and colourmen, one of whom sends out no traveller; another sends one half a day per week, who calls only upon surgeons and manufacturers, not on shopkeepers, whilst the third very properly keeps together a connection which has been established amongst surgeons, manufacturers and shopkeepers for more than a century.

Mr. Hart having thus far drawn on his imagination for facts, not hesitating at a deliberate untruth, next invents an imaginary conversation, or distorts one for the purposes of satire.

Sir, you have in this published an unfounded and unwarranted attack upon a body of your members, who value their independence and respectability as highly or more so than Mr. Hart evidently does, and the chemists of Stockport request me to ask you to publish this letter, and to obtain for them the amends they feel themselves entitled to. Our Association has met this morning and taken into consideration the said letter, and has instructed me to take such steps in reference thereto as may be deemed advisable.

Stockport Chemists' Association, Stockport. Wm. Billing Orton, *Secretary.*

Sir,—Will you kindly find room for the accompanying correspondence in your next issue?

J. Hart.

Copy.

"Stockport Chemists' Association,
"Stockport, *July* 15, 1882.

"Dear Sir,—Having read your letter to the *Pharmaceutical Journal* of to-day, will you kindly give me the name of the one who 'employs a traveller to cultivate this particular trade,' and the name of the one 'who indignantly replied, "I am not," etc.' By so doing you will much oblige

"Yours truly,
"Wm. Billing Orton,
"*Secretary.*

"J. Hart, Esq."

Copy of Reply.

"131, Embden Street, Manchester,
"*17th July*, 1882.

"Dear Sir,—I trust you will not think me wanting in courtesy if I decline to give you the information you require; in fact, the reasons why I should not do so are so very obvious that I can scarcely credit you were serious in making your request; besides which my letter was a public one on a public matter, not attacking individual persons, but pointing out and striking at the greatest curse of our trade, that, whilst we so loudly deplore our lot we never strive to better it by our own individual effort. I do not suppose, nay, I am quite sure the Stockport chemists are not sinners above their brethren, but the fact of their presenting the memorial was the reason of my using them 'to point a moral and adorn a tale.' My strictures will, I am sorry to say, apply to a large number of towns, and if you have any remarks to make upon them, I shall be most happy to discuss them in the columns of the Journal (to which I send this correspondence), with this sole proviso that the 'Future of Pharmacy' and not individuality is to be the text.

"I am, dear Sir,
"Yours faithfully,
"J. Hart.

"W. Billing Orton, Esq."

Fresh Bael Fruit (Ægle Marmelos).

Sir,—Seeing a letter in last week's Journal under the above heading, I was induced to read it through; but up to the present moment I have not been able to decide what Mr. Postans's intention could have been when he penned that letter. It occurs very forcibly to me that his chief objects must have been to remind the pharmaceutical world that some three years since he presented the Society with a specimen, and that he also drew attention to it (the specimen, of course, not the act of presentation, or was it a little bit of both?) at an Evening Meeting.

But be that as it may, Mr. Postans may rest assured that we all know where or how we may obtain the "best preparation" of the fruit when we have occasion to use it. We have had a preparation of it in our Pharmacopœias for a number of years equal, if not even greater, than the number that Mr. Postans has spent in the business. The preparation has, therefore, had ample time to have been thoroughly tried, in point of fact it has been tried, and I fancy most chemists will differ with Mr. Postans when he says that "it is coming somewhat into use." The fact of an occasional specimen being sent to the Square does not justify such an assertion. Indeed, had he but said that its use had long since been given up and was not likely to be re-established he would undoubtedly have been nearer the mark.

Ebbw Vale. Arthur B. C. Orchard.

A correspondent writes,—"It is not often that the sober retail of a chemist's counter compasses a joke, but a very little grain of joke did occur among the 'straw' of daily business the other morning. A boy came in for 'Three pennyworth of powdered rhubarb, to give to young turkeys.' The retailer, with a grim appreciation of the 'litel geste,' smole to himself while he wrote on the packet the very appropriate label of 'Turkey Rhubarb.'"

W. R. Kermath.—Unless the nature of your objection to the practice were stated we do not think the publication of your letter would be desirable.

A. E. R.—Any convenient method of powdering will do, and the finer the powder is the better suited it will be for the purpose mentioned.

Ignoramus.—Spoonfuls.

E. F. Salmon.—We are obliged to you for your communication.

U. S. P.—Phosphate of potash has been recommended as useful in scrofulous and tubercular disease. According to Stillé and Maisch the dose is from 10 to 30 grains, which may be given dissolved in water.

A. J. H.—The prescription distinctly orders a preparation under a name that is to be found in the Pharmacopœia. The substitution of a non-official concentrated preparation, without communicating with the prescriber, is not justifiable.

Junius.—If the recipes already communicated have been found to be unsatisfactory, you are recommended to make some experiments towards their improvement and let us know the result.

Kino.—Kater's "compensation pendulum" had for its object the prevention of error arising from the effect of variations of temperature upon the length of a pendulum. The original description of it, with figures, will be found in *Nicholson's Journal*, vol. xx. (1808), p. 214, which is in the Society's library.

S. H.—(1) See the British Pharmacopœia, Appendix, "Weights and Measures of the British Pharmacopœia." (2) No decomposition appears probable beyond perhaps separation of colouring matter from the extract of belladonna by the acetate of lead.

J. J. Hall.—The appearance is due to a fungus (*Epichloe typhina*).

J. John.—*Cotyledon Umbilicus.*

B. Walker.—*Sedum Telephium* (*Crassulaceæ*).

Naphtha.—Wood spirit or crude methylic alcohol.

Non-Abstainer.—The ferrous salt is soluble in water, but is very readily converted by oxidation into the more sparingly soluble ferric salt.

Communications, Letters, etc., have been received from Messrs. Jones, Barbet, Hutchwen, Bentley, Inquirer.

"THE MONTH."

One of the most important fields of research in chemistry, and the one most likely to throw light upon the constitution of chemical compounds, is the connection, if connection there be, between the physical constants of a substance and the molecular weight corresponding to the formula supposed to represent its constitution. The connection traced by Professor Kopp between the chemical constitution of organic substances and their boiling points has already led to important results. More recently the researches of Prof. Hartley (*Pharm. Journ.*, [3], xi., 54) upon the relation between the chemical constitution of certain organic compounds and their action upon the ultra violet rays have revealed interesting and important connections. In the *Philosophical Magazine* for this month Dr. E. J. Mills has recorded the results of a series of careful experiments, made with the view of finding if any connection obtains between the chemical constitution of a number of typical organic compounds and their melting points. Many difficulties have previously stood in the way of the accurate determination of melting points, the foremost being the want of thermometers which not only should be sensitive to heat but also capable of indicating changes in temperature corresponding to minute fractions of degrees. Dr. Mills himself has considerably aided in this direction, and has devised a very accurate method of determining melting points (*Proc. Roy. Soc.*, xxxiii., 203). In short, it consists in observing the indications given by a very delicate mercurial thermometer, and then comparing these with those of the air thermometer, the actual melting point being expressed by the indications of the air thermometer. Of course a very great number of accurate determinations of melting points must be effected before an induction can be made of the connection with the chemical constitution. Yet making but a comparatively small number of experiments upon specially prepared substances, Dr. Mills has arrived at conclusions which are as interesting as they are important, and at least indicate the existence of a relation between the chemical and physical constants. The following table indicates an interesting connection between the molecular weight and the melting point:—

	Molecular weight.	Melting point.	$\phi = \frac{\text{M.P.}}{\text{M.W.}}$
Dichlorobenzene	$C_6H_4Cl_2 = 147$	52·821	0·35933
Bromaniline	$C_6H_6BrN = 172$	61·742	0·35971
Trinitrotoluene	$C_7H_5(NO_2)_3 = 227$	80·532	0·35477

Thus the melting point of the above compounds being unknown, it could be found by multiplying the molecular weight by the constant ϕ, which in the above cases has been obtained by dividing the melting point by the molecular weight. In the case of nitro-compounds the amount of the (NO_2) group introduced seems to be correlative with a constant difference in melting point. Isomeric compounds, as might be expected, differ in their melting points, but Dr. Mills has further shown by the accuracy of his method that isomerism probably exists in certain cases where it was not previously suspected.

Mr. F. D. Brown (*Phil. Mag.*, July, 1882) has made some experiments with the view of facilitating not only the construction of an accurate thermometer but also the methods of making the corrections which are necessary even with the most delicate instruments. In the researches of Dr. Mills, the readings the mercurial thermometer were not themselves taken as the ultimate indications of temperature, but were referred to the readings of an air thermometer, this being taken as the standard. Mr. Brown has experimented in order to determine whether an accurate method can be devised which shall not incur the large expenditure of time and trouble involved by this method. Two mercurial thermometers were constructed, the details being described fully in the paper, and it was found that these gave almost identical readings. Hence an accurately constructed mercurial thermometer is capable of being used as a standard, and, further, is capable of replacement by another if broken or otherwise destroyed, without the indications of the second being appreciably different from those of the first. Experiments were then made to discover the most accurate method of determining the zero point. It was found that a mixture of distilled water and ice yielded more accurate results than were obtained by the use of melting ice alone, as ordinarily recommended.

An experiment performed by Mr. Fletcher, of Warrington, at the *soirée* of the Society of Chemical Industry, has given rise to some rather wild comments in the newspapers concerning a new theory of combustion. On the occasion referred to, Mr. Fletcher heated a large mass of iron wire red hot in a gas flame, into which he directed a blast of air that was gradually increased until the flame was no longer visible. As the flame became smaller the temperature increased, until at length the iron melted and ran into drops, though no flame could be seen. The *Chemical News* quotes an account of this experiment which describes the results as being so totally unexpected that many persons present were under the impression some deception was being practised; but such a view of the matter would seem to be more suited for the gratification of admirers of the marvellous than for acceptance by minds accustomed to observation and inquiry. That the flameless, or as it might more correctly be termed non-luminous, combustion of hydrocarbon gas should be attended with a greater heating effect than the luminous combustion of the same gas is a self-evident result rather than otherwise. Such non-luminous combustion of the gas means the existence of conditions under which the elementary constituents combine with oxygen simultaneously, and not one after the other to any extent sufficient for the elimination of carbon particles in the solid state, as in the luminous flame. Under such conditions, the degree of heat produced would naturally be the highest attainable with the material burnt, and the local temperature would be proportionate to the rate of combustion, because there would be less opportunity for loss by radiation and conduction than when the oxidation of the burning materials was more progressive.

The various technical journals have recently described two electrical inventions based on the principles of Professor Hughes's induction balance, which promise to be of great importance in the immediate future if present anticipations of their value are realized in actual practice. These are the "torpedo detector" of Captain M'Evoy, and the "divining rod" of Mr. C. F. Varley. It is thought that Captain M'Evoy's invention will also be found of utility in detecting the whereabouts of lost anchors, etc. The apparatus consists of a small mahogany box containing a pair of coils or bobbins and a vibrator, similar to that of electric bells, and a telephone. To this box is attached a given length of flexible cable containing four conducting wires. To the other end of this cable is attached a flat wooden case, in which there are two coils. This case is weighted so as to readily sink in the water. There are terminals on the box for attaching battery wires, and a suitable switch arrangement for turning the current on and off is provided. One complete primary and one complete secondary circuit pass through the box, cable and wooden case. The battery, the vibrator, one coil in the box and one coil in the wooden case form the primary circuit, while the telephone and the two remaining coils form the secondary circuit. The coils are so adjusted that little or no noise from the vibrator is heard in the telephone. Thus adjusted the instrument is ready for work; if the flat wooden case is now brought near a metallic body a loud noise is heard in the telephone, thus indicating the proximity and locality of such a body.

Mr. Varley's divining rod, which makes use of the underlying principles of the preceding invention, is for the purpose of ascertaining the presence or absence of an underground mineral lode. The comparative complexity of the instrument renders it difficult to make a useful abstract description of it. Good detailed descriptions of this instrument and also of Captain M'Evoy's torpedo detector will be found in the *English Mechanic*, xxxv., p. 441.

A few weeks ago Messrs. Jamin and Maneuvrier described to the Academy of Sciences some remarkably interesting and novel effects produced in the well-known "electric egg" by Gramme alternating currents. The experiments appear to have had for their object the investigation of the alternating electric arc *in vacuo*. The authors say that the phenomenon to which the two currents contribute equally is that of Geissler tubes, but of far greater brilliancy owing to the considerable currents of electricity passing. The carbon rods get heated, redden, and reach a pale white heat, not merely at their extremities but throughout their entire length; they are then rapidly volatilized through the combined effects of heating and disintegration. Whatever be the cause of this volatilization the authors state that it is certain that a carbonaceous matter spreads in the state of vapour. In the earlier experiments the globe became filled with a blue gas, like the vapour of iodine, deepening in hue to indigo, and this vapour is abundantly condensed on the glass, rendering it opaque. This termination was avoided by using two cone-shaped bundles of carbons instead of the two single rods used previously, which obviated the volatilization. Still brighter effects were obtained by using copper rods instead of the carbons. The authors have followed up this line of inquiry and in a more recent paper have described the effects produced in the vacuous globe when sulphide of carbon vapour is present. The carbons in these experiments were parallel, fixed at the base and separable at the top by a simple mechanism; in fact, forming an electric candle similar to the one devised by one of the authors (Jamin). With a vacuum as complete as possible in the receiver, the arc, of course, does not form, and the Geissler tube phenomenon is present instead; but when a few drops of sulphide of carbon are introduced, increasing the pressure about 0·05 m. or 0.06 m., the arc appears between the points, and it persists as they are separated. At this moment there is, as it were, an explosion of light, unbearably bright and incomparably superior to the usual brilliancy of the arc. Through coloured glass the arc appears to be of horseshoe form, or like a large omega, resting with its two ends on the carbon points, and about 0·05 m. in height. A long flame rises vertically from this arc. The points of the carbons seem red and very brilliant, but the arc is pale green, and as this colour dominates, the whole room appears as if illuminated by a Bengal flame with copper in it. The brilliancy increases with increase of tension of the vapour; but, the resistance also increasing, the arc may go out and have to be started again and again. The spectrum of the light is formed of four channelled spaces in the red, the yellow, the green, and the violet, very similar in appearance, though the green is the most luminous. They are believed by the authors to obey the same harmonic law, which remains to be discovered. If air remains in the receiver the sulphide of carbon burns incompletely; a cloud of sulphur fills the space and is deposited on the glass, the carbon alone burns. If the exhaustion is nearly complete these clouds are not formed, but a brown deposit forms instead, which turns black. This deposit is volatile; its odour resembles that of sulphur. The authors regard it as a compound of sulphur and carbon. In summarizing, the authors conclude that these experiments are remarkable for the extraordinary amount of light produced, for the size of the arc, for its colour, for the constitution of its spectrum, and for the chemical actions which take place. They think it is not probable that it could ever be turned to account for illumination on account of its colour, unless for lighthouses and signalling at a distance.

Some interesting experiments are recorded in *Nature* (July 13, p. 246), by Mr. J. W. Swan, on the effect of strong sunlight in altering the perception of colour. He finds that by looking at a sheet of white paper while strong sunlight fell on it for two or three minutes the eye became red-blind to colours seen in the shade, but that the reverse effect was produced with respect to flowers seen in a strong light. This effect, however, passed off in a few minutes. These observations may perhaps throw some light on cases of colour blindness which have not a congenital origin.

A suggestive paper in *Nature* (June 22), by Dr. W. Ramsay, is devoted to the enunciation of a theory to account for the sense of smell. Assuming that the sense of smell is excited by gases only, including under this term the vapours of liquids and solids which have a low vapour tension and consequently give off vapour at the ordinary temperature, he points out that all gases which have no smell, or produce simple irritation of the nostrils, have low molecular weight, and that increase of molecular weight (*i.e.*, in gases increase of specific gravity) in compounds of the same class is correlative with increase in the intensity of their smell. Thus methyl alcohol, in a state of purity, is odourless; ethyl alcohol, when freed from ethers and as much as possible from water, has a faint smell, and the odour rapidly becomes more marked with each rise in the series till the limit of volatility is reached and solids are arrived at with such a low vapour tension that they give off no appreciable amount of vapour at the ordinary temperature. Dr. Ramsay gives many other similar illustrations and lays down the proposition that to produce the sensation of smell a substance must have a molecular weight at least fifteen times that of hydrogen. This he thinks can be sufficiently explained by the hypothesis of vibration, the period of vibration of the lighter molecules being too rapid to affect the sense, though the point at which the vibrations begin to be perceptible varies in different individuals. On the other hand it is thought doubtful whether there exists a lower limit to the sense of smell, the vapours of osmic acid, carbon tetrabromide, selenium, tellurium, and arsenious and antimonious oxides, which are among the heaviest known, having a most distinct smell. The intense perfume of flowers is ascribed to terpenes or their products of oxidation, which have a specific gravity with which is associated a rate of vibration that appears to excite the olfactory nerve most powerfully. The paper also contains some ingenious speculations as to the rate of the vibrations and the extent to which smell may resemble sound in having its quality affected by harmonics.

The effects produced by various chemical compounds upon unstriated muscle have been the subject of some recent experiments by Herr Nothnagel, the results being of considerable interest (*Lancet*, July 8, p. 25). The experiments were made upon etherized rabbits, the open abdomen being placed in a warm neutral solution and the chemical substance placed gently, in a solid form, upon the external surface of the bowel. It was found that the result produced was characteristic of the basic rather than of the acid constituent of a salt. A fundamental difference was observed in the action of potash and soda salts; a potash salt producing instantaneously a strong muscular contraction, limited to the part touched or extending round the intestine in an annular direction, whilst a soda salt produced a contraction that was not limited to the part touched, but extended for several centimetres, though always in an upward direction towards the pylorus. So characteristic is this action of a soda salt that in a case where it was desired to ascertain which was the upper and which the lower portion of a piece of exposed bowel, it would only be necessary to place upon it a fragment of common salt, which would produce a contraction that would invariably pass upwards. Several other chemical compounds were tried, but the most striking results appear to have been obtained with the potash and soda salts.

Some interesting speculations have been put forward by M. Corne (*Journ. Pharm. et de Chimie*, [5], vi., 17) as to the phenomena of the phosphorescence and oxidation of phosphorus. He has found that if fragments of phosphorus be allowed to lie in boiled distilled water, which is in contact with pure oxygen under diminished pressure, a time arrives when if a stick of phosphorus be plunged into the oxygen, although this is still in an uncombined state, there is no longer a production of phosphorescence or fumes. It is conjectured that the vapour emitted by the phosphorus under the conditions of the experiment passes from the distilled water upwards into the oxygen, but arrives there in a state in which oxygen is no longer capable of acting upon it, and that eventually the oxygen becomes saturated with this vapour, and is then incapacitated from acting upon phosphorus brought directly into contact with it. M. Corne infers, therefore, that the vaporization of phosphorus, and not oxygen, is the principal cause of phosphorescence and fumes, but that for their production it is necessary that the vaporization should take place in the presence of that gas. Further, he believes that phosphorus is not attacked directly by ordinary oxygen, but that in the vaporization electricity is generated, which, acting upon the oxygen, throws it into the form of ozone, and that this ozone attacks the phosphorus vapour with evolution of heat and light (phosphorescence), whilst the vapour passing instantaneously from the gaseous into the solid state forms fumes. Of course these conjectures will be entirely upset if it turns out, as might be expected, that the oxygen does not remain free, but enters into combination with the phosphorus vapour.

If the inferences drawn from some experiments by M. Combe, which have been brought under the notice of the Academy of Sciences by M. Wurtz (*Comptes Rendus*, xciv., 1717), prove to be correct, it is probable that any disturbance of the quinine market through the synthesis of that alkaloid by M. Maumené will be postponed for the present. It will be remembered that M. Maumené claimed that the preparation of a new compound, NH_2, had enabled him to complete the synthesis of quinine, and pending therapeutic experiments with the product he deposited a sealed packet with the Academy. M. Combe has been tempted to repeat the experiments, but he fails to find any particular novelty in the carbonate obtained in the way indicated by the action of potassium permanganate upon ammonium oxalate, since it appears to be nothing more than a compound of ammonia and carbonic acid, which is not exactly the missing link that was supposed to be hidden in the sealed packet.

In the *American Journal of Pharmacy* Dr. T. G. Wormley answers in the negative the question, "Is gelsemic acid identical with æsculin?" and states that the two differ chiefly in the following particulars:—Gelsemic acid crystallizes very readily (even the $\frac{1}{1000}$ of a grain separating in needles from 1 grain of solution), requires 29·12 parts of water for solution, is soluble in 330 parts of ether, freely soluble in chloroform, and gives a copious yellow precipitate with corrosive sublimate. Æsculin, on the other hand, does not crystallize except from strong solutions, is soluble in from 300 to 576 parts of water and in 36,000 parts of ether, nearly insoluble in chloroform, and gives no precipitate with corrosive sublimate.

In a recent communication to the Academy of Sciences (*Comptes Rendus*, xciv., 1722) M. Chapoteaut described a pulverulent white body that had been obtained by precipitating with 95° alcohol an aqueous solution of gastric juice that had been first dried and washed with ether. Finding that alcohol appeared to modify the precipitate, the aqueous solution was acidulated with sulphuric acid, which even in excess does not redissolve the precipitate, whilst hydrochloric acid dissolves it readily (*Comptes Rendus*, xcv., 140). In this way he obtained a white precipitate, closely resembling an albuminoid in composition, which appeared to constitute the active portion of the gastric juice, and which he considers is entitled to the name "pepsine." It dissolves in water at the ordinary temperature to the extent of 2 grams to the litre. It is soluble in alkalies, being precipitated from such solutions by acids whilst gradually losing its properties. This "pepsine" occurs in the gastric juice as a salt of potash, together with another albuminoid without solvent action on blood fibrin, and a fat acid without solvent action and incapable of displacing the pepsine from its potassic combination.

A lengthy and very interesting communication by Dr. Julius Wortmann throws some fresh light upon the capabilities of bacteria (*Zeit. f. Phys. Chemie*, vi., 287). The rapidity with which these organisms multiply in a solution containing albumenoid matters is now well known. According to the views held by Dr. Wortmann the change which takes place in the albuminoid is first excited by a peptonizing ferment, which under these conditions is abundantly secreted by the bacteria. The product of the action of this ferment upon the albumenoid matter is considered to constitute the food of the bacteria; in proportion, therefore, to the activity of the ferment the necessary nourishment is provided in quantity favourable to the multiplication of the bacteria, and these again yield an increased secretion of ferment. The present experiments of Dr. Wortmann were intended to ascertain what takes place in the absence of albumen, and when starch is the only source available to the bacteria for the carbohydrates necessary for their growth. In this case Dr. Wortmann says the bacteria secrete another special ferment, which is not peptonizing, but acts upon starch in every respect similarly to diastase, and like diastase is soluble in water and precipitated by alcohol. It will be observed that in both these cases it is assumed that the ferment is derived from the bacteria, and that therefore these organisms are capable of secreting different ferments, according to the necessities imposed by surrounding conditions. But, bearing in mind the recent statement of M. Béchamp (see before, p. 66) that "albumenoids" contain a ferment within themselves, which is confirmed by the research of M. Chapoteaut referred to in the previous paragraph, as well as other known facts, it does not seem impossible that the first action of bacteria may be to release from the particular substance which they attack the ferment by which it is eventually to be digested or saccharized, as the case may be. This would be quite consistent with the conclusions published by Messrs. Gautier and Étard in recent communications to the Academy of Sciences upon the chemical mechanism of putrefaction (*Comptes Rendus*, xciv., 1357, 1598). They are of opinion that the molecule of albumen is split up under the influence of bacteria into a number of less complex bodies that previously existed within it as nuclei, and it is worthy of notice that they state that in the case of beef muscle, at the very commencement of the process, there is an oozing of a clear syrupy liquid which appears to be the result of digestion of the flesh by a ferment belonging to it.

Two "new antiseptics" are described by M. Le Bon (*Comptes Rendus*, xcv., 145), a glyceroborate of calcium and a glyceroborate of sodium. They are prepared by heating together, with constant stirring, equal parts of borate of lime, or soda, and glycerine, until a drop removed and placed on a glass plate forms a brittle transparent pearl. Upon being poured out to cool the product forms a transparent glassy mass, soluble in alcohol and water, which, being very hygroscopic, is broken into fragments and kept in stoppered bottles. The glyceroborate of sodium is soluble in water in all proportions, and even in dilute solution is said to be a powerful antiseptic, though so non-irritating that a concentrated solution may be applied to the eye and other delicate organs without inconvenience. A simple coating of meat with a varnish of glyceroborate is said to be sufficient for its preservation. The similarity of these bodies to another recently referred to in these columns is obvious.

At a meeting of the Royal Society of Edinburgh, on June 19 (*Nature*, p. 264), Dr. Dobbie and Mr. G. Henderson communicated the results of analysis of the dragon's blood of Socotra obtained by Professor J. B. Balfour during the expedition to that island. The resin which is obtained from *Dracæna Cinnabari* differs considerably from the other kinds met with in commerce. The authors came to the conclusion also that different species of the same genus yield the same resin, but that the dragon's blood of commerce is derived from plants of different genera.

A material for a varnish, possessing properties that may perhaps be turned to account in pharmacy, has been discovered in aluminium palmitate (*Amer. Journ. Phar.*, p. 371). This substance melts at a higher temperature than dammar and copal, is readily soluble in oil of turpentine and benzol, and the varnish so made dries readily, remains permanently pliable, has a silky lustre, is insoluble in water and does not penetrate through paper.

In the course of some experiments undertaken with a view to investigate the nature of lignin, Herr Singer made the observation (*Monatshefte*, iii., 395) that an extract obtained by boiling pine wood in water, which presented all the characteristic reactions of woody tissue, had, when filtered and evaporated, a distinct odour of vanillin. This led him to try the behaviour of the same reagents (phloroglucin and hydrochloric acid, aniline sulphate, indol, etc.) with pure vanillin, upon which it was found they produced practically the same effect. The experiments were then extended to extracts from other woods, as well as from lignite and decomposing woods, and in every case with the same results as to colour reaction and odour. It was also found that the liquids that held the body presenting these characters in solution,—water, alcohol and soda ley,—were those in which vanillin is soluble, and that both bodies were decomposed at the same temperature. Herr Singer is therefore inclined to believe that the colour reaction and odour always observed in an aqueous extract from woody tissue are due to the presence of vanillin, in which case that body would be one of the most widely diffused in nature. Moreover, from the fact that in successive decoctions of the same woody tissue the same results were always obtained, it would appear that either lignin is a complex body from which by heating in water vanillin is continuously split off, or that the substance known under the name of "lignin" is a mixture of chemical individuals, among which vanillin is a constant constituent. Other bodies found constantly associated with woody tissue were a substance corresponding to coniferin, from which vanillin was first prepared artificially, and a kind of gum.

The astringent bark of the West Indian sapotilla tree (*Sapota Achras*) has been recommended for use as a tonic and febrifuge. It has been recently examined by M. Bernou, who reports (*L'Union Pharm.*, xxiii., 291) that he has obtained from it a crystalline alkaloid, soluble in ether, chloroform and alcohol, and insoluble in water, which he has named "sapotine." It forms a crystallizable hydrochlorate. From acid solutions the alkaloid is precipitated by ammonia, and it can also be removed by shaking with ether. The bark also yielded a large quantity (11·8 per cent.) of "sapotannic" acid, as well as two resins, one soluble and the other insoluble in ether.

At a recent meeting of a Medical Society, in Berlin, Dr. Schiffer called attention to a preparation that he thought might prove useful in the treatment of spasms, tetanus and similar affections of the nervous system (*Zeit. d. allg. öst. Apot.-Ver.*, xx., 253). It consisted of an aqueous extract of the "guachamacha," a South American member of the oleander genus, which has a considerable reputation among the natives. Its active constituent is an alkaloid soluble in water, slightly soluble in absolute alcohol, and almost insoluble in ether and chloroform. In this it resembles curare, as well as in the fact that the active constituent is almost completely precipitated by tannin. It further resembles curare in its paralysing action, with the difference that the respiration is not affected.

An action similar to that of digitalis, but without its inconveniences, is, according to Messrs. Sée and Bochefontaine (*Comptes Rendus*, xcv., 51), exerted by the lily of the valley (*Convallaria majalis*), together with diuretic properties beyond those possessed by any other agent known. In the account of their physiological experiments given to the Academy of Sciences, Messrs. Sée and Bochefontaine spoke of having used an extract of the entire plant and one of the flowers, the latter having been found the most powerful. In mentioning the subject subsequently, however, at a meeting of the Academy of Medicine (*Lancet*, July 15, p. 83), Professor Sée attributed similar properties to a new alkaloid that had been isolated from the lily of the valley by M. Hardy, to which the name "convallarine" has been given.

The leaves of *Globularia Alypum*, or wild senna, used in the south of France as a substitute for senna, have been recently investigated botanically, chemically and therapeutically by Messrs. Heckel, Mourson and Schlagdenhauffen. They find that the active principle, globularin, does not yield two products of decomposition when treated with acid, as stated by Walz, but only one, which they have named "globularetin." It is oily and resinous looking and becomes a transparent uncrystallizable mass, which under the action of caustic alkalies is transformed into cinnamic acid by taking up the elements of water. *Globularia* also contains a small quantity of a volatile aromatic substance which appears to be cinnamate of benzyl.

In the *Practitioner*, for July (p. 32), several pages are devoted by Dr. L. Shapter to *Herba Pulsatilla*, under which he includes *Anemone pratensis*, D.C., and *A. Pulsatilla*, L. It is the former of these that was recommended by Baron Störck under the name of *Pulsatilla nigricans* and which is still used extensively by homœopaths. It differs from *A. Pulsatilla* in having smaller pendulous flowers of a dark purple, with sepals connivent at the base and acute and reflexed at the tips. This plant has not as yet been recorded as occurring in this country. Dr. Phillips attributes the activity of the plant to anemonin, a crystalline principle obtained by distilling the herb with water, concentrating the distillate and purifying the resulting crystals from the inert anemonic acid by solution in alcohol, in which the anemonin is soluble. As this principle is found in several other plants of the same order, *e.g.*, *Anemone nemorosa*, *Ranunculus Flammula*, *R. sceleratus* and *R. bulbosus*, it would decide the question whether the *Anemone Pulsatilla* or *A. pratensis* is the more valuable of the two, if anemonin were experimented with instead of the crude herb. As is the case with several of the Ranunculaceæ the dried herb is much less active than the recent one, but Dr. Shapter does not state which he has used. The strength of tincture he recommends is 2½ ounces of the herb to one pound of spirit, the dose being from ♏v. or x. to ʒss. Hitherto, pulsatilla has been used chiefly as a remedy for mucopurulent discharges, especially in patients of a lymphatic temperament; but Dr. Shapter, led by the statements of Clarus and Orfila, that the plant has a stupefying or paralysing action on the nervous system, to investigate further, has arrived at the conclusion that pulsatilla is a sedative to the sympathetic nervous system. As anemonin is but little soluble in cold alcohol or cold water, it seems doubtful whether the properties that Dr. Shapter attributes to pulsatilla are due to the anemonin or to some other principle not yet detected in the plant. It is noteworthy, however, that he states that he believes the addition of tinct. chloroformi to a ♏xx. dose (anemonin is readily soluble in chloroform) assists the action of pulsatilla.

The New Zealand remedy for diarrhœa, called "koromiko" (*Veronica salicifolia* and *V. parviflora*), seems to be more valued in China than in this country. Dr. J. Jardine, writing from Kiukiang, in the 'Chinese Imperial Maritime Customs Medical Reports,' says that he was induced to try koromiko in dysentery and diarrhœa. Some of the results obtained exceeded his most sanguine expectations, cases of dysentery which had varied in duration from six weeks to four years being cured by four or five doses of the drug. He adds, "Judging from the few cases I have been able to follow, I augur a brilliant future for this remedy in the chronic forms of the disease."

It has long been known that opium has a beneficial influence in diabetes, diminishing thirst and the excretion of urine, while the proportion of sugar in the urine becomes less. Dr. R. S. Smith, in the *British Medical Journal* (p. 933), states his opinion that this action is due to codeia, which he has given with beneficial effect in this disease. The doses he gives are from 1 to 6 grains three times a day.

In *El Sentido católico en las Ciencias Méd.*, in an article by Dr. F. Guermonprez, attention is directed to the variable action of santonin, and its occasionally poisonous action. It would be interesting to determine how far this may be dependent upon the active principle being prepared from different samples of the crude drug, two or three varieties obtained from different plants being met with in commerce.

Preparations of box in one form or another have been frequently used as remedies for fevers, intermittent and otherwise, in France, Italy and Germany. The remarkable results obtained in the treatment of fever in Italy, in 1838, with Pavia's so-called buxine, by Tibaldi, Buzzoni and others, show that even in the impure form the box alkaloids have a powerful therapeutical action. Dr. Alessandri has therefore done good service in investigating the best method of extracting the alkaloidal and other principles of box leaves and bark (see before, p. 23). There seems to be little doubt that he has succeeded in isolating one at least of the alkaloids of the *Buxus*, thus giving experimental therapeutists the opportunity of working with a definite chemical compound and obtaining some trustworthy information on the subject. The most complete treatise on the medicinal properties of box is to be found in a thesis read by M. G. Bazoche before the Faculty of Medicine of Strassburg, in 1859. The remarkable experiments of Drs. Ringer and Murrell with extract of box as an exciter of tetanus in frogs, prove that whether or not the box tree deserves the name of the "poor man's cinchona" bestowed on it by Dr. Alessandri, it possesses most extraordinary physiological properties, and hence ought in all probability to be a powerful therapeutical weapon.

One of the characters formerly given for distinguishing belladonna root was the invariable presence in it of starch. Herr Brandes has, however, pointed out that belladonna root sometimes occurs perfectly free from starch, and he has expressed an opinion that in any case the quantity present is dependent upon the period of vegetation. He states that he has found that the young roots always contain starch, but less in the spring than in the autumn, whilst the older roots are rich in starch in the spring and autumn and contain less in the summer. Some experiments made by Herr Buddel (*Archiv*, xx., 414) appear to indicate that there is some correspondence between the variations in the amount of starch and the amount of atropine, and that roots that are richest in starch contain most alkaloid. They failed, however, to confirm Herr Brandes' conjecture as to the amount of starch in the root being affected by the period of vegetation, for of two specimens, collected at the same period in spring and in the same locality, one, which yielded alkaloid equal to 0·625 per cent. of the dried root, gave no reaction with iodine or perchloride of iron, showing absence of starch and tannin compounds, whilst the other, which yielded 1 per cent. of alkaloid, contained starch. Herr Buddel infers that the roots devoid of starch are derived from young plants, since it is probable that the proportion of alkaloid in a root will increase year by year up to a certain point. It must be remembered, however, that M. Lefort (*Pharm. Journ.* [3], ii., 1031) came to the conclusion that the older the root the smaller is the proportion of atropine it contains, he having obtained about as much again from roots two to three years old as from those seven or eight years old.

At a meeting of the Linnean Society last month, Mr. C. B. Clarke exhibited a large bundle of plants gathered that morning by him in Hampshire, among which the *O. incarnata*, Linn., *O. incarnata*, Syme, and *O. maculata*, Linn., were readily distinguishable at a glance. The first-mentioned has been described by Mr. C. B. Clarke (*Journ. Lin. Soc.*, vol. xix., p. 206), as a species long overlooked in this country. It resembles *O. latifolia*, but is a shorter plant, has leaves of a pale green colour, and never spotted. The flowers are of a pale flesh colour, with a yellow lip, fading to a sallow yellow. The margin of the lip has a line, sometimes bright rose when young, but the flowers never have any purple about them. The plant has been found in Hampshire and Cornwall.

In the *Bull. de la Soc. Linnéene de Paris* (p. 317), Professor Baillon describes a new *Cinnamodendron* from Porto Rico, under the name of *C. macranthum*. It has shorter, broader, and more obtuse and rigid leaves than those of the false winter's bark tree, *C. corticosum*; they are also a little oblique at the base; the secondary veins are more numerous, parallel, and forming a sharper angle; the flowers are much larger, being two centimetres every way. An interesting feature in the plant is the fact that the intermediate petals between the exterior and the interior ones, which in *C. axillare* and *C. corticosum* are considered as scales, are so placed (forming false whorls of three pieces) that he believes it ought to modify the present opinions upon the interpretation to be given to the different floral appendages in this genus, which in this particular recall those of the Magnoliaceæ, and he regards the genus *Cinnamodendron* as bearing the same relation to other Magnoliaceæ as *Monodora* to *Anona*.

The cause of the direction of growth of pollen tubes has been investigated by Dr. L. Kny, who has endeavoured to find out, by experiment, whether Sachs' theory that the direction is caused by the arrest of growth on the side in contact with the solid substance of the stigma, or that of Darwin's, that it is due to the effort to avoid the light, be correct. He immersed pollen grains in a mixture of gelatine (first warmed) and a solution of sugar with a very small quantity of extract of meat, in which nutrient fluid they readily put forth their tubes. He found that neither the spot to which the pollen tube attaches itself, nor the direction which it afterwards takes, nor the rapidity of its growth, is in any way affected by gravitation, by light, or by contact with a solid substance (*Journ. Micr. Soc.*, June, p. 372–3).

In the *Mém. de la Soc. des Sc. Nat. de Cherbourg* (vol. xxiii., p. 209, pl. iv., 11), Dr. E. Janczewski gives an account of the development of sieve tubes from the cambium cells in certain dicotyledons, monocotyledons and acotyledons. In the first-mentioned class the tubes are, after once becoming passive, rapidly replaced by the activity of the cambium; but in monocotyledons the activity of the tubes lasts much longer, in fact, as long as the organ in which they are found. In vascular cryptogams the dots in the tubes always remain closed, not giving place to perforations as in mono- and dicotyledons.

The foxglove seems to have grown very luxuriantly this year. A writer in the *Garden* (p. 6), describes a plant which he saw in a garden at Hastings as 9 feet high and not then fully grown; the flowering portion of the spike being two-thirds of that length, the central spike branching out below this point into several minor ones. A Cornish correspondent at Penzance sends a local newspaper cutting to the effect that in the beautiful Trelowarren Woods, so well-known to all visitors to the Lizard, a foxglove was found which measured 10 feet in height.

At the Botanical Gardens in Regent's Park a plant of *Pilocarpus pennatifolius* flowered for the first time in the early part of this month, its pendent spike of purplish flowers measuring about $1\frac{1}{2}$ foot in length. The blossoms opened almost simultaneously and lasted only about three days, the petals soon falling off. The carpels in the young state appear to be erect and close together as in the star anise.

At Kew the sumbul plant has flowered again this year and is now forming fruit, all the stem-leaves having died down. The berries of the mezereon are now beginning to assume their beautiful scarlet hue. Even if gathered green and dried this colour is developed, showing that it is not dependent on light so much as on chemical change.

In the London drug market this month some of the false arnica, described last month, was offered for sale. Among other unusual drugs were aricine bark (*Cinchona pubescens*), in fine pieces, the flowers of *Artemisia judaica*, and the root of a species of *Camphorosma*, probably *C. acuta*, L., from the Persian Gulf. The *Artemisia* was examined a few months since by Merck, of Darmstadt, who obtained from it a fragrant volatile oil, and a bitter principle (glucoside). The *Camphorosma* is used as an excitant, diaphoretic and diuretic in asthma, rheumatism, and chronic skin diseases. Under the name of coto bark, a pale, aromatic, bitter, but not pungent, bark has been offered. It is probably the bark of a species of *Croton*, the flavour having a family likeness to that of cascarilla. Spurious saffron, of the kind described by Hanbury as being adulterated with carbonate of lime, is still extant in English commerce, two samples having recently been obtained in London.

CONTRIBUTION TO THE KNOWLEDGE OF THE ALKALOIDS OF PAPAVERACEÆ.*

BY PROFESSOR J. F. EYKMAN, OF TOKIO.

Concerning the alkaloids of the Papaveraceæ we have, at present, more or less extended researches on *Papaver somniferum* and *Rhœas*, *Chelidonium majus*, *Glaucium luteum*, *Sanguinaria canadensis* and *Eschscholtzia californica*. Probably the most study has been bestowed upon the alkaloids of opium (from *Papaver somniferum*) and we owe particularly to the grand labours of Hesse a knowledge of different series of homologues existing in opium, among which are at least fifteen well-defined alkaloids. The interesting labours of Wright, Beckett, etc., have considerably increased the number of these homologous series by the preparation of many derivatives, and have furnished many clues to a knowledge of the constitution of these bases.

Much less attention has been paid to the other papaveraceous plants, and the number of alkaloids which they contain is much smaller. Besides the poisonous sanguinarine (=chelerythrine), which is characterized by the orange-red colour of its salts, a second alkaloid yielding colourless salts has been met with in all these plants. Chelidonine was discovered by Godefroy in the root of *Chelidonium*; glaucopicrine in the root and glaucine in the leaves of *Glaucium luteum* by Probst; Riedel discovered in the root of *Sanguinaria* the alkaloid named by Gibb "porphyroxine," and Walz found in the *Eschscholtzia* a bitter and an acrid alkaloid. Wayne claims to have found a third alkaloid in sanguinaria root, which Gibb called puccine.

Of all these bases, only sanguinarine and chelidonine have been somewhat carefully studied; while the data respecting the others are insufficient to properly characterize them.

Since the number of alkaloids known to exist in opium has risen to at least fifteen, it may be suspected that it merely requires a further research to find, in the other papaveraceous plants, a still greater number of alkaloids belonging to homologous series. The great difficulty of separating the latter and obtaining them pure, and the fact that many supposed-opium alkaloids formerly accepted have in late years turned out to be mixtures of several others, lend great probability to this suspicion.

A more detailed study of these plants is desirable and very interesting also for another reason. Namely, it is a remarkable fact that, while one and the same alkaloid (sanguinarine) has been shown to exist in all the other papaveraceous plants, it does not appear to occur in *Papaver*, and none of the substances found in opium seems to be identical with any of those extracted from other members of the family.

Hence, while sanguinarine constitutes a chemical link between most of the Papaveraceæ, no such link seems to exist between these and *Papaver*. The name porphyroxine, which has been applied to two different substances, one prepared from sanguinaria and the other from opium, does not imply that these two bodies are identical; besides one of these has since been shown to be a mixture.

The analogies which may be traced between sanguinarine and some of the alkaloids of opium,* though not at present to be depended on, at least justify the supposition that a more exact study of the Papaveraceæ will show the alkaloids existing in them to be either identical or isomeric with those of opium, or to form new members of the homologous (or isologous) series.

The discovery of such alkaloids, identical or homologous with those of opium, would not only form an additional proof of the chemical relationship of *Papaver* with the other Papaveraceæ, but would also perhaps permit the employment of some of the latter for the preparation of alkaloids at present only obtainable from opium.

Following will be found the results of an investigation of *Macleya cordata*, a papaveraceous plant previously unstudied.

Macleya cordata, R. Br. (*Bocconia cordata*, Wild.), is a native of Japan and belongs to the same sub-tribe as *Sanguinaria*, namely, Bocconieæ. It is known in Japan as a poisonous plant and grows almost everywhere upon hills and mountains, in uncultivated spots.

The hollow stem of the (perennial) herb grows to a height of more than 1 metre, the leaves are up to 30 cm. (11¾ inches) long. On puncturing the stem, veins of leaves or fruit, an orange-yellow milky juice exudes. The small flowers are arranged in a large panicle and consist of two white sepals, many hypogynous stamens and an ovary which grows to a lancet-shaped fruit of 2 cm. in length and 1½ cm. in thickness. The seeds are small and have a red colour. The root is about 5 cm. thick and on cross-section is seen to have a red colour near the periphery. It flowers in July.

The Japanese names of the plant are numerous, varying in the different provinces. The most common are: *takenikusa*,† *tsiampangiku* and *tachiobaku*.

An assay of the root and leaves with Mayer's solution showed that they contained about the same quantity of alkaloid (0·5–0·1 per cent.) as *Chelidonium majus*. Calculated for dry substance, the fruit appeared to contain the largest quantity of sanguinarine, the root much less and the leaves the least quantity. The other alkaloid (forming a double iodide soluble in alcohol) exists in root and leaves about in equal proportion, and is less in the fruit.

The root, of which larger quantities could be obtained, was further examined. Sanguinarine was extracted in the usual manner. The root having been exhausted with dilute sulphuric acid and alcohol, the percolate was deprived of alcohol by distillation, then supersaturated with ammonia, the precipitate—which had a dirty violet-red colour, the same as the liquid portion—filtered off after a few days, and, after drying, extracted with ether until the latter no longer acquired a yellow colour.

Gaseous hydrochloric acid was conducted through the clear ethereal solution, whereby a scarlet precipitate was produced which was washed with ether and was freed, by treatment with a little water, from an almost white sub-

* Condensed from the pamphlet: 'Beitrag zur Kenntniss der Papaveraceen-Alkaloide.' Von J. F. Eykman, Tokio. 8vo. Yokohama, 1881. Reprinted from *New Remedies*, June, 1882.

* These analyses are stated in detail by the author; but cannot be reproduced here for want of space.

† The plant is used in Japan for dyeing; *take*=bamboo; hence the name *take-ni-kusa*="bamboo-boiling-herb."

stance which remained undissolved. The orange-red solution was again mixed with ammonia, the grey-violet precipitate extracted with ether, and gaseous HCl again conducted through the liquid. These operations were repeated several times more, and finally the ethereal solutions were decolorized by animal chaacoal. In this manner a dark scarlet powder was obtained, easily soluble in water, and generally exhibiting the reactions of hydrochlorate of sanguinarinc.

Mixed with a little water it melted, on the water-bath, to a dark-red syrupy liquid, which, after cooling, congealed to a crystalline mass. The dark orange-red aqueous solution yielded more or less yellow to orange coloured precipitates with most metallic salts. Ferric chloride, cupric sulphate and lead acetate, however, produced no precipitate. Tannic acid, with agitation, produced a precipitate which gradually increased, particularly on addition of hydrochloric acid.

The ethereal solutions, from which the hydrochlorate of sanguinarine had been separated by hydrochloric acid gas, were freed from ether by distillation and the residue was treated with water. This left behind a brown resin (sanguinarin-resinoid?). From the filtrate the alkaloid was precipitated with ammonia, and, after drying, extracted with ether. The portion insoluble in ether was rubbed with hydrochloric acid, and the portion still remaining insoluble, together with the residue left in previous purifications of the hydrochlorate of sanguinarine, further purified by recrystallization from water. It could not, however, be obtained in a pure state, by this method, since the solutions always assumed an intense orange colour on evaporation. The aqueous solution of this substance, which turned out to be the hydrochlorate of an alkaloid, was therefore treated with ammonia, the precipitate (in order to remove any still adhering sanguinarine) first extracted with ether and the insoluble portion afterwards boiled for some time with absolute alcohol. This removed a large proportion of the colouring matter and left most of the alkaloid behind. The latter was then again converted into the hydrochlorate by trituration with hydrochloric acid, and recrystallized from alcohol. The purest portion of the separated crystals was dissolved in boiling water, the alkaloid precipitated by ammonia, dissolved in boiling alcohol, and precipitated by addition of ether. This treatment was continued until colourless, though small, crystals were obtained. They melted at 201° C. (uncorrected) and had the properties below mentioned.

The original greyish-black powder produced by precipitating the extracts from the root with ammonia, and which had been exhausted with ether until the latter no longer acquired a yellow tint, was percolated with alcohol. The dark-brown percolate was freed from alcohol by distillation, the residue treated with acetic acid to faintly acid reaction, and then mixed with water until nothing further was separated. The filtrate was mixed with excess of solution of iodide of potassium, the voluminous precipitate (which soon shrivelled up) filtered off and washed with water. This washing produced a white precipitate in the filtrate which was separated by a new filtration. Each of these substances, viz.: the last precipitate (*A*), the brown-coloured filtrate (*B*) and the hydriodate remaining on the original filter, was separately examined. The latter was first recrystallized from water, whereby a still purer hydriodate (*D*) and a fresh mother-liquor (*C*) were obtained.

A. The white precipitate produced in the filtrate by the washings was dissolved in boiling water, the solution treated with ammonia and then shaken with ether. The separated ethereal solution, on evaporation, left an almost white residue, from which ether readily separated a soluble body. The portion remaining insoluble in ether became partially soft and assumed a red colour at 180° C. and was melted completely at 198° C.

B. The filtrate after removal of *A* was treated with ammonia, the precipitate separated from the liquid, dissolved to neutralization in acetic acid, and separated from a substance thereby remaining insoluble. The alkaloid was further purified by recrystallizing its oxalate from water and, after having again separated the alkaloid, recrystallizing it from chloroform. In this way large crystals were obtained, melting at 200·5° C. (uncorr.).

C. The mother-liquor of the recrystallized hydriodate. The base having been separated from it by excess of soda, it was filtered off, dissolved in boiling alcohol and crystallized by spontaneous evaporation. After purification and recrystallization from chloroform, the alkaloid had the melting point 201° C. (uncorr.).

D. The once recrystallized hydrochlorate was covered with solution of soda, set aside for one day, then the crystalline alkaloid (*P*) filtered off and washed. After complete purification, this was chiefly used in the further investigation of the properties, etc., of the alkaloid.

The alkaloid (*P*) separated from the hydriodate was boiled with strong alcohol to separate it from the accompanying brown substance; but the attempt was only partially successful. The alcohol was then poured off and chloroform added to the still moist crystalline mass.

As soon as the alkaloid had dissolved in the chloroform, two layers were formed, the upper (alcoholic) being quite dark and black, the lower (chloroformic) having only a light-brown tint and containing the alkaloid in solution. The lower layer was separated, and, after the chloroform had been distilled off, the residuary alkaloid converted into the acid oxalate which is readily soluble in hot water. From the solution the base was precipitated by soda and then boiled with absolute alcohol. The white portion remaining insoluble therein was dissolved in a little chloroform, precipitated by addition of ether and finally again recrystallized from chloroform.

In this way about 5 gm. of quite large, colourless, well-developed and transparent crystals were obtained. At every fractional crystallization the melting point was 200·5° to 201° C., which appears to be a satisfactory proof that the alkaloid (*macleyine*) is a pure and simple body.

Properties of the Alkaloid: *Macleyine* is almost insoluble in water and alkalies. On adding ammonia to an aqueous solution of the salt, and filtering, the filtrate separates, after a while, wart-like crystals. It is scarcely soluble in cold, a little more soluble in boiling alcohol; also very little soluble in ether, except when freshly precipitated: very little in cold benzol, more so in boiling. Chloroform, especially when warm, dissolves it tolerably well. Macleyine has no pronounced taste, but its salts have a bitter, afterwards sharp and cooling taste.

When crystallized from chloroform or ether, or precipitated by alkalies and dried by exposure to air between blotting paper, the alkaloid is obtained anhydrous. Analysis led to the formula $C_{20}H_{19}NO_5$. Macleyine exhibits a number of interesting reactions, which are detailed at length in the author's paper, but which we will have to omit for the present, for want of space. It was owing to these very reactions, however, and to the general properties of the alkaloid that the author was led to suspect its identity with one of the opium alkaloids, namely, *protopine*, the rarest of the series. Concerning protopine the author had to follow Hesse, who alone had prepared and described the substance. The agreement of the observed properties of macleyine with those described by Hesse for protopine covered the characteristic globular or warty form of the substances when separating from ether, their solubility in different menstrua, their ultimate composition, the composition of their platinum salts, and other properties of the salts. In other respects the agreement is nearly as close as in the former, though the slight differences may be owing to accidental circumstances. The author does not claim that the identity is proven, but thinks it has been rendered highly probable.

PHARMACEUTICAL NOTES.*

BY R. F. FAIRTHORNE, PH.G.

Manna as an Excipient for Pills.—Certain substances are with difficulty made into pills that will retain the spherical form. Amongst others may be named reduced iron, subnitrate and subcarbonate of bismuth, oxalate of cerium, calomel, bicarbonate of sodium, tannin, extract of logwood, Dover's powder, acetate of lead, sulphate of zinc, chlorate of potassium, phosphate of iron, ammonio-ferric alum, lactate of iron, citrate of iron and ammonium, aloes, and sulphite of sodium. After these have been made up into pills with any of the ordinary excipients of a soluble character, they almost always flatten and often unite together in a mass that is both unsightly and the cause of much inconvenience. This difficulty can be overcome by using manna and syrup in variable proportions, according to the substance operated on. The quantity of manna required is from 25 to 33 per cent. of weight of the article to be made into pills. Thus, if 100 grains of reduced iron are to be made into fifty pills, 25 grains of manna will be required, together with sufficient syrup to make a mass. The quantity of the syrup must be carefully adjusted, so as not to have more than enough to produce a mass of the proper piluiar consistence. When this precaution is taken, no difficulty will be experienced in making pills which will retain their proper form. Manna possesses certain advantages over other excipients that render it of value in the instances named; one is its hardness and another its solubility. It is certainly preferable to powdered tragacanth or rice flour, which are frequently used to give consistence to the pilular mass. I would suggest the use of manna in making Vallet's mass, substituting it for both sugar and honey. The mass would be more easily handled and firmer than that as usually met with.

When manna is used in making pills with the substances named it is best to place it in the mortar first and soften it with a few drops of syrup, and add the medicinal ingredients to it.

Elixir of Blackberry.—As summer approaches, preparations of an astringent character are frequently called for, and as many of them are unpleasant to take, I offer the following receipt as one that possesses the former quality without the disadvantage of the latter:—

Take of

Fluid extract of blackberry		f℥ivss.
Syrup of blackberry fruit		f℥xv.
Jamaica spirit		f℥xij.
Curaçoa cordial,		
Cinnamon water	each	f℥iv.
Syrup of orange peel		f℥iij.
Oil of cloves,		
Oil of allspice	each	12 drops.

Mix the essential oils with the fluid extract of blackberry, add the Jamaica rum, and afterwards the other ingredients.

Elixir of Logwood is another preparation of a similar character:—

Take of

Extract of logwood		10 dr., 2 scr.
Brandy		12 fluid ounces
Curaçoa		6 fluid ounces
Syrup		6 fluid ounces
Oil of nutmeg,		
Oil of cinnamon	each	4 drops.

Warm water sufficient to make 2 pints.

Dissolve the extract in the water, add the other ingredients, and, when cool, filter.

Glycerol of Myrrh and Borax.—This preparation commends itself for many purposes, and will be found especially serviceable as an addition to gargles and tooth-washes and as an application to sore nipples. It is made by the annexed formula:

Take of

Myrrh (in coarse powder)		1 ounce.
Powdered borax		1½ ounce.
Glycerin,		
Water	each	3 fluid ounces.

Mix the borax and myrrh together, add the other ingredients, and boil in a flask for ten minutes; strain through muslin, and add enough water to make the mixture 6 fluid ounces; when cold, filter through cotton or paper.

Solution of a considerable amount of the myrrh is effected by the borax, and the addition of glycerin enables a larger quantity of the borate of sodium to be dissolved than in water alone, producing a solution that is miscible with water without precipitation taking place.

This makes an elegant *lotion* for application to the gums, or as a *mouth-wash* when diluted with decoction of quillaia bark and flavoured with oil of rose or other essential oil.

The following is a very satisfactory formula:—

Take of

Glycerol of myrrh and borax	f℥ij.
Decoction of quillaia (2 ozs. to Oj)	f℥iv.
Oil of rose	4 drops.
Oil of cloves	6 drops.
Oil of orange peel	6 drops.

Mix and filter.

A Good Black Ink can be made with the following ingredients:—

℞ Galls (in moderately fine powder)	2 pounds avd.
Copperas	10½ ounces.
Gum arabic	10 ounces.
Sugar	½ ounce.

Water sufficient to make 18 pints.

Place the galls in an enamelled vessel, pour on it 6 pints boiling water, and allow it to macerate two days; transfer to a glass percolator, in the neck of which is a piece of absorbent cotton, through which allow the liquid portion to drain. When this is accomplished, pack the galls firmly and displace with sufficient water to produce two gallons with that portion of the infusion which first passed. Then dissolve the gum and sugar in 2 pints of water; add this and the copperas to the infusion of galls. This, after standing about twelve days, will produce a very superior ink. About 8 drops of wood creasote should be added to prevent moulding

* From the *American Journal of Pharmacy*, June, 1882.

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Continued from page* 70.)

POTASSII SULPHOVINAS (*Sulphovinate of Potassium*). [Æthylsulphate of potassium. Kali sulphovinicum. Sulphas æthylico-kalicus.]

Sulphuric acid	1
Absolute alcohol	1
Distilled water	4
Carbonate of barium	q.s.
Carbonate of potassium	q.s.

Mix the sulphuric acid and absolute alcohol gradually, and taking care that the temperature does not rise above 50° C. (122° F.). Let the mixture stand for four days at a temperature of 20°–25° C. (68°–77° F.), then dilute it with the distilled water, and add to it a sufficient quantity of carbonate of barium to render the mixture neutral. Filter the liquid, and add to it, under the application of a very gentle heat, enough carbonate of potassium to render the reaction faintly alkaline. Filter the liquid from the precipitated carbonate of barium, and evaporate the filtrate, at a temperature not exceeding 80° C. (176° F.) to the point of crystallization.

* From *New Remedies*, April, 1882.

Clear crystals, easily soluble in water, deliquescent on exposure to air, decomposing at 120° C. into alcohol and acid sulphate of potassium, and yielding acetic ether when heated with anhydrous acetate of potassium.

The aqueous solution of the salt should not be rendered turbid by sulphuric acid, and should be rendered not more than faintly opalescent by solution of barium chloride.

CUPRI SULPHAS IN BACILLIS (*Sulphate of Copper in Sticks*).

Heat crystallized sulphate of copper until it has become completely anhydrous, and rub the dry salt to a fine powder. Press or ram the powder into small cylindrical moulds made of filtering paper, about 8 cm. (3¼ inches) long, and 7 mm. (about ¼ inch) in diameter, and after having closed them, put them for one or two days in a damp place. Finally remove the casing of filtering paper.

FERRI TERSULPHAS (*Tersulphate of Iron*) (*dry*).
[Ferric Sulphate.]

Sulphate of iron (ferrous)	256
Distilled water	256
Sulphuric acid	47
Nitric acid . . . . sufficient, or about	67

Dissolve the sulphate of iron in the distilled water, heat the solution, and add to it the sulphuric acid. Then gradually drop into it nitric acid as long as nitrous vapours are given off [or until a drop of the liquid, diluted with water, ceases to give a blue precipitate with ferricyanide of potassium].

Evaporate the clear solution on a water-bath to dryness.

The product is a white powder difficultly soluble in water.

SYRUPUS FERRI BROMIDI (*Syrup of Bromide of Iron*).

Iron, in powder	1
Bromine	2
Sugar	15
Distilled water	q.s.

Put the iron into a flask, pour upon it 10 parts of distilled water, and add to it the bromine in small quantities at a time, and under constant agitation. Filter the light-green liquid into a flask containing the sugar, and wash the filter with sufficient distilled water to make the contents of the flask weigh 27 parts. Finally dissolve the sugar by agitation, and preserve it in small well-closed vials.

The syrup has a light-green colour, and contains 10 per cent. of ferrous bromide.

SYRUPUS CODEINÆ (*Syrup of Codeine*).

Codeine	1
Alcohol	5
Syrup	494
	500

Dissolve the codeine in the alcohol and add the syrup.

SYRUPUS DEPURATIVUS (Larrey) (*Larrey's "Purifying Syrup"*).

Sarsaparilla, cut and bruised	200
Guaiac wood, rasped	50
China root (*Smilax China*), in coarse powder	5
Sassafras, rasped	5
Senna	6
Borage (*Borago officinalis*)	6
Elder juice (inspissated)	40
Molasses	500
Sugar	500
Water	q. s.

Boil the sarsaparilla, guaiac wood, and China root for half an hour with enough water so that 720 parts of liquid may be separated from the dregs. Add to this liquid the sassafras, senna, and borage; let it macerate for half an hour, and strain. Then mix the strained liquid, which should amount to 700 parts, with the other ingredients.

SYRUPUS EUCALYPTI (*Syrup of Eucalyptus*).

Eucalyptus leaves	5
Sugar	20
Water	q.s.

Pour 50 parts of boiling water upon the eucalyptus, let it macerate for one hour, then strain and express.

For every 12 parts of liquid so obtained, add 20 parts of sugar, and dissolve.

SYRUPUS FUCI VESICULOSI (*Syrup of Seawrack*).

Extract of seawrack	1
Water	1
Syrup	7

Dissolve the extract in the water and add the syrup.

The extract is prepared as follows:—

EXTRACTUM FUCI VESICULOSI (*Extract of Seawrack*).

Seawrack, dried and in coarse powder	1
Alcohol (stronger)	3
Water	q.s.

Macerate the seawrack with 2 parts of alcohol and 3 parts of water during three days, occasionally agitating. Express and treat the residue again, during one day, in the same manner, with 1 part of alcohol and 2 parts of water. Again express, unite and filter the liquids and evaporate them, on a water-bath, to a dry extract.

Preserve it in a well-stopped bottle.

EXTRACTUM FULIGINIS (*Extract of Soot*).

Soot, obtained by the burning of wood or peat	1
Boiling water	2
Alcohol	2

Mix the soot with the boiling water, let it stand for one day, occasionally stirring, express, and filter the liquid. Treat the residue in the same manner with the alcohol. Unite the liquids and evaporate them, on the water-bath, to a dry extract.

SYRUPUS CHLORAL[I] (*Syrup of Chloral*).

Chloral hydrate	16
Distilled water	24
Syrup	200
Oil of curled mint	0·1

Dissolve the chloral in the distilled water, add the solution to the syrup, and finally add the oil.

[If the parts are taken in *grams*, 1 *drop* of the oil is sufficient. Oil of peppermint will answer equally well.]

SYRUPUS FERRI HYPOPHOSPHITIS (*Syrup of Hypophosphite of Iron*).
(Syrup of Ferrous Hypophosphite.]

Hypophosphite of calcium	30
Sulphate of iron (ferrous)	47
Sugar	600
Distilled water	q.s.

Dissolve the hypophosphite in 300 parts of distilled water and the sulphate of iron in 100 parts of distilled water. Mix the two solutions, let the mixture stand for one hour, occasionally stirring, then filter.

To every 370 parts of the filtrate add 600 parts of sugar and dissolve.

Keep the syrup in a cool place.

SYRUPUS CALCII IODIDI (*Syrup of Iodide of Calcium*).

Lime	5
Iodine	2
Sugar	200
Water	q.s.

Triturate the lime to a fine powder with the sugar and gradually add 100 parts of water. Let the mixture stand for several hours, occasionally stirring, then filter.

To the filtered liquid add the iodine, and when this is dissolved, 170 parts of sugar. Dissolve the latter without heat.

The syrup is clear and colourless and should be preserved in a well-stoppered bottle.

SYRUPUS JUGLANDIS (*Syrup of Butternut Leaves*).

Extract of butternut leaves	1
Syrup	60

Dissolve the extract in the syrup.

(To be continued.)

The Pharmaceutical Journal.

SATURDAY, JULY 29, 1882.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

CHEMISTRY IN RELATION TO THE INDUSTRIAL ARTS.

IN almost every department of science the work that has been done by natives of Great Britain will bear comparison with that which has been done elsewhere, and though science itself is of no particular country, it is from a national point of view satisfactory to reflect that the names of some of our countrymen rank among the foremost of those who are historically celebrated for discoveries and for researches by which our knowledge of nature has been extended. But while there is on this score reason for congratulation, there is also a very important circumstance of difference between this country and many others in regard to science wherein we compare very unfavourably with them. It has been too much the habit to look upon science as having to do with something that is, if not unreal, at least outside the range of ordinary practical experience; science has been cultivated too much from an abstract point of view and without sufficient general recognition of the fact that it is of direct practical concern in every-day operations, inasmuch as its subject matter is the same as that with which all such operations have to do. Especially has this been the case with chemistry, which has been commonly looked upon as a species of parlour magic, suited for the entertainment of *dilettanti* rather than as the light by which industrial art is to be guided in order to ensure success and improvement. With that love of a formula which characterizes the Britisher as much as his love of a lord, it has been customary to act upon the assumption that science has little or nothing to do with the practical operations by which various materials are made to yield products necessary for our daily wants, or with the conduct of industrial processes by which some of those materials are adapted for useful purposes. This erroneous belief in the absence of any useful relation between science and practice is, however, dying out, and though we have not yet advanced so far as our continental neighbours in making science of advantage by combining it with practice, it is at least satisfactory to observe that some progress is being made in this direction.

One of the most recent illustrations of this progress is afforded by the formation of a Society of Chemical Industry, the main object of which is to promote that attention to chemical science which is indispensable for the successful conduct of the various branches of industry that are dependent upon the utilization of chemical action. For this purpose it is proposed to associate together persons interested in such industries or possessing a knowledge of the chemical principles concerned with them, so as to afford opportunity for the interchange of ideas and information by which important branches of national industry might be improved. This Society has now been in existence but little more than a year, and the number of its members has been increased to 1250, including representatives of manufacturing firms all over the country. Its first annual meeting has just been held at Manchester and the President, Professor ROSCOE, opened the proceedings by delivering an address in which he referred to the rapid increase in the number of members as furnishing a proof that the establishment of such a society was necessary. On the support thus afforded it has been possible to undertake the publication of a journal, of which several numbers have appeared already. It is intended to make this journal a complete epitome of the progress of chemical industries throughout the world by giving accounts of the newest discoveries and patented inventions in various branches of applied chemistry and to uphold the principle that in manufacturing operations a healthy practice can only exist when based on a sound knowledge of theory.

It is with much pleasure that we refer to this bold and uncompromising attack upon the position of the "practical men" who have been in the habit of repudiating any dependence upon theory, and we trust that it may prove the first step towards the recognition of the principle that manufacturers must be educated up to the level of the science of the day—able to understand and apply the discoveries of the purely scientific chemist, which constitute the foundation of their trade. The illustration given by Professor ROSCOE of the beneficial effects resulting from the adoption of the principle in the case of the German and Swiss colour makers is a very striking one, for it shows that even local advantages and the possession of abundant sources of raw material fail to be of practical account when industrial operations are managed, as they unfortunately have been to great extent hitherto in this country, by persons ignorant of the scientific principles involved in them. It is in consequence of this difference between our relation to science as an industrial agent and that obtaining on the Continent that we lose the profit of an industry producing annually upwards of three millions sterling, which, on account of our production of greater part of the raw material required should properly be ours. Unless this difference be done away with by timely attention to the necessities of the case, and by the establishment of schools suitable for the highest and most complete scientific training of intending manufacturers, the consequences of the deficiency on our part will infallibly make itself felt in other branches of industry to our disadvantage.

THE REGULATION OF PHARMACY IN NEW ZEALAND.

A meeting of the Pharmacy Board of New Zealand was held last month at Christchurch, at which the President, Mr. Barraud, of Wellington, stated that up to the present time there had been 234 chemists and druggists registered under the Pharmacy Act of New Zealand, a draft of which was published in the Journal for 13th November, 1880. It was also mentioned that the Board proposed to hold examinations simultaneously at Auckland, Wellington, Christchurch and Dunedin, the first of which were to take place in the first week of this month. As soon as these examinations were established it was intended to institute proceedings against all unregistered chemists carrying on business. According to a resolution of the Board it was determined that the Modified examination of the British Pharmaceutical Society should be adopted for the present standard, but that a higher standard, the syllabus of which was arranged, should come into operation wholly or in part in January, 1884. It was agreed to communicate with the Pharmacy Board of Victoria, New South Wales, Queensland and Tasmania, with a view to ascertain the standard of efficiency necessary to ensure mutual recognition of certificates. A series of text books for the use of students in pharmacy was approved, and it was ordered that the conspectus of education required by the Board should be printed and circulated through the local Registrars and that every facility should be given for placing pharmaceutical education on an efficient and permanent footing.

A copy of the regulations for the examination of candidates for registration as pharmaceutical chemists has been forwarded to us by Mr. J. A. Allan, the Secretary and Registrar, according to which the Modified examination is to include Prescriptions, Practical Dispensing, Materia Medica, Quality of Specimens, Pharmacy, and Chemistry of the Pharmacopœia.

Division I.—Prescriptions.—The candidate must be able to read autograph prescriptions, translate them into English, render a correct translation of the directions for use, and detect unusual doses.

Practical Dispensing.—The candidate must be able to weigh, measure, compound medicines, write the directions neatly in suitable language, and to finish and direct each package properly.

Division II.—Materia Medica.—The candidate must be able to recognize the Pharmacopœia chemicals in frequent demand, and specimens of roots, barks, leaves, fruits, resins, and gums in ordinary use; the following plants, either in a fresh or dried state, or from plates:—Belladonna, stramonium, hyoscyamus, conium, aconitum, digitalis, and sabina; also, to correctly estimate the quality of each specimen submitted.

Division III.—Pharmacy.—Every candidate must be able to recognize the preparations of the Pharmacopœia which are not of a definite chemical nature, such as extracts, tinctures, and powders, and give the proportion of the more active ingredients.

The proposed syllabus of study for examination before examiners appointed by the Pharmacy Board coming into existence in January, 1884, comprises, in addition to what is above specified as to prescriptions and practical dispensing, under the head of pharmacy, a practical knowledge of the processes, and the principles of the processes, by which the preparations of the Pharmacopœia are made, and of the best excipients and methods of manipulation for forming emulsions, pills, etc.; under materia medica the recognition of specimens of roots, barks, leaves, fruits, resins, gums, animal substances, etc., used in medicine, the botanical and zoological names of the plants, etc., yielding them, and the natural families to which they belong, the countries and sources from which they are obtained, and the official preparations into which they enter, judging the quality and freedom from adulteration or otherwise of the specimens, and describing the methods of obtaining their active proximate constituents in a separate state.

Botany is to comprise an acquaintance with the parts of the flower, fruit and seed. The candidate must be able to distinguish practically between each of the following natural orders:—Ranunculaceæ, papaveraceæ, malvaceæ, leguminosæ, rosaceæ, cucurbitaceæ, umbelliferæ, compositæ, gentianaceæ, convolvulaceæ, solanaceæ, atropaceæ, polygonaceæ, orchidaceæ, iridaceæ, liliaceæ, graminaceæ, and refer to their respective orders such specimens as may be shown to him.

Chemistry is to comprehend a practical knowledge of the nature and properties of the elements and their compounds, especially those used in medicine or the arts. The different combinations and decompositions must be explained by equations; also the qualitative analysis of the more important chemicals, *e.g.*, nitrates, chlorides, carbonates, sulphates, phosphates, oxalates, tartrates, etc., and the detection of impurities in them, and the volumetric estimation of the strength of all Pharmacopœia preparations in which standard solutions are ordered to be used.

We may therefore infer that the provisions of the New Zealand Pharmacy Act are being carried out, so far as circumstances admit, and the resolutions adopted by the Board afford some guarantee that the future pharmacist of that colony shall possess at all events a good education and be thoroughly efficient in his business.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

July 12, 13, 14, 19, 20 and 21, 1882.

Present on each day—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Allchin, Barnes, Benger, Brady, Corder, Ekin, Gale, Greenish, Linford, Martindale, Plowman, Southall, Taylor and Thresh.

Dr. Greenhow attended on the 13th, 14th and 19th, on behalf of the Privy Council.

July 12.

MAJOR EXAMINATION.

Seven candidates were examined. *Four* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Caldecott, Clement Guest .. ...Whitchurch.
Dowdeswell, Jonathan............Tiverton.
Holmes, Francis ....Lutterworth.

MINOR EXAMINATION.

Twenty candidates were examined. *Fifteen* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Allen, Samuel ....Worcester.
Bowering, John ....Taunton.
Cave, Herbert William ....Wisbeach.
Evans, John Robert...............Carnarvon.
Nichol, Anthony ....Carlisle.

MODIFIED EXAMINATION.

One candidate was examined, but failed to pass.

July 13.

MAJOR EXAMINATION.

Seven candidates were examined. *Four* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists :—

Bain, John...........................Bridge of Allan.
Drew, Walter Clark...............London.
Yeatman, Frederick James......London.

MINOR EXAMINATION.

Twenty candidates were examined. *Fourteen* failed. The undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Comer, Ernest Edward ....East Dereham.
Cullwick, Herbert Ernest ......Knighton.
Daniel, George ....Holsworthy.
Dillon, Charles Linder............Hereford.
Eley, Herbert ....Derby.
Foggitt, John Blackett ....Thirsk.

July 14.

MINOR EXAMINATION.

Twenty-six candidates were examined. *Thirteen* failed. The undermentioned *thirteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Evans, William.....................Cardigan.
Frost, John Henry ....London.
Gaskin, John Henry...............Wolverhampton.
Greenall, Thomas Holdsworth...Ashton.
Hall, Amos ....Stafford.
Hankinson, George Robert......Grange-over-Sands.
Hanson, Christopher ....Buckhurst Hill.
Harston, Charles Edward ......Lincoln.
Hewlett, Thomas Charles ......Bedford.
Hickson, Robert William ......Hull.
Hodgson, Thomas Samuel ......Manchester.
Hornby, William Thomas ......Stockport.
Innes, David..........................Stalybridge.

July 19.

MAJOR EXAMINATION.

Six candidates were examined. *Four* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Murray, George ....Coldstream.
Wheatley, Joseph..................Huddersfield.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Thirteen* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Loam, James Gilbert ....Liverpool.
Longtoft, William ....Bedale.
Mann, Joseph ....Peterborough.
Meadows, John Martin ....Swindon.
Miller, Wm. Philip Faulkner...Folkestone.
Mitten, Flora ....Hurstpierpoint.
Noble, Henry Edward............Peterborough.
Thomas, Joseph Arden .... Cambridge.

July 20.

MINOR EXAMINATION.

Twenty-three candidates were examined. *Eleven* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Norburn, Albert Edward ......London.
Northen, Charles ....Thorpe-by-Water.
Parker, Thomas Herbert ......Bedford.
Pearson, William ....Sinderland Green.
Pellew, Albert ....Woodbridge.
Pickering, Wade ....Crowle.
Pinder, Robert.......................Bourne.
Ransom, Francis ....Hitchin.
Rodmell, John Gale................Rochester.
Rowland, Thomas William......Epping.
Sergent, William Thomas ......Croydon.

July 21.

MINOR EXAMINATION.

Twenty-five candidates were examined. *Eleven* failed. The undermentioned *fourteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Shapcott, William Henry Pyne..London.
Thisleton, Hugh ....Preston.
Thomas, William Hendy ......Penryn.
Townsend, Henry Holden ......London.
Tyson, Thomas Balmforth ......London.
Warburton, Edward ....Farnworth.
Waymouth, Thomas Staddon...Exeter.
Weddle, William ....Gateshead.
Wellburn, John Samuel ....Scarborough.
Wells, William George ....Maidstone.
Wheeley, John Thomas Martin.London.
Williams, William Jesse ....Crickhowell.
Wood, John Ridal ....Rotherham.
Worts, Harry Augustine.........Harwich.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination:—

Certificates of the College of Preceptors.

Dennis, Frederick Woodrow ...Louth.
Gratton, George Edwin ....Conway.

Certificate of the University of Aberdeen.

Kettle, George James ....Aberdeen.

Certificate of the University of Cambridge.

Atterbury, Clive ....Burton-on-Trent.

EXAMINATIONS IN EDINBURGH.

July 20 *and* 21, 1882.

Present—Messrs. Ainslie, Baildon, Clark, Gibson, Gilmour, Kinninmont, Nesbit and Stephenson.

Professor Maclagan attended on the 20th on behalf of the Privy Council.

July 20.

MAJOR EXAMINATION.

Two candidates were examined. *One* failed. The undermentioned passed, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Kinross, William Malloch ......Edinburgh.

MINOR EXAMINATION.

Thirteen candidates were examined. *One* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Adamson, William Stewart ...Edinburgh.
Bell, Charles Russel..............London.
Bell, John Henry....................Epworth.
Berry, Andrew Wales.............Aberdeen.
Bostock, Samuel Pass ....Hyde.
Dugan, Alexander Ferrier ....Aberdeen.
Gatward, Oswald ....Hitchin.
Haddon, John ....Birmingham.
Hogg, Henry Scott ....Glasgow.
Jackson, William Moses..........Ayr.
Jamieson, Simpson ....St. Andrews.
Jones, John Wesley.................Llanelly.

July 21.

MINOR EXAMINATION.

Fourteen candidates were examined. *Seven* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Mackay, William...................Edinburgh.
McRither, Alexander Buchan...Dundee.
Miller, George ....Arbroath.
Schofield, John William ....Morpeth.
Skirving, Alexander................Glasgow.
Sutherland, Adam Gordon ....Edinburgh.
Sutherland, John William ....Edinburgh.

MODIFIED EXAMINATION.

The undermentioned was examined, and was declared qualified to be registered as a Chemist and Druggist:—

Gill, Richard Turton ....Pocklington.

Pharmaceutical Society of Ireland.

SPECIAL MEETING OF THE COUNCIL.

Thursday, July 20, 1882.

Present.—Professor Tichborne, President; Dr. Aquilla Smith, Vice-President; Sir George B. Owens, M.D., Drs. Collins, Montgomery, and Whitaker (Belfast); Messrs. Allen, Brunker, Grindley, Hayes, Payne (Belfast), Pring (Belfast), Simpson.

A letter was read from William Whitla, M.D., of Belfast, resigning his seat on the Council.

The President stated that Dr. Whitla was a candidate for the Examinership in Pharmacy, which was his reason for ceasing to be a member of the Council.

Dr. Whitla's resignation was accepted, on the motion of Dr. Collins, seconded by Mr. Payne.

Mr. William F. Wells, jun., of 20, Upper Baggott Street, Dublin, was proposed by Mr. Pring, and seconded by Mr. Hayes, to fill the vacancy.

Mr. William Harrington, of Cork, was proposed by Sir George Owens, and seconded by Dr. Collins.

A division resulted in the election of Mr. Wells.

Proceedings of Scientific Societies.

SOCIETY OF CHEMICAL INDUSTRY.

The first annual meeting of the Society of Chemical Industry was opened on Wednesday, July 5, at Owens College. The members assembled in the Chemical Theatre, and the chair was taken by Professor Roscoe, President of the Society.

There was a large attendance of members

The President's Address.

The President, after welcoming the members to Manchester, said: "On June 28 of last year, at the first meeting, in London, the number of members on the Society's books was 297; I am now able to announce that the number on the rolls is 1250, consisting of gentlemen connected with the most widely different departments of industrial chemistry resident throughout the United Kingdom, and including many distinguished names of English and continental scientific chemists. I have to congratulate the Society on the unprecedentedly rapid and most satisfactory progress it has made, sufficiently proving—if any proof were required—the truth of the opinion which I expressed last year of the necessity for the establishment of a society of the kind, which should include all those interested or possessing knowledge concerning the utilization of chemical action on a large scale, and having charge of, or connected with, those branches of industry dependent on chemical principles. During last autumn two sections of the Society have been founded—one a metropolitan section, under the chairmanship of Professor Abel, C.B., F.R.S., and the other established under the direction of Mr. Edmund K. Muspratt. A variety of papers on subjects interesting both from a manufacturing and theoretical point of view were read at those sectional meetings by various members of the Society, and discussions which have proved of practical utility have taken place. The Council of the Society also appointed last year a Committee on the Patent Laws. This Committee has held several meetings, and has taken active steps in view of the approaching legislation on this important question. The Committee wil lay a separate report of its action before the Society. The feature, however, of the greatest importance in connection with the Society is the adoption of the suggestion made by the Council at the first general meeting respecting the publication of a journal. The first number of it appeared in January of the present year. The Publication Committee appointed by the Council to superintend the issue of the journal was fortunate in securing the services of Mr. Watson Smith, of Owens College, to act as editor, and were able to arrange for printing and publishing by Mr. Emmott, of Manchester. The results have proved highly satisfactory, the journal supplying a want which has long been felt in English chemical industries. The Publication Committee have endeavoured to secure not only satisfactory reports of the papers which have been read and the discussions which have taken place at the sectional meetings, but have striven to make the journal a complete epitome of the progress of chemical industries throughout the world. For this purpose they have engaged a number of qualified abstractors, to whom they are indebted for the able accounts of the newest discoveries and patented inventions in the various branches of applied chemistry. It is the intention of the Publication Committee to spare no pains to make the journal of the Society the most complete and reliable one of its kind in existence. Above all the Committee has determined to uphold and retain the scientific status of the journal, convinced that a healthy practice can only exist when based on a sound knowledge of theory. In this respect the *Journal of the Society of Chemical Industry* will differ from many so-called technical journals, inasmuch as we shall have frequently to treat of the highest and most complicated problems of chemical science, just because it is these which serve as the starting point for some of the most important industrial applications. Thus conducted, I think our journal cannot fail to exert a beneficial influence on many branches of English chemical industry which have unfortunately hitherto been managed to a great extent by persons ignorant of the scientific principles involved in the processes which they carry on. In my address last year I drew attention to the fact that although the greater part of the raw material used in the manufacture of the coal-tar colours is produced in this country, we imported from Germany and Switzerland by far the largest quantity of the manufactured colours, and thus we lose the profit of an industry of the value of above three millions sterling, which should properly be ours. Many reasons no doubt have contributed to this result. Patent laws may act injuriously upon our inventors, and other grounds may be assigned, but in my opinion the chief superiority which the German and Swiss undoubtedly possess over the English colour makers is to be sought in the thorough appreciation on the part of the foreigners of the value of, and necessity for, scientific training and knowledge of the highest type in the conduct of their business. The German and Swiss colour maker is not content to manufacture a series of well-known products; he must constantly bring out novelties, and for this purpose he and his chemist must be educated up to the level of the science of the day. He must be able to understand and apply the discoveries of the purely scientific chemist, for these form the foundation of their trade. The necessity for this was long ago proclaimed by Liebig, who said, 'It has taken a long time to convince technical men of the fact that they are bound to acquire for themselves the highest possible scientific education if they wish properly to understand their processes, and if they desire to start new manufactures and to meet the ever-increasing demand for novelties.' I have recently had an opportunity of visiting some of the continental coal-tar colour works, and I think I cannot better enforce this argument than by giving a sketch of one of these, with the kind permission of the proprietors. The one I choose as an example is neither the chief nor the most famous of these works. It is a new and comparatively small one, erected on the banks of the Rhine at Basle, by Messrs. Binscheidler and Busch. These works, though far less extensive than those of Messrs. Meister, Lucius and Co. at Hoechst, or the Badische Aniline and Soda Works at Ludwigshafen, are carried on in a no less scientific spirit. As I have already stated, the first principle that governs continental colour works is the absolute necessity of having highly-trained scientific chemists, not only at the head of the works, but at the head of every department of the works where a special manufacture is being carried on. In this respect this method of working stands in absolute contrast to that too often adopted in chemical works in our own country, where the control of the processes is left in the hands of men whose only rule is that of the thumb, and whose only knowledge is that bequeathed them by their fathers. On entering the works of Messrs. Binscheidler and Busch—and I have to thank the former gentleman for his kindness in affording me information and for giving me leave to make it public—one is struck in the first place with the adaptation of means to ends, with the spacious, well-lighted, well-ventillated workshops, and above all with the all-pervading cleanliness and neatness. But it is not of these things I now desire to speak, but rather of the method in which their business is conducted. In the first place, then, the scientific director is a thoroughly educated chemist, cognizant of and able to make use of the discoveries emanating from the various scientific laboratories of the world, and under him are three scientific chemists, to each of whom is intrusted one of the three departments into which the works are divided. Each of these head chemists, who has in this instance enjoyed a thorough training at the Zurich Polytechnicon, has several assistant masters placed under him, and all these are gentlemen who have had a theoretical education in a German university, or in a polytechnic school. An important part of the system is now to be noticed, namely, that directly under these scientific assistants come the common workmen, who have of course no knowledge whatever of scientific principles, and who are in fact simply machines acting under the will of a superior intelligence. The many and great advantages of this arrangement are patent to all, and the fact of having men of education and refinement in positions of the kind renders the foreign manufacturer who adopts this system less liable to annoyance and loss than his English competitor who works on a different plan. So much then for the *personnel* of the works. Now for the means with which they carry on their work. To begin at the beginning, we find no less than ten well-equipped airy experimental laboratories, perfectly distinct from the workshops where the manufacturing processes are carried on. In these ten laboratories the chief departmental chemists and their assistants carry on their investigations respecting the production of new colouring matters or the more economical manufacture of old ones. To assist them in this work a complete scientific library is at hand, consisting of the newest researches, for these, as I have said, form the material out of which the colour chemist builds up his manufacture; and no sooner, perhaps, do the results of a purely scientific research appear which may possibly yield practical issues than the works' chemist seizes upon them, repeats them with modifications and alterations, so as at last to bring them within the charmed circle of financial success. Thanks to Dr. Binscheidler, I am able to quote a specially representative case, and a clear description of one such case is worth a host of generalities. Through the original investigations of the Messrs. Fischer the attention of the manufacturer was drawn to a colourless base obtained by the action of benzaldehyde on dimethylaniline, inasmuch as they stated that the salts of these colourless bases became green on exposure to air. Founded on these observations, an endeavour was made to effect the practical manufacture of a green colouring matter by oxidization of these colourless bodies. In order to attain the desired end the following investigations had to be made by the chemist and his assistants who were to conduct the operations. First, a cheap method had to be found for manufacturing benzaldehyde (commonly known as the oil of bitter almonds). Secondly, a profitable mode of making the colourless bases had to be worked out. Thirdly, the proper oxidizing agents and their best method of application had to be determined. Fourthly, the best method of purifying and crystallizing the green colouring matter had to be discovered. The laboratory experiments on the above points having proved so far successful as to give prospect of good results, operations on a somewhat larger scale were started, and these yielding a satisfactory issue, the manufacture of the colouring matter, now so well known as malachite green, was commenced on the technical scale, the operations still being watched and constantly under the control of the chemist. But even now their scientific work was by no means ended. Continual laboratory experiments go on for the purpose of finding improvements in the mode of manufacture. Thus, for example, the improved yield, both as to quality and quantity, of the benzaldehyde is a matter of investigation. Again, the synthetic production of pure colourless bases by a more direct process is sought for, so as to get rid of loss in working, and to obtain a yield as close as possible to that pointed out by theory. In the same way improvements in the materials used for oxidation and in their application are made, so as to effect the oxidation quantitatively without the forms of by-products. Lastly the action of various solvents is examined so as to obtain the best form of the crystallized colouring matter. As indicating the value of these improvements, made after the colour became a marketable article, it is only necessary to state that the price of crystallized oxalate has been reduced from £2 to £1 4*s*. per kilo. The foregoing may serve to give a picture of a really scientifically constructed work, where each step in advance is made systematically as the result of a well-devised plan of operations. This is indeed the only means of progress, and this fact is so well recognized in Germany that each of the larger colour works at Hoechst and Ludwigshafen possesses a staff of from thirty to forty well paid, thoroughly trained chemists to conduct its operations. But I am, of course, far from believing that because the methods adopted in these foreign colour works are scientific and productive of good, those made use of in all English works must therefore be unscientific and bad. Taking the whole applications of chemical science I think we may with truth say that the English industrial chemists have been at least as successful commercially, and certainly as productive, in new and important discoveries as their continental rivals. The Germans and Swiss, however, have been and still are distinctly before us, not only in the means of obtaining the highest technical training in their numerous universities aud polytechnic schools, but, what is more to the point, before us in the general recognition of the value and importance of such training for the successful prosecution of any branch of applied science. However, though England is apt to be late in taking up such views, she is, as Mr. Forster has well said, generally not too late, and the recent establishment of colleges and technical schools, as well as the appointment of the Royal Commission on technical instruction, on which I have the honour to serve, show that the country is now alive to the necessities of the case; and my object in the foregoing remarks has been to show that in certain branches at least of chemical industry it is only the highest and most complete scientific training that can ensure commercial success. Such a training, I may perhaps be allowed to add, can now be obtained in our own country."

Mr. Ludwig Mond, foreign secretary, read a report of the Patent Laws Committee. After full discussion the majority of the Committee had come to an agreement in the main with the bill elaborated by the Society of Arts, and brought in by Sir John Lubbock. They differed from the bill, however, on a few points, which the Committee considered of sufficient importance to lay before Mr. Chamberlain, who had undertaken to bring in a bill on the part of the Government. Mr. Chamberlain replied that it was quite uncertain when the Government bill for amending the patent laws would be introduced. He would be glad, however, if the Society would communicate with him as soon as the bill was introduced.—The Committee was re-appointed.

Mr. A. K. Huntington, Professor of Metallurgy, King's College, London, read a paper on "The Mexican Amalgamation Process." He gave the results of about forty experiments in which was shown the action of mercury on sulphide of silver, and on proustile in water in a solution of common salt, and in a solution containing sulphate of copper and common salt. The commonly accepted explanation of the action of cupric chloride on sulphide of silver in the Mexican amalgamation process was shown to be only to a limited extent correct. Other points in this process were also elucidated. Professor Huntington also read a paper on "The Metallurgy of Cobalt and Nickel." He sketched the present state of our knowledge of the metallurgy of these metals, with special reference to rendering them malleable. A fine collection of specimens was exhibited.

Mr. Watson Smith read a paper prepared by Dr. Otto N. Witt (who was unable to be present) on "The Application of Indophenol Blue to Calico Printing and Dyeing."

Mr. Charles O'Neill read a paper on "The part of Chemistry in Calico Printing." He sketched the past relations of chemistry with printing and dyeing, pointing out that in 1409, there were print works in London using colours composed of nearly the same ingredients as were in general use within the last ten years. Although calico printing and dyeing might be considered a chemical business, many houses of the second class managed to get on without any skilled chemist or even a laboratory in which experiments could be made or materials tested. This want of chemical knowledge was a source of considerable loss. It was impossible in such circumstances to determine whether or not materials supplied were genuine, and goods were often damaged in consequence. The impossibility of controlling the supply of drugs and other materials from lack of acquaintance with them often left employers in the hands of dishonest servants. He had much hope for the future of our calico printing. Employers and managers were becoming more educated in chemical matters, and better able to appreciate the services chemistry can render.

The President agreed with Mr. O'Neill as to the importance and necessity of scientific chemical training in the carrying out of the work of the calico printer. He had no doubt the fact of the Society meeting in Manchester, and this expression of opinion, would not be without influence. As to the work the Royal Commission on technical education had to do, his lips were of course to some extent sealed. But the attention of the Commission had been drawn to this subject—and no one had done more in this way than Mr. O'Neill—and it was the intention of the Commission to give full weight to what had been laid before them. Professor Roscoe, in concluding, asked Mr. O'Neill for his opinion in regard to some calico prints sent in for exhibition by Manchester firms, and some manufactured by M. Thierry-Mieg, of Alsace.

Mr. O'Neill said the examples of printing from Alsace were certainly very fine, and while he would wish to hold up the printing of this country if he could, it must be admitted that the foreign goods were something better than any of the others in the room. It was, of course, to be taken into account that the British prints were sold at cheaper rates, but home manufacturers had something to learn yet before they could produce the quality shown in the prints from Alsace.

In the evening the members of the Society dined together in one of the large rooms at Belle Vue Gardens. Professor Roscoe presided, and there were about one hundred and twenty gentlemen present.

On Thursday, the annual meeting was resumed at Owens College, the President, Prof. Roscoe, in the chair.

Mr. M. A. Chance (Birmingham), read a paper on Shaffner and Helbig's sulphur recovery process,* as to which he said the interest had extended far and wide since public attention was attracted to it in January last. The process would necessarily affect very materially importers and consumers of sulphur, and several of the leading alkali makers in England were already so convinced of its value as to be taking steps to adopt it. The pressing question of the hour was to determine the best form of plant and the best mode of manipulation to turn the reactions to the best account. Mr. Chance proceeded to describe the plant he is erecting to work the process on a scale of dealing with 300 tons of salt cake per week. This year, he concluded, would be memorable in the alkali trade as having witnessed the introduction of this beautiful process into England, a process replete with problems full of interest to chemist and engineer alike.

* See *Pharm. Journ.* [3], xii., 969.

Some discussion followed, in the course of which much admiration was expressed of the process and hope as to its ultimate success. Only Mr. Ludwig Mond was of opinion that the value of the process had yet to be shown.

On the motion of Mr. John Williams, seconded by Mr. Newlands, the office-bearers of the Society were reappointed, the only change being the substitution, in the president's chair, of Professor Abel for Professor Roscoe.

Professor Abel, in accepting office, said he was sorry the Council had not been able to persuade Dr. Roscoe to continue President for another year. To him the success of the Society was largely due, and for his indefatigable labours he moved that Dr. Roscoe be awarded a hearty vote of thanks.

The motion, which was seconded by Mr. Muspratt, Liverpool, was heartily passed.

It was resolved that the meetings of the Society next year be held in London.

In the afternoon the members visited a number of works in the city and the neighbourhood.

A Conversazione was held in the evening at the College, and largely attended by members of the Society and ladies and gentlemen invited by the Council. The guests were received by Professor Roscoe, the President of the Society. The whole of the College was thrown open, and there were a number of interesting exhibitions and entertainments of various kinds.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Wednesday, July 19, at 4.0 p.m.

Present—Professor Attfield, President, in the chair; Messrs. Benger, Brady, F.R.S., Ekin, Plowman, Southall, Squire, Taylor, Dr. Thresh, and Messrs. Benger and Carteighe (Honorary Secretaries).

The minutes of the previous meeting were read and confirmed.

Letters of apology for non-attendance were read from Mr. Chipperfield, Mr. Payne, Professor Tichborne and Mr. Young.

It was reported that in addition to the papers previously announced, the following gentlemen had offered contributions:—Messrs. Bothamley, Brownen, Dunstan, Fletcher, Gerrard, Giles, Greenish, Holmes, Hooper, Jackson, Naylor, Proctor, Shenstone, Symes, Woodland and Professor Tichborne.

A letter was read from Mr. Gerrard stating that he would be unable to complete the investigation he had undertaken on *Atropa Belladonna* in time for the Southampton meeting. It was decided that he should be invited to report the result of his work up to the present time.

A letter from Mr. Carteighe stating that it was necessary for him to resign his office as one of the Honorary Secretaries was read. In accepting Mr. Carteighe's resignation, regret was expressed at the loss of his valuable services, and the thanks of the Committee were accorded to him for his services in the past. Mr. Sidney Plowman was then unanimously invited to act provisionally as an Honorary Secretary until an appointment could be made by the members at the approaching annual meeting.

The following gentlemen were elected members of the Conference:—Mr. D. Hooper, Birmingham; Mr. F. R. Squire, San Remo; Mr. M. R. Whitla, Monaghan.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The annual meeting of this Association was held on Thursday, July 20. The President, Professor Attfield, F.R.S., in the chair.

The Honorary Secretary (Mr. Wyndham R. Dunstan) read the annual report of the Executive Committee, which showed an increase, not only in the number of papers read before the Association, but also in the number of attendances at the meetings. During the session sixteen papers and seven reports have been read before the Association. The following is the list of papers:—

"The Meaning of Science," by the Secretary; "Foods and their Values as Sources of Force," by Mr. A. J. Evans; "The Rise and Development of Pharmacy in Russia," by Mr. H. G. Greenish; "The Relation of Microscopic Organisms to certain Industries and Diseases," by Mr. C. H. Hutchinson; "The Chemistry of Cerium," by Mr. H. S. Elworthy; "Animal Parasites," by Mr. E. Haward; "Vapour Densities," by Mr. F. J. Yeatman; "Note on the Preparation of Calcium Hypophosphite," by Mr. F. W. Short; "Alkaloids," by Mr. F. W. Short; "Coal Tar Distillation and some of its Products," by Mr. R. A. Cripps; "Gas Analysis," by Mr. C. Thompson; "The Production of Benzoic Acid and Oil of Bitter Almonds from Toluene, Part I.," by Mr. A. T. Job; "Note on a New Variety of Euphorbia Amygdaloides," by Messrs. F. J. Yeatman and F. W. Short; "The History of Citrine Ointment," by Mr. R. A. Cripps; "The Preparation of Benzoic Acid and Oil of Bitter Almonds from Toluene, Part II.," by Mr. A. T. Job; "Note on some Reactions of Glycerine," by Mr. E. Marsh.

The following reports have been made by the members of the Committee of Reporters, which is appointed annually by the Executive Committee:—

Two Reports on Materia Medica ("Notes on American Drugs," "New Remedies"), by Mr. W. Elborne; Report on Inorganic Chemistry ("Electrolytic Quantitative Analysis"), by Mr. C. H. Hutchinson; Two Reports on Botany ("Chlorophyll," "Darwin's Researches on Plant Movement"), by Mr. J. O. Braithwaite; Report on Pharmacy ("Thorey's Researches on Hyoscyamine"), by Mr. H. G. Greenish; Report on Organic Chemistry ("The Investigation of a so-called Catalytic Phenomenon"), by Mr. Wyndham R. Dunstan.

The President, at the commencement of the discussion, congratulated the Association upon the completion of so satisfactory a session of work.

The adoption of the report was then moved by Mr. J. O. Braithwaite, seconded by Mr. H. S. Elworthy, and carried unanimously.

Mr. C. Thompson then proposed that the balance in the hands of the Association be devoted to the constitution of a Research Fund, to defray the expenses of materials used by members in the investigation of subjects forming the basis of communications to the Association.

This proposition received support from all the members who took part in the discussion, and finally the meeting resolved, "That the proposition be adopted, and that the matter be referred to the Executive Committee for the consideration and settlement of details."

Mr. R. H. Parker then proposed that in future the meetings of the Association be held at eight, instead of half-past eight, as heretofore, on the ground that eight o'clock was more convenient for the majority of the members.

This was seconded by Mr. J. O. Braithwaite, and after a discussion, was carried unanimously.

Messrs. F. J. Yeatman and W. H. Ince were then appointed as auditors to examine the Treasurer's accounts, which they reported to be correct.

After a hearty vote of thanks had been passed to the President, Secretary, and other officers of the Association, the meeting adjourned over the summer vacation.

Parliamentary and Law Proceedings.

A Small Fatal Dose of Laudanum.

A fatal case of poisoning of an infant is reported from Keyworth, and is remarkable for the alleged smallness of the dose. A "drop" of laudanum was administered one afternoon with castor oil, to an infant, three weeks old, for the cure of diarrhœa, to which the child had been subject from its birth. Shortly after, the child became suddenly very ill. At half-past five on the same afternoon it was seen by Mr. Percy Blumer, when the child was lying with contracted pupils, livid lips, skin covered with perspiration, small pulse, and slow respiration. It could be roused with difficulty, and speedily relapsed into its former state. Notwithstanding the administration of emetics, and the use of cold effusions, the child died thirteen hours after it was first seen by Mr. Blumer. Death from 1 drop of laudanum has occurred before, but the repetition of an ascertained case of death after such a dose is worthy of record, if only to impress on the public and the profession the danger attending the administration of opium in any form to young children.—*British Medical Journal.*

Poisoning by Arsenic.

A sad case of accidental poisoning, having a fatal termination, has occurred at Ingoldmills, near Alford, Lincolnshire.

Amos Deans, waggoner, in the employ of Mr. Davison, farmer, purchased some arsenic four or five years ago, for the purpose of destroying rats. What was not used on that occasion was placed inside an American clock case, in a small spice box. Last week a nurse was engaged for Mrs. Dean, named Ellen Blades, a widow, and she, under the impression that the poison was baking powder, used some of it in making a fruit pudding. The pudding was partaken of by the nurse, Mr. Dean, and two children. Mr. Dean, remarking that it tasted "funny," asked what it had been made of, and on being told immediately replied that they were poisoned. Remedies were at once applied, and on Monday the patients appeared to have recovered, but later in the day, Mrs. Blades, who had taken the occurrence much to heart, became unwell, and rapidly got worse. Every attention was paid to her, but she died on Tuesday.—*Leeds Mercury.*

Poisoning by Vermin Killer.

Mr. J. C. Malcolm, the Leeds coroner, held an inquest at the Leeds Town Hall on Friday, July 21, touching the death of Eliza Motherby, domestic servant. The deceased retired to bed on Tuesday evening, evidently in good spirits. The following morning Dr. Creser, finding that she had not risen, called her, and knocked at her bedroom door a great many times, but as she did not respond he entered the room, and found her lying dead on the bed. Mr. Wright, surgeon, afterwards made a *post-mortem* examination of the body, the appearances of which led him to the opinion that death had resulted from some irritant poison. It was stated that on Monday last the deceased went to the shop of Mr. W. B. Ferguson, chemist, Great George Street, and asked for something to destroy mice. Mr. Ferguson supplied her, at her own request, with a sixpenny packet of "vermin killer." In answer to questions she said her name was Eliza Elwiss, and that she was employed by a Mrs. Marshall, residing in Lyddon Terrace. On receiving the packet she signed for it in Mr. Ferguson's book. On Wednesday morning a portion of the powder was found on the dressing table in the girl's room, and there were also some potted meat sandwiches, upon which was spread a quantity of the vermin killer. A razor was likewise found in the room. The girl's mother, who resides at Hensall, near Snaith, said she could not account for her daughter's act. The deceased received a sunstroke about four years ago. The other day she received a letter from her daughter, who said she was very poorly, and she hoped she would soon be sleeping in Hensall Churchyard.

The jury returned a verdict of "Suicide whilst in a state of temporary insanity."—*Yorkshire Post.*

Poisoning by Morphia in a Hospital.

A death under very distressing circumstances took place last week in Westminster Hospital. A man named Ebden was an inmate in one of the wards, suffering from severe heart disease, but sufficiently well to be able to sit up in the ward during the latter part of the day. In the same ward was another man, who was receiving hypodermic injections of morphia, which appear to have been given by the nurse in charge. One day, when about to give the customary injection, she placed the bottle containing the morphia solution on the table in the middle of the ward by which the man Ebden was sitting. He then seized the bottle and drank off about a tablespoonful of the fluid. Every effort was made to remove the fluid from the stomach, and to counteract its poisonous effects, but they proved fruitless, and the man died from the effects of the morphia. Such an event is extremely distressing, more particularly as it tends to lessen the confidence of the public in hospitals. The coroner's jury returned a verdict of "Death by misadventure," but added a rider that in their opinion the nurse was to blame for leaving poisons within reach of patients able to leave their beds. Those familiar with the working of a hospital will hardly concur in this opinion, but they will rather ask how it is that the nurse was in possession of the bottle of morphia. The coroner's jury would have done better service if, instead of trying to affix blame upon a nurse who was not shown to have been careless, they had elicited whether it was the custom in the hospital for the administration of hypodermic injections of morphia to be relegated to nurses. We have no hesitation in saying that such a practice is to be deprecated in the strongest possible terms. It is no part of a nurse's duty to determine on the necessity for such an administration, still less on the amount required, and, least of all, is a nurse qualified to inject the fluid. Had the administration of hypodermic injections of morphia been kept in the hands of the resident staff we presume a bottle of a strong solution of morphia would not have been in the ward, and could not have been left on the table. The case clearly points to a danger connected with the other plan, and we hope it will prove a warning to the authorities of all hospitals, and that precautions will be taken to prevent the repetition of such an unfortunate accident.—*Lancet.*

Poisoning by Sulphuric Acid.

The Bolton coroner on Monday investigated a case of poisoning by sulphuric acid. A number of houses in Derby Street were being whitewashed, and the occupants meanwhile placed a quantity of loose articles in a back street to be out of the way. Amongst these was a bottle of vitriol. A child named Alice Makin, aged five, took this for "Spanish juice" and drank a teaspoonful. She immediately became ill, and with difficulty reached home after falling three times, and died in four hours. A verdict of "Death from misadventure" was returned.—*Manchester Evening News.*

Reviews.

The New Hand-Book of Dosimetric Therapeutics. By Dr. Ad. Burggraeve. Translated from the French and Edited by H. A. Allbutt, M.R.C.P., L.S.A. London: David Bogue.

This book is an exposition of the dosimetric system of therapeutics, which was instituted by Professor Burggraeve, of the University of Ghent. Why the name dosimetric should be given specially to this method of treatment has never been obvious, neither is it made more so by a perusal of this book. Dosimetry, we are told by the translator in a somewhat rambling preface, "looks upon the two rival systems of medicine, allopathy and homœopathy as being both equally at variance with truth. Allopathy weakens the patient's system by bleedings, purgings, sweatings and fasting. Its massive doses also thoroughly nauseate and disorder him. Homœopathy, as taught by its founder Hahnemann, is merely another kind of expectation, for its remedies consist of infinitesimal dilutions which have no materiality."

In theory no one will object to the main principles of the dosimetric system; in fact, they are so many truisms. Thus, Mr. Allbutt tells us that "the dosimetric method takes everything, however trifling, into consideration, such as the medical constitution, the individual constitution, the hereditary condition, the age and sex, and the mode of life; the treatment being modified according to the varying conditions of each case." Again Professor Burggraeve states that "dosimetric medicine is the art of appropriating remedies to the nature and progress of diseases, to their symptoms, and to individual idiosyncrasies." The translator, in his preface, makes a statement which is so remarkable that we quote it at length. "The great object in all treatment is that the medicaments should act by physiological catalysis, that is, they should excite certain movements of nutrition, etc., without themselves participating in those movements, either chemically or physically. Hence may be seen the danger of giving too large doses of any medicament, for if such is done the economy is disordered, irritated and depressed. Every medicinal agent, when administered according to the dosimetric method, has an elective action, that is, each goes naturally to its proper address, but not otherwise." We are not discussing or criticizing the book from a literary standpoint, so let pass with mere comment the verbal contradiction and misuse which characterizes the above paragraph. Catalysis has recently been the subject of special comment in this Journal and its worthlessness as an explanation pointed out; the subject need not, therefore, detain us here. The opinion expressed in the sentences above quoted indicates, at least, an absence of knowledge concerning the fundamental facts of physiology and pathology.

Turning now to the remedies employed by dosimetry. It is stated that "dosimetry prescribes powerful remedies in a pleasant form, accurate in composition, reliable in action, and which are measured to the urgency of the case." What system of medicine, properly so called, it may be asked, does not also aim at this? This is in reality not the question, the real point is whether the means employed by any given system are capable of effecting these obviously desirable ends. Dosimetry proposes that the use of drugs in the crude form, and this includes all galenical preparations, should be abandoned, and the active principles of these drugs only employed. The fact that in a great number of cases the same therapeutical effect is not obtained from a separate active principle as from the drug itself is a sufficient objection to this proposal. And further, in many cases the active principle has never been isolated. Are we on this account to abandon the use of a powerful remedy? The case of ergot is a notable example of this. Recent work has thrown much light upon the matter, but we are not yet in possession of the active constituent or constituents in a pure state. It is an interesting and significant fact that among the "powerful remedies, accurate in composition," employed by this system occurs "ergotine," which name has been used to designate at least two preparations of ergot, both of which may be regarded as little more than fluid extracts of the drug.

The pharmacy of dosimetry is barely touched upon. It is evident, however, that as all the proposed remedies are merely definite quantities of metallic salts, alkaloids, etc., made up into pilules with sugar, even if the system was generally adopted two or three manufacturers would suffice to supply the whole of this country or indeed of the civilized world. Thus the pharmacist, as we now know him, would, if he existed at all, be reduced to the position of a mere vendor of these pilules. The translator, however, thinks, or rather says, otherwise. "Chemists need not fear that the new pharmacy will work them harm, rather will it elevate them into scientists, making them not mere vendors of quack medicines, but skilled preparers of drugs, giving them a new position equal to that of their medical *confrères*." It is almost needless to say that there is not the slightest indication given as to how this wonderful transformation is to be effected. The only passage having the least bearing upon the question is the following one, which is of paramount interest as it admirably confirms and gives authority to what we have stated would be the inevitable effect that the adoption of the dosimetric system would have upon pharmacists. "Let me caution those physicians who adopt the dosimetric method, and who desire to obtain uniform results in the treatment of cases, to be on their guard against all coarse and cheap imitations of the Chanteaud granules. No granules are genuine or reliable but those which are manufactured by M. Charles Chanteaud, the eminent Parisian pharmacist. To these only has Dr. Burggraeve attached his signature as proof of their reliability."

The whole book is written in a style which will not recommend itself to English readers. In many parts one feels that it is more of a "talk" about the subject than an exposition in a serious and systematic manner.

Examination Questions on the Medical Sciences. Selected and Arranged by James Greig Leask, M.B. Abdn. London: Baillière, Tindall and Cox. 1882.

A question suggested not unnaturally by the title of this book is, Do examiners also cram? This fear, however, may be allayed by a perusal of the brief preface, in which it is stated that the author aims at providing, in a convenient form, such a concise collection of questions as will prove useful to the medical student. To attain this end "university calendars, army medical reports and medical periodicals have been consulted;" but with result before us we are constrained to ask, *Cui bono?* We confess we cannot find an answer, although it may be assumed that at least the author and publisher would be ready with one. Even if the careful consideration of examiners' questions were the most satisfactory method of studying a science, this book is not sufficiently complete to be of much value. It is true that examiners are credited with asking wide questions; but we do not think, for instance, a medical student would be safe in expecting that he would be more likely to be asked to describe the genus *Carex*, or the geographical distribution of the Magnoliaceæ, than for particulars about such orders as Euphorbiaceæ, Scrophulariaceæ, Solanaceæ, or Polygonaceæ. Yet the former questions are quoted, but we do not see anything more nearly representing the latter than the following rather elastic question, "Describe the natural orders of plants and their essential distinctive characters." At a first glance it seemed that an important subject of a medical student's examination was omitted, there being no special section devoted to materia medica. But some of the sections are very inclusive, as may be seen from the fact that a question as to the external characters by which the substitution of dulcamara leaves for belladonna leaves may be discovered is found under "Medical Chemistry." The book is neatly printed and bound.

Notes and Queries.

[733]. Coloured Carboys.—Could any reader give me information as to the origin of the custom of chemists placing carboys containing coloured liquids in their shop windows?

I have been unable to find any information on the subject in books.

John R. Hill.

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[734]. Decoct. Sarsæ Co. Conc. c. Quiniæ.—"Lex" would be obliged for formula for a miscible compound of dec. sarsæ co. conc. and quinine.

[735]. TINCT. OF EUONYMIN. — Could any reader oblige me with a reliable formula for tinct. euonymin, which I have frequently had occasion to make?

THETA.

[736]. TINCT. DATURÆ TATULÆ.—Can anyone give me a form for tinct. daturæ tatulæ in next impression of *Pharmaceutical Journal*?

INQUIRER.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE FUTURE OF PHARMACY.

Sir,—I was very much pleased to see a letter from Mr. Hart appearing in the issue of the 15th inst., as I think it points to a very serious drawback to our trade; viz., the grasping propensities and love of filthy lucre which lead men in the trade to supply hucksters and other general dealers with drugs and pharmaceutical preparations, to the detriment of their more consistent brethren. When I was an assistant, in one situation which I filled the master himself used to go out soliciting orders from hucksters for drugs, pills, etc., and would not scruple to supply them even with laudanum, if he thought they would be sure to pay him for it; and yet I see his name appearing as a member of the Chemists' Defence Association. Since I have been in business, I have experienced much competition from hucksters in the retail drug line, aided and abetted by such as I have referred to. Only yesterday, a girl came into my shop, with a packet of rhubarb in her hand, for a pennyworth of white precipitate, because she could not get that where she was in the habit of buying the rhubarb and other drugs. There, I think the huckster had the best of it, as the law will not allow him to sell dangerous preparations; that unenviable business is reserved for the pharmacist. If, as Mr. Hart says, every member of the trade would be true to the interests of the trade, it would be much better for all of us. What with competition from hucksters, general supply stores, etc., and low prices by members of our own craft, our trade is not up to much. The would-be pharmacist of the future will probably, before he goes through a compulsory curriculum, come to the conclusion that the "game is not worth the candle." A great deal of this competition from outsiders is encouraged and supported by men like my example, who will do anything for the sake of gain, and yet belong to an association for defending the interests of pharmacists. But perhaps that is their peculiar way of defending and promoting the interests of their brethren. In regard to patents, I find that by breaking the government stamp, we can then retail the medicine out in any quantities. I question whether it would not pay to buy the largest size of the most extensively used patents and then retail the remedy out in any quantity the customers desired. This would save many the nuisance of being obliged to part with 9½*d*. every time they want a dose of So-and-so's pills, powders, cough stuff or lozenges, and although the turnover would be small, it would no doubt take much of the trade from tailors, hucksters, stores, etc., and put a little more in our own pockets. Many of the outsiders would not care to spend the time in measuring and labelling medicines, the druggist would be on more level terms with them then, besides the advantage of always recommending our own remedies in preference. Now that a fair profit is so seldom obtainable on what was once the paying part of a chemist's business it is time to do something. It is the outsiders dealing in such large quantities and having such enormous turnovers, that has beaten the ordinary chemist; but when it comes to small quantities, then we are more in our element.

I hope my letter may draw forth some opinions on the subject that will lead to practical good.

PILL MAKER.

FRESH BAEL FRUIT (ÆGLE MARMELOS).

Sir,—A quarter of a century since I used to procure for a customer of mine, residing at Boulogne-sur-Mer, a not inconsiderable quantity of the "Confection of Bael," which was supplied under the more homely name of "Bael Preserve or Jelly." I invariably procured it from Mr. Pound, who then occupied the old established pharmacy in Oxford Street, at the corner of Orchard Street, as I understood it was a specialty of that house. If anyone will take the trouble to refer to vol. x. of the *Pharmaceutical Journal*, for 1850, he will find on page 165 an interesting account and an illustration of the bael plant. I do not recollect whether Mr. Pound's preparation was made from the ripe fruit or from the unripe fruit or half-ripe fruit, or whether it was made in London or at Malabar, but anyone reading the paper will see that certainly it gives Mr. Pound the credit of first importing the fruit, and looking again over the paper I find that the "preserve" appears to have been made from the fruit in various conditions.

Pharmaceutical history, like other histories, "repeats itself," and different people are frequently making the same discoveries. I might mention the instances of phosphorized cod liver oil and the tincture of quinine made with the hydrochlorate instead of the sulphate of quinia.

It would be hypercritical as well as irreverent to class the discovery of the so-called new remedies with the finding of a "mare's nest." *Per contra*, is it not somewhat euphemistic to attach any great amount of novelty to them?

13, *Baker Street. W.* JOHN TAYLOR.

Theta.—The deposit should be examined; probably it is thrown down from the infusion of cinchona by the potassium iodide.

N. J. Lewis.—You are recommended to communicate with the Registrar upon the subject.

J. Miller.—*Sedum reflexum.*

D. S. Barbet.—Acetate of morphia is not a stable salt, being completely soluble in water only when freshly prepared. If kept there is a gradual elimination of acetic acid, with the formation of a basic compound. See a paper by Merck in *Pharm. Journ.*, [3], vii., 229.

J. T. Lloyd.—We are much obliged to you for taking the trouble to translate the report. See, however, p. 78 in the number for last week.

W. Ashton.—Your letter has been forwarded to Mr. Will.

M.P.S.—*Liquid Dentifrice.*—The following recipe has already been quoted from an American source :—Soap bark, 4 ounces; glycerine, 3 ounces; diluted alcohol, sufficient to make 2 pints; oil of gaultheria and oil of peppermint, of each 20 drops. Macerate the soap bark in the mixture of glycerine and alcohol for three or four days, and filter through a little magnesia previously saturated with the essential oils. See also p. 89 of the present number.

Toxicologist.—Taylor, "On Poisons" (Churchill).

T. D. Sneath.—Carbolic acid is soluble in 15 parts of water. We cannot assist with information as to the composition of the proprietary preparations mentioned.

T. O. Sandell.—For an account of salep, see 'Pharmacographia.' "*Salib misri*" is a kind of salep met with in the Indian bazaars, derived from species of *Eulophia.* Possibly a supply could be obtained through Messrs. Christy, Fenchurch Street.

W. Miller.—*Filago germanica.*

John Brown.—The specimens are apparently both referable to the same species, *Chiococca racemosa.*

J. Hutchinson.—*Impatiens parviflora.*

A. P. S.—Pereira's 'Materia Medica.'

Beautifier.—We do not think it desirable to publish your letter, but would suggest that if you are acquainted with any person in the business you might bring your views under his notice.

Anthony.—All communications respecting advertisements should be addressed to Messrs. J. and A. Churchill, 11, New Burlington Street, W.

X. Y. Z. is referred to the rule respecting anonymous communications.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Mee, Lewis, Hart, C. E. L., C. S., S. L.

THE INTERNATIONAL ELECTRIC EXHIBITION.

(*Continued from page* 42.)

Mr. Edison appears to have first begun his experiments in incandescent lighting in the summer of 1878. His earliest efforts were made in the direction of utilizing incandescent platinum wire as a source of light. "He adopted for a lamp a coil of platinum wire, and endeavoured to perfect a regulator of the current which would allow the coil to become luminous without becoming so hot as to melt." The length of platinum wire used in this coil amounted to as much as 17 feet. Great difficulties were met with, owing to the constant tendency to the formation of electric arcs between adjacent portions of the convolutions of the wire, and every time an arc formed the wire disappeared in a shower of sparks. Attempts were therefore made to insulate the wire with some substance that would become luminous when the current was passing. Numerous experiments were also made with wires of other metals, including iridium, and various minerals, but all apparently without the conductor being enclosed in a vacuum. As might have been anticipated, a saving of the electric energy was found to result, depending on the ascertained fact, that radiation of heat is less across a vacuum than through air. In spite, however, of all precautions and devices, these experiments were a non-success, and after more than a year's laborious and costly experimenting the persevering investigator was unwillingly obliged to admit that he was entirely on a wrong track. The ultimate failure in this direction had been predicted from the outset by electrical experts in this country and in America. To attain economical results an incandescent conductor must have an exceedingly small section and be capable of sustaining an extremely high temperature without volatilizing or fusing, and in this latter respect all known metallic conductors fall far short of the mark. In point of fact, as far as is known at present, some form of amorphous carbon is the only substance that realizes the necessary conditions.

A comparatively small circumstance drew Edison's attention to the possibility of forming a carbon wire or filament. Having occasion to make some carbon buttons for the form of telephone invented by him, he was using a mixture of tar and lampblack for this purpose, when he noticed the facility with which the mixture could be drawn out into strings; this led to experiments which showed that it was possible to form a "carbon wire" from a mixture of this kind. After several weeks' experimenting Edison found that a wire or filament thus formed was capable of lasting for a short time in a vacuum. The key note of ultimate success had been struck and it appeared evident that what was mostly required was increased durability. Attempts were next made to use coils formed from carbonized cotton, thread, twine, etc. The texture of these materials as prepared by Edison was found to be much too loose and tender. Much more satisfactory results were found to accrue from the use of strips of carbonized paper. This material was cut into thin horseshoe shapes, carbonized, and the carbonized slips mounted in glass globes that were afterwards exhausted of air by the Crookes-Sprengel pump. The carbon horseshoes were connected by platinum wire connections with the electrical source. These lamps were found to require about one-eighth of a horse-power each when producing a light of sixteen candles or a little more. In order to see if any injurious effect resulted to the carbon filament by suddenly turning the current on and off, one of Edison's workmen was deputed to turn the current on and off to one lamp. After doing this no less than five thousand times, the lamp was found to have withstood this test without the slightest injury. The durability of the lamp appeared thus certain. A number of lamps thus constructed (something more than forty-five) were apparently found to last when lighted every night nearly a fortnight without showing any signs of breaking down. Patents were taken out for this incandescent paper horseshoe lamp in several countries. Eventually Mr. Edison relinquished the use of paper for the incandescent bridge and settled on the use of carbonized bamboo as the most advantageous incandescing substance.

Students wishing to pursue the manufacture of the Edison lamp further will find a completely illustrated article in *The Electrician* (vol. viii., p. 338); the woodcuts accompanying that article show the original bamboo and all the successive stages of the fabrication of the carbon bridge, also the successive steps by which the enclosing glass globe is prepared for the reception of the carbon bridge. For the purposes of this article it will suffice to give the description by the Incandescent Lamp Committee of the Paris Electrical Exhibition. The jurors' report commences by stating that the lamps in the exhibition, purely incandescent in character, were those of Edison and Maxim in the United States section, and those of Swan and Lane-Fox in that of Great Britain.

"They all consist of a glass envelope more or less spherical in form, in which is enclosed a carbon loop, made of carbonized organic material, and supported upon wires of platinum sealed into the glass. The space in the interior of the lamp is very perfectly exhausted.

"The Edison lamp is pear-shaped in form. The carbon filament is long and fine, and is bent into the shape of a U. It is made from Japanese bamboo, cut to the requisite size in a gauge. In section it is nearly square, being about 0·3 millimetre on a side, the ends being left considerably wider. The fibre is carbonized in moulds of nickel, and is attached to the conducting wires by copper electrolytically deposited upon them."

The committee found the resistance of Edison's lamp, cold, to range from 233 ohms to 268. Ten different lamps were taken, the mean resistance of the ten being 241 ohms. The resistance of the lamps when hot and giving a light of sixteen candles was found to be 137·4 ohms (mean); when giving thirty-two candles, 130·03 ohms. The resistance of carbon decreases with rise of temperature, carbon not following the same law as metals. Hence this decrease of resistance when heated is common to all incandescent carbon lamps.

From the committee's report it would appear that Edison's incandescent lamp is more economical than its rivals, both in point of electrical energy and in candles yielded per horse-power. This economy holds good both when yielding sixteen and thirty-two candles luminous intensity. A current of 0·651 ampères, with an electromotive force of 89·11 volts, was found to be passing when yielding a light of sixteen candles; these numbers representing 196·4 candles per horse-power of energy, or 12·28 lamps of sixteen candles per horse-power. At thirty-two candles a current of 0·7585 ampères and an electromotive force of 98·39 volts was recorded, giving three hundred and seven candles per horse-power or 9·6 thirty-two candle lamps for each horse-power expended.

The Edison exhibit at the Crystal Palace was one of the great sights of the show, the salient feature being an immense pyramidal electrolier of hammered brass, 15 feet high, representing a basket of flowers. This costly piece of work was designed and executed by Messrs. Verity and Sons, of Covent Garden. The electrolier contained some three hundred and fifty represented flowers, ninety-nine of which carried incandescent lamps on three circuits, either of which could be turned off or on without disturbing the rest. This magnificent example of the art of the brass-smith was greatly admired by the crowds of visitors to the exhibition, and was commented on in glowing terms in the columns of the daily press.

The next incandescent lamp to be referred to is the invention of an Englishman and a pharmacist, Mr. J. W. Swan, of Newcastle-upon-Tyne. Though Mr. Swan's patent for an incandescent lamp using a carbon filament in a vacuum is scarcely two years old, it appears that he nearly anticipated the present lamp some twenty years ago. The story had better be given in his own words. It forms the important exception alluded to on p. 42:—

"As a matter of history, I will briefly describe an experiment which I tried about twenty years ago.

"I had a number of pieces of paper and card of various forms and sizes buried in charcoal in a crucible. This crucible I sent to be heated white hot in one of the pottery kilns belonging to Mr. Wallace, of Forth Banks. From the pieces of carbonized card which I thus obtained I selected a long spiral; the ends of this I clipped between small blocks of carbon carried by uprights and connected with conducting wires. A small glass shade was cemented over this mounted carbon spiral, and the air was exhausted by means of a very good air-pump, lent to me for the purpose of this experiment by the Rev. Robert Green, of Longhorsley. A good vacuum (according to the ideas that then prevailed) having been produced, I applied the wires of my battery (consisting of ten cells of Callan's modification of Grove's battery) with great expectation of a brilliant result; instead of this, there was the most absolute negative presented to me, not a vestige of heat or light appeared in my long ringlet of carbonized paper. It was evident, and I immediately recognized the fact, that an electric current of the strength I was using would not go in sufficient quantity through so long a piece of carbon as I had taken. I therefore repeated the experiment with shorter carbon and a greater number of cells, and I obtained, under these altered circumstances, an extremely interesting result.

"My carbon was in the form of an arch, about 1 inch high and ¼ of an inch wide. The ends of the arch were held in small clamps with small blocks of carbon.

"The air-pump having been worked, I had the pleasure of seeing that when contact with the battery of forty or fifty cells was completed my carbonized paper arch became red hot, and it was evident that nothing more was wanted than a still stronger current to make it give out a brilliant light; but I had used up all the battery power at my disposal, and having reached this limit, I contented myself with watching the behaviour of the arch, the engrossing question being, How long will it endure?

"I noticed that the inner part of the arch was hotter than the outer part, and that, perhaps in consequence of this, the arch became bent on one side. This bending gradually increased, until at last the arch had so far curled down that the top was on a level with the clamps, and on coming into contact with the sole of the lamp it broke in two, and the experiment collapsed.

"That, I confidently believe, was the very first instance in which carbonized paper was ever used in the construction of an incandescent electric lamp."

Mr. Swan's experiments had been mentioned by Mr. Barnard Proctor nine months previously, in a letter to this Journal, which will be found in vol. x., page 600. It will be seen, therefore, from these statements that Mr. Swan must be accredited with a large share of priority in this important matter. The Paris committee thus describe the present form of the lamp:—"The Swan lamp is globular in form, the neck being quite long. The carbon filament is made from cotton thread, parchmentized before carbonization by treatment with strong sulphuric acid. The ends of this filament are very much thickened, and the loop has a double turn at the top. Its ends are clamped in a pair of metal holders, supported laterally by a stem of glass, which rises through the neck to the base of the globe. Below, these holders are fastened to wires of platinum, which pass through the glass." It may be added that Mr. Swan has patented a method of depositing carbon from hydrocarbon vapour on the junction of the metal holder and the filament. The parts of the bridge or filament on which the deposit is not to take place are electrotyped with copper. The resistance of the lamp (cold) was found by the committee to range from 74 to 39 ohms, the mean of ten lamps being 59 ohms. The hot resistance at sixteen candles was 32·78 ohms mean; at thirty-two candles, 31·75 ohms mean. The current required per lamp at sixteen candles was 1·471 ampères; at thirty-two candles, 1·758 ampères; the electromotive force in the first case was 47·3 volts, in the latter, 54·21 volts. These figures give 10·71 sixteen candle lamps, and 7·9 thirty-two candle lamps per horse-power, or 177·92 candles in the first case, and 252·4 candles per horse-power in the latter. The Swan lamp has found great favour wherever seen; the light is extremely mellow and pleasant to the eye and the lamp is now produced comparatively cheaply. Swan lamps have been introduced into the saloons of a number of ocean-going steamships, where they have very successfully replaced the paraffin lamps previously used.

Perhaps the most important and useful application that has ever been made of any incandescent lamp is the installation of Swan lamps in the Risca Colliery, a fiery mine in the South Wales district. The seam of coal worked at this colliery has an exceedingly evil reputation as regards the danger involved in getting it. It is hoped that the strongly protected Swan lamps, and the thoughtful and ingenious manner in which the necessary contacts and conductors have been arranged, will go a long way towards the prevention of the dangerous explosions that have occurred at this colliery. The experiment is one which will be watched with great interest by scientific men and by all who are interested in protecting the lives of our colliers,—and who is not?—while they are following their perilous labours in the depths of the earth.

The Swan lamp was well represented at the Crystal Palace, but no attempt was made by the Swan Company to imitate the grand surroundings of other exhibitors.

(*To be continued.*)

SOLUBLE SALTS OF CAFFEINE.*

BY C. TANRET.

Hitherto, in consequence of its slight solubility, caffeine has been administered hypodermically only in very small doses; in fact, at the ordinary temperature, it requires 93 parts of water to dissolve it, so that a cubic centimetre would contain scarcely more than a centigram. Most of the salts of caffeine mentioned in therapeutical works do not exist, and those that do cannot be employed, because upon being dissolved they are decomposed into acid and caffeine, the latter being precipitated if the water is not in the proportion required for the solution of the free alkaloid.

The alkaloidal properties of caffeine are extremely weak; it is perfectly neutral in its behaviour towards litmus, while the ordinary reagents for alkaloids do not precipitate it unless its solutions are relatively very strong. Not being alkaline, caffeine is incapable of saturating the smallest quantity of acid, and although it forms salts with certain acids these salts are far from being as stable as those of most of the other alkaloids, as will be seen upon considering its behaviour with the acids most frequently employed.

Acetic acid dissolves caffeine freely. If this solution be allowed to evaporate spontaneously the acid volatilizes entirely and there remains, not a salt of caffeine, but pure caffeine. An acetate of caffeine, therefore, does not exist.

Neither does valerianic acid form with it a valerianate of caffeine. If caffeine be saturated hot with a very strong solution of this acid, upon cooling it will deposit, not valerianate of caffeine, but simply caffeine, entirely soluble in chloroform and only retaining mechanically traces of the acid, sufficient to impart the odour. The acid titrate of the solution remains the same as before the addition of the caffeine, which proves clearly that the caffeine has not carried down with it a sensible quantity of the acid in its precipitation. Also when caffeine and valerianic acid are placed together under a bell glass, as in the preparation of valerianate of ammonia, the caffeine only becomes impregnated with the odour of the acid. I have verified this fact upon commercial "valerianate of caffeine" occurring in fine crystalline needles resembling those of caffeine, a character that was very natural, since it was only caffeine with a valerianic odour. Exposure to the air and simply washing removed this odour.

Lactic acid does not combine with caffeine to form a lactate. Syrupy lactic acid, saturated in the cold with caffeine, remains syrupy indefinitely; and as in the case of valerianic acid, pure caffeine crystallizes out upon the cooling of a lactic acid solution that has been saturated while hot.

It is the same with citric acid, which does not give a citrate. The product which is decorated with this name is only a mixture of caffeine and acid.

Another circumstance, goes to prove further the non-existence of these pretended salts of caffeine and organic acids. Whilst, for example, citric acid, which is tribasic, requires for the formation of citrates three equivalents of base, one or two of which can be replaced by one or two equivalents of water, there is required to effect the solution of one equivalent of caffeine in water a quantity of acid represented in weight by about three equivalents of acid. The relations are, therefore, precisely the inverse of those which should obtain in the formation of a citrate. To sum up, organic acids do not form definite salts with caffeine. They augment, it is true, its solubility in water, but without combining with it, and since the acidity of the acids is in no way modified by caffeine, it will be evident that with solutions of caffeine in organic acids there would be injected a quantity of free acid several times the weight of the dissolved caffeine.

With mineral acids the conditions are different. Sulphuric acid forms with caffeine a sulphate that crystallizes with difficulty. Hydrochloric and hydrobromic acids on the contrary form salts that are easily obtainable in very fine crystals. These salts are perfectly definite and have been described; but they are not stable, and water decomposes them into free acid and caffeine, which precipitates or not according to the quantity of water employed. They are also altered by the air, and the crystals of the hydrochlorate when exposed effloresce rapidly, losing their acid. After a time, more or less long, according to the temperature, nothing remains but caffeine. Therefore, from this point of view, the salts of caffeine formed with mineral acids do not present any advantage over pure caffeine.

In presence of these negative results, I had the idea of employing the natural salt which holds the caffeine in combination in coffee, the chlorogenate of potash and caffeine of Payen. But that salt is very difficult to obtain in any considerable quantity, and this presents an obstacle to its employment in the ordinary way, besides which when in solution the salt is very alterable in the air. Moreover it contains only 29 per cent. of caffeine, and in the cold requires to dissolve it several times its weight of water, which gives solutions still less charged with caffeine.

It occurred to me then, in view of the apparent similarity that exists between chlorogenic or caffetannic acid and benzoic, cinnamic and salicylic acids, that double salts analogous to Payen's salt could be formed with the three last-named acids, and my conjecture proved correct.

In presence of benzoate, cinnamate or salicylate of soda caffeine dissolves in a very small quantity of water and forms thus very soluble double salts that are very rich in quinine. That there is in this case more than a simple solution is proved by the fact that for a definite weight of caffeine there is required a definite weight of the alkaline salt; in other words, combination takes place according to the equivalents of these various bodies. But this combination is rather weak, since if the salts be treated with chloroform they give up to it all their caffeine. In my opinion these double salts may be best compared with hydrated salts, which lose their water of crystallization when treated with a neutral liquid in which water is soluble. In this way blue sulphate of copper loses its water of crystallization and becomes white when immersed in absolute alcohol.

Cinnamate of soda dissolves caffeine in water equivalent for equivalent, 170 parts of cinnamate for 244 of caffeine. The double salt thus obtained contains 58·9 per cent. of caffeine.

Benzoate of soda and caffeine contains for two equivalents of benzoate of soda (288), one equivalent of caffeine (244), or 48·5 per cent. of caffeine.

The double salt richest in caffeine can be obtained with salicylic acid. An equivalent of salicylate of soda (160) allows of the solution of an equivalent of caffeine (244), which gives 61 per cent. of caffeine in this double salt.

The solubility of these double salts is such that solutions can be easily obtained with the benzoate and cinnamate of soda containing 20 centigrams per cubic centimetre, and with salicylate of soda as much as 30 centigrams.

Benzoic, cinnamic and salicylic acids having supplied me with what I was in search of, I have not thought it necessary to ascertain to what extent analogous results might be obtained by employing these acids in combination with other bases than soda. I may mention, however, that I have been able to obtain double salts with acetic, lactic, citric, sulphuric and hydrochloric acids.

With these new salts, therefore, it will be possible in future to administer caffeine hypodermically. It is true that the alkaline salts associated with it have their own peculiar action; but this action is known, and consequently it will, according to the case and the dose, sometimes be ignored and sometimes taken account of; that will be a matter of therapeutics.

* *Journal de Pharmacie,* [5], v., 591.

In conclusion, these salts may always be prepared extemporaneously by simple solution in water in the proportions given above. But since the commercial benzoate of soda has sometimes an alkaline reaction, it will be as well, in preparing hypodermic injections, to first neutralize the soda salts with the corresponding acids.

EFFECT OF VARIOUS ANTISEPTICS UPON MORBIFIC GERMS.*

Actual experiment with morbific germs is the only way of acquiring definite knowledge on the value of disinfectants. Moreover, there is reason to believe that there are vast differences in the power of resistance possessed by germs of different kinds, so that it cannot be assumed that the results obtained with one are true of another. More facts are still needed, and we note therefore, with interest, a series of experiments which have been made at Lyons by Arloing, Cornevin and Thomas, on the influence of various disinfecting agents on the virus of symptomatic anthrax. The results have been published in the *Lyons Médicale.* If pulp from the tumours in this disease is allowed to dry slowly at a temperature of 35° C., a residue is obtained in which the organisms of anthrax retain their full activity. A few cubic centimetres of water, through which a little of the residue is diffused, has a virulence not inferior to that possessed by the fresh virus, and which continues for at least two years. The experiments on the influence of disinfectants were carried out with this dried virus, and also with perfectly fresh virus. It was found that the resisting power of the former is much greater than is that of the latter. Whatever destroys the dried is capable of destroying also the fresh virus, while the converse is not true. The different substances tested were left in contact with the virus for forty-eight hours, and the test of virulence was the hypodermic injection of five drops. The following substances were found to have no action even upon the fresh virus: alcohol saturated with camphor or with carbolic acid, glycerine, ammonia, acetate and sulphate of ammonia and sulphate of ammonium, benzine, a saturated solution of chloride of sodium, quicklime and lime water, polysulphide of calcium, a one-in-five solution of chloride of manganese, a one-in-five solution of sulphate of iron, a one-in-five solution of borate of soda, a one-in-five solution of tannic acid, a one-in-ten solution of sulphate of quinine, a one-half solution of hyposulphite of soda, essence of turpentine, and monobromide of camphor; of gases, ammonia, sulphurous acid, and chloroform. A saturated solution of oxalic acid, a one-in-twenty solution of permanganate of potash, a one-in-five solution of soda, vapour of chlorine, and of sulphide of carbon destroyed the activity of the fresh virus, but had no effect on that which had been dried, while the activity of the latter was destroyed only by solutions of carbolic acid (2 per cent.), salicylic acid (1 in 1000), nitrate of silver (1 in 1000), sulphate of copper (1 in 5), boric acid (1 in 5), saturated salicylic alcohol, corrosive sublimate (1 in 5000), and bromine vapour.

Thus many substances unanimously regarded as antiseptics were without effect upon the virus, even in the fresh state. Pure or camphorated alcohol is largely used by surgeons in France to wash their instruments, but is evidently capable of giving only an illusory safety against morbid germs. Quicklime, in which it is often recommended that the bodies of animals dying of anthrax should be buried, and with which the walls of infected places are washed, is no better. At the moment of its hydration some organisms are probably destroyed by the heat which is disengaged, but those which are not in immediate contact with the lime seem to have preserved all their activity. Very thin layers of the tissue of the tumours of anthrax were taken and rolled up and plunged into the quicklime, and left in it for forty-eight hours. At the end of that time they were rubbed up with water, and the liquid was found to possess full virulence. The inutility of tannic acid suggests the question whether tanning is really adequate to destroy the poison in the hides of the affected animals, and it is clear that salting has no influence on the virus contained in the flesh, etc. Quinine, so powerful in the paludal diseases, which are now believed to be due to organisms, was found to have no influence over the bacteria of anthrax. Ammonia and its compounds were also powerless. Ammoniacal fermentation, therefore, which is said to destroy some bacteria, does not influence those of anthrax. Sulphate of iron and chloride of manganese, substances which have been strongly recommended as disinfectants, were equally powerless. Further, the sulphurous acid, which is so potent in action upon some parasites of high organization, and on many forms of virus, has no influence on the bacteria of symptomatic anthrax. Chlorine and sulphide of carbon, which destroy the fresh virus, are powerless against that which has been dried. Of all the vapours bromine is the only one which seems to offer complete security. Another important result, from a surgical point of view, is the action of carbolic acid. A 2 per cent. aqueous solution destroys the activity of the dry virus, but all the power is lost if the carbolic acid is mixed with alcohol. This fact has already been noted by Koch with regard to other kinds of spores. On the other hand, salicylic acid mixed with alcohol preserves its power. Turpentine, recommended by Pasteur, for the purpose of destroying the bacillus of true anthrax, has no influence on that of symptomatic anthrax. At the head of the efficient agents stands corrosive sublimate, of which a solution of 1 in 5000 is sufficient; next come in order nitrate of silver, salicylic acid, and carbolic acid. A 2 per cent. solution of the latter was found, however, only to destroy the organisms when it had been in contact with them for eight hours in the case of the fresh virus, and for twenty hours in the case of that which had been dried.

The practical deductions from these experiments are obvious, and are of the highest importance. So far as their use against symptomatic anthrax is concerned, the choice of agents to destroy the fresh virus in stables, etc., is a wide one. That for the dried virus, however, is more limited; only the bromine vapour can be regarded as affording complete security. For washing down places the most efficient agent, corrosive sublimate, is rather dangerous. Solutions of sulphate of copper, carbolic acid (2 per cent.), or salicylic acid (0·1 per cent.) are recommended. For the effectual disinfection of carcases, however, no agent should be trusted but combustion; but if this is impossible it should be cut deeply and treated with corrosive sublimate, sulphate of copper, or carbolic acid.

Practitioners of veterinary medicine have the great advantage of being able to bring these questions to the test of experiment much more perfectly than is possible with regard to many of the diseases of man. It would be extremely important, for instance, to have a similar series of experiments as to the influence of the various disinfectants on the virus of scarlet fever and other maladies which are not transmissible to the lower animals. Too little regard has certainly been paid to the differences possessed by different germs in their capacity of resistance, and the results obtained in the case of one have been applied too freely to all.

* From the *Lancet.*

OCCURRENCE OF BASSORA GUM IN CYCADEÆ.*

BY C. R. BLACKETT.

Baron von Müeller, the Government botanist, in the course of his scientific researches upon some hitherto undefined species of cycadaceous plants, being anxious

* From the Australian Supplement to the *Chemist and Druggist*, May, 1882.

to examine the gum exuded by *Macrozamia Fraseri*, collected by Mr. John Forrest, the Australian explorer, and *Macrozamia Miguelli*, procured by the Rev. Dr. Wools, requested me to make an examination as to the character of this gum.

It would seem that hitherto it has not been recorded that a kind of gum is exuded by cycadaceous plants, although the abundance of a peculiar starch in the stems of the Australian Macrozamias has been noticed in various publications, and also in the pages of the *Chemist and Druggist* by Baron von Müeller. This gum is similar to Bassora and cherry gum, is secreted both from the stem and fruit-cones of the Macrozamias; in general appearance it is not unlike gum acaciæ, it is very tough and of a brownish colour. In the experiments upon these gums from *M. Fraseri* and *M. Miguelli*, it was found that they were with difficulty fractured, and swell up and soften on being macerated in cold water, becoming transparent gelatinous masses, and not rapidly dissolving; by long-continued digestion in boiling water, the less soluble matter is gradually brought into solution; the clear solution dried at 100° C. forms a clear and hard gum, adhesive to the touch of the slightly moistened finger. The addition of potassic hydrate renders the gum readily soluble, but darkens the colour considerably. In water, acidulated with H_2SO_4 it is soon dissolved, and a flocculent precipitate is formed, and after boiling for a short time the presence of sugar was detected on the addition of Fehling's copper test; absolute alcohol produced only a slight turbidity in the watery solution. The latter will keep undecomposed for several days, and dries up very slowly; therefore, this gum, even if more adhesive, could not be used as a substitute for gum arabic. Ferric chloride produces no action upon the solution whatever. The ash yielded was found to be equal to 1·75 per cent., and composed of lime, iron, sodium, potassium, carbonic acid, sulphuric acid and chlorine.

This gum is therefore analogous to Bassora gum, or tragacanth, and similar gummous exudations of plants; whether it can be used instead of gum tragacanth has yet to be tried. This gum was not found to possess any of the deleterious acridity which pervades the sap of the cycads generally, and which renders their fruit, in a raw state, poisonous. Since writing the above, I find that Dr. Pereira, in his 'Materia Medica,' p. 288, vol. iii., under Cycas, says—"A clear mucilage, which converts into a gum-like tragacanth, exudes from fresh wounded plants of several species of cycas."

Gum of Bassora, which appears to be the produce of a cactus, is white and honey-coloured, mealy, and silvery on its surface, and in the form of somewhat flattened and elongated masses. It is insipid, and crackles between the teeth. In water it swells up to a transparent jelly, but only a small portion dissolves. The soluble portion contains arabin, amounting to about 1 per cent. of the gum; the insoluble portion contains bassorin. It dissolves with the aid of heat in potash and weak acid.—'Watts's Dictionary,' p. 955.

Baron von Müeller informs me that he has "just obtained a specimen of gum from *Brachychiton ramiflorum*, which behaves like the bassorin gum of the Cycadeæ." He also says:—"In my travels I have noticed gummous exudations from all the brachychitons and sterculias in Australia, including the famous 'bottle-trees,' and I have no doubt that the gum of the various sterculia trees of the tropics of Asia, Africa and America consists of bassorin, one species from Western Africa being described by Professor Lindley as *Sterculia tragacantha*, on account of the tragacanth-like gum exuding from its stem and branches. Whether by chemical action this bassorin gum can be turned to important practical uses has yet to be seen."

THE PURIFICATION OF COMMERCIAL ALCOHOL.*

BY A. RICHE.

It is known that in fermentation sugar does not split up exclusively into alcohol and carbonic anhydride, according to the equation of Gay-Lussac, and Pasteur has shown that glycerine and succinic acid are constantly formed during the alcoholic fermentation. Many others besides these four products make their appearance at the same time, several of which are not yet defined, but mention may be made of most of the alcohols and acids of the fatty series; the aldehydes, their isomers and various derivatives; and isopropylic acid.

Alcohol is now manufactured from the most varied materials: fresh and dried grapes; beetroot and beetroot molasses; various grains, such as barley, rye, maize and rice; saccharine fruits, as figs, dates, plums, and mulberries; and several starches. Some of the bodies contaminating commercial alcohol are derived from the material used as the source of the alcohol, and are only met with if the alcohol is derived from a particular material.

The temperature to which the fermented liquor is subjected in the distillatory columns also determines the formation of contaminating products, and notably of substances possessing a disagreeable odour and taste; so that the number of compounds affecting the purity of alcohol is very large and very diverse in nature. In weight they only represent a very small portion of the alcohol, but this quantity is nevertheless sufficient not only to give the alcohol a special flavour, but also to render it more injurious for consumption than pure vinic alcohol.

It is therefore very important to free the alcohol from these impurities. At first it was hoped that this could be done by several rectifications, and M. Pierre effected it by frequently repeated operations conducted at the lowest possible temperature. But on a manufacturing scale this is impracticable, because the distillatory columns are heated strongly and for a long time, so as not to leave any alcohol in the residues: at most one third of the product would be alcohol of good flavour, and that would be still far from pure.

At the commencement of the distillation the first runnings consist of alcohol having a bad flavour (*mauvais goût du tête*), due especially to aldehydes and alcohols; then the runnings become less impure (*moyen goût de tête*). Alcohol of good flavour is collected towards the middle of the operation, and the remainder constitutes the last runnings (*moyen goût de queue* and *mauvais goût de queue*), which contain the higher alcohols and empyreumatic oils.

Attempts have been made to purify the alcohol by means of wood and animal charcoal, but with very imperfect results. Oxidation both by treatment with various oxidizing bodies, and by the action of a current of air has also been tried, but with indifferent success, in consequence of the loss of alcohol. Considering the fact that the most active and odorous of the contaminating compounds are aldehydes,—vinic, butylic, amylic, etc.,—M. Naudin conceived the idea of getting rid of them by a process of hydrogenation, and this he has carried out practically by means of the copper-zinc couple.

If a plate of zinc be immersed in a solution of a salt of copper it becomes covered with a metallic deposit, and eventually constitutes a true copper-zinc couple, in which the copper exists in a finely divided state. Thus prepared the couple is capable of decomposing pure water, with evolution of hydrogen and formation of hydrate of zinc. It can consequently act freely in neutral liquids and constitutes a powerful agent of hydrogenation. If an alcoholic distillate indicating 40 to 65 alcohometric degrees be brought into contact with such a couple in action it is found that the hydrogen evolved is absorbed

* Abstract of a paper in the *Journal de Pharmacie*, [5], v., 480.

and that the odour and taste of the distillate disappear rather rapidly. The distillates of maize and beet molasses thus hydrogenated, when rectified in the ordinary apparatus, show an augmentation of 25 to 30 per cent. of good flavoured alcohol over the old yields.

In the apparatus of M. Naudin zinc cuttings are placed in successive beds of 15 to 20 centimetres in thickness, supported on wooden diaphragms pierced with holes in a vat made of wood, copper, or iron. At the commencement of the operation a sufficient quantity of 5 per cent. solution of sulphate of copper is run into the vat. The decoloration of the cupric solution marks the completion of the precipitation of the copper in a pulverulent state upon the zinc cuttings, and the couple is then ready for work. The resulting solution of sulphate of zinc is run off, and the vat is filled with the distillate to be purified.

By a special arrangement, the alcohol is kept circulating in the vat, but the time required for it to remain in contact with the couple is not always the same. This necessarily depends upon the degree of contamination in the product to be purified, the temperature at which the hydrogenation takes place, and the condition of the couple. Temperature, especially, has a considerable influence upon the rapidity of the reaction; for instance, a sheet of zinc covered with precipitated copper gave in one hour at 2·2° C. 1·2 c.c. of hydrogen, and at 98° C. in the same time 528 c.c. The temperature of the liquor in the vat is controlled by a worm through which hot water or steam can be passed. When the hydrogenation is completed, the distillate is passed on to the rectifying column.

The hydrogenating action of metallic couples is generally sufficient for the entire purification of the distillate, and in the case of distillates from grain and beet molasses, the increase in the yield of good flavoured alcohol in the first runnings is 25 to 30 per cent.

But this treatment, although sufficient for many distillates, does not sufficiently improve those obtained directly from beet, and in these cases M. Naudin completes the action by electrolysis by means of electric machines. The distillate from the beet is first left in contact with the copper-zinc couple a sufficient time (two days or more) to ensure its complete hydrogenation and then, nearly purified but having still a slight flavour of its origin, it is acidulated by means of sulphuric acid and sent into a special arrangement of voltameters. The number of voltameters coupled varies with the intensity of the action required, and the quantity of distillate to be purified. In practice, in a factory running 6000 or 7000 gallons daily, twelve voltameters are in couple, and the electrolytic action is regulated by disconnecting or placing in circuit the required number. It is evident that in this operation there must be some oxidizing action, and to this extent it would appear to be open to the same objection as the processes based upon oxidation.

M. Pictet has recently announced that he effects the purification of alcohol by rectification carried on at a low temperature, and that this operation is carried on in a large scale in Paris. The distillates, or even the musts, are placed in a large boiler surmounted by a rectification column, above which rises a condenser surrounded with cold water, which condenses the less volatile products so that they run back into the boiler. The vapour not condensed here, passes into a refrigerator, surrounded with cold water, where they are completely condensed. The first runnings (*goûts de tête*) are collected in a receiver; next comes the good flavoured alcohol, which is then run into a second boiler.

The first still is connected with an air pump, by which a more or less complete vacuum can be produced, and the temperature thus regulated. In the second still a nearly complete vacuum is produced, so that the temperature falls quickly. The vapour which issues from it consists of nearly pure alcohol, because the few foreign bodies which pass into the first distillation do not give off vapour at the temperatures, varying between − 10° and 5°, which obtain in this part of the apparatus.

The vapour of alcohol thus purified rises into a second rectification column, terminated by a refrigerator cooled by liquid sulphurous anhydride, in which is maintained a temperature between − 25° and − 50°. The first portion is collected in a special vessel and withdrawn; the remainder is pure alcohol.

IS GELSEMIC ACID IDENTICAL WITH ÆSCULIN? WITH OBSERVATIONS ON THE PREPARATION, PROPERTIES AND RECOVERY, WHEN ABSORBED, OF THE IMPORTANT CONSTITUENTS OF GELSEMIUM SEMPERVIRENS, AND GELSEMIUM POISONING.*

BY THEODORE G. WORMLEY, M.D.,

Professor of Chemistry in the Medical Department of the University of Pennsylvania.

In the *American Journal of Pharmacy* (Jan., 1870) the writer announced that *Gelsemium Sempervirens* contained a non-nitrogenized principle, of an acid reaction, which was named *gelseminic*, or *gelsemic* acid; and also a strongly basic principle, which was named *gelsemia*, or *gelsemine*.

From a subsequent examination of the constituents of the plant, M. Sonnenschein and Charles Robbins concluded that the so-called *gelsemic acid* was identical in properties and composition with the glucoside *æsculin*, found in the bark of the horse-chestnut, and certain other barks (*Ber. der Deut. Ges.*, Sept. 1876, 1182).

Before examining this question of claimed identity, the method, of several employed, which we have more recently found the most satisfactory for the extraction of the two important constituents of the plant, will briefly be given.

Preparation.—100 grams of the powdered dry root are macerated for two days in 400 c.c. of a mixture of equal parts of water and alcohol of ·815, the mixture being slightly acidulated with acetic acid and occasionally warmed and agitated. The liquid is strained through muslin, and the solids well washed with water containing a little alcohol, the washings being collected with the first liquid. The whole is evaporated to about 200 c.c., and allowed to stand until the resinous matter has deposited. The liquid is then filtered, concentrated to about 80 c.c., and, if necessary, again filtered.

1. *The non-nitrogenized principle.*—This is extracted from the concentrated liquid, while it still has an acid reaction, by ether, in the usual manner, using three or four volumes of the liquid in two or three portions.

The crystals obtained on evaporation of the ether are washed with a little absolute alcohol, which readily dissolves the adhering colouring matter. The residue may be further purified by a second extraction by ether.

A very good method of purifying the substance, especially from the last traces of the alkaloid, is to dissolve it in about 250 parts of water, by the aid of a few drops of ammonia, and then treat the clear solution with diluted hydrochloric acid, added drop by drop until the point of neutralization is almost, but not fully, reached, taking care that the first cloudiness or precipitate produced has fully crystallized before adding another drop of the acid. The crystals are collected on a small filter and washed with a little cold water.

2. *Gelsemine.*—The liquid from which the former principle is extracted was gently warmed until the dissolved ether has been expelled. It is then rendered slightly alkaline by sodium hydrate or carbonate, and the liberated base extracted by ether, which is allowed to evaporate spontaneously.

The impure alkaloid thus obtained is dissolved by the aid of a few drops of hydrochloric acid in about 12 c.c. water, the solution filtered, and the filtrate treated with a very slight excess of sodium hydrate, when a large portion of the alkaloid will separate as a pure white

* From *The American Journal of Pharmacy*, July, 1882.

precipitate. This is quickly collected on a filter and washed with pure water. The remaining portion of the alkaloid is extracted from the filtrate by ether or chloroform.

From the dried root of the plant we obtained, after this manner, ·25 per cent. of gelsemine and ·50 per cent. of the acid principle.

Is Gelsemic Acid Identical with Æsculin?

For the purpose of answering this question various samples of the gelsemium principle were examined comparatively with a sample of *æsculin* prepared by E. Merck, of Darmstadt. It consisted of a spongy, sparkling white mass of minute (microscopic) needles and prisms. On comparing it with a somewhat coloured preparation obtained from horse-chestnut bark, the substances presented essentially the same properties in the several respects examined.

This comparative examination showed:

A. These principles agree more or less in the following respects:

1. Both substances are readily soluble in the *caustic alkalies*, forming solutions which have a yellow colour by transmitted, and appear blue by reflected light, the fluorescence appearing in both instances, even in very highly dilute solutions, being distinctly marked in a 100,000th solution.

The fluorescence of the gelsemium principle, however, is *greenish blue*, whilst that of æsculin is deep *sky blue*. The fluorescence in both instances is destroyed by free acids.

2. *Nitric acid* dissolves both substances with a yellow colour, and the solutions, when treated with excess of ammonia, assume a deep red colour. This red coloration may be obtained from even the $\frac{1}{50000}$ of a grain of either substance.

The nitric acid solution of the gelsemium principle, when present in sufficient quantity, has an orange-red colour, whereas that of æsculin is yellow.

B. They differ more or less in the following properties:—

1. *Crystallization.*—The gelsemium compound very readily assumes the crystalline form, even in the presence of comparatively large proportions of resinous matter, whereas *æsculin* crystallizes with some difficulty, even from pure solutions. Thus the $\frac{1}{10000}$ grain of the former substance, when separated from 1 grain of solution, is left in the form of needles, whilst crystals can only be obtained from rather strong solutions of æsculin, and then usually appear as transparent spherical masses, with some dense tufts of short prisms.

2. *Solubility.*—*a. Water.* The gelsemium substance, when pure, requires 2912 parts of water for solution, even when excess of the powder is kept in contact with the liquid at a temperature ranging from 18° to 24° C. (65° to 75° F.), for twenty-four hours.

Under like conditions, Merck's æsculin dissolved in 401 parts of water. According to Trommsdorff, æsculin requires 576 parts of water for solution, but according to Minor it dissolves in 300 parts (Gmelin's 'Hand-Book,' xvi., 22).

b. Ether. One part of the gelsemium principle was readily taken up by 330 parts of *ether* of specific gravity ·728, whereas *æsculin* required at least 36,000 parts of the same fluid for solution.

So also, the former principle is rather freely soluble in *chloroform*, whilst the latter is nearly or wholly insoluble in this liquid.

3. *Sulphuric acid* dissolves the gelsemium substance to a more or less yellowish solution, which when warmed in a water oven (if the substance is pure) undergoes little or no change. Æsculin readily dissolves in the acid, but on warming the solution it quickly acquires a brownish or chocolate colour and becomes charred.

If a drop of aqueous ammonia be allowed to flow into a drop of the sulphuric acid solution of the gelsemium compound, a dirty white deposit or cloud of very minute crystalline needles separates at the margin of contact of the liquids.

If only a minute drop of the acid be employed and excess of ammonia be avoided, even the $\frac{1}{10000}$ grain of the substance will in this manner yield a very satisfactory deposit of needles. If the drop of liquid be allowed to evaporate, these crystals may be re-examined, even several times, by moistening the residue with a minute drop of water, which will quickly dissolve the ammonium salt, whilst the needles will remain, they being apparently insoluble under these conditions.

This reaction is highly characteristic of the gelsemium principle.

A sulphuric acid solution of *æsculin* under like conditions fails to yield any crystals, unless a comparatively large quantity is present and the mixture be evaporated to about dryness, when transparent nodular masses with some groups of prisms may appear.

4. *Hydrochloric acid* fails to dissolve or act upon the gelsemium compound, even under the heat of a water-bath. Æsculin is readily soluble in this acid.

In the following liquid reactions the results refer to the behaviour of a few drops of $\frac{1}{100}$ solutions of both principles.

5. *Nitrate of silver* produces in a solution of the gelsemium principles a copious brownish-yellow precipitate, which soon darkens in colour, and finally the mixture becomes deep blue-black, due to the reduction of the silver salt. This reaction will manifest itself, after a time, even in a $\frac{1}{50000}$ solution.

Æsculin yields from a $\frac{1}{100}$ solution, a slight dirty yellow precipitate, which remains unchanged for several minutes; it then slowly darkens.

6. *Corrosive sublimate* throws down a copious yellowish precipitate, from which the organic acid quickly separates as large tufts of needles.

Æsculin fails to yield a precipitate or crystals.

7. *Bromine* in *bromohydric acid* produces a copious green deposit, which quickly acquires a bluish and finally a brownish colour.

Æsculin yields a slight yellow precipitate, which becomes yellowish-grey.

8. *Sulphate of copper* causes in a solution of the acid a dirty brown precipitate, which soon assumes a dull red colour, and crystalline needles separate.

Æsculin yields a bluish-white deposit, which undergoes little or no change.

9. *Acetate of lead* (neutral) produces a copious yellow precipitate, which after a time is partly changed into very minute star-like groups of crystals. These are insoluble in ammonia, but readily soluble in acetic acid, being quickly replaced by slender needles of the free acid.

Æsculin yields a somewhat similar precipitate, but no crystals were obtained.

10. *Physiological action.*—*a.* 0·010 gram (about $\frac{1}{6}$ grain) of the gelsemium principle was administered hypodermically to a frog. After a few minutes the eyes were fluorescent, and the animal seemed sluggish; after half an hour it was somewhat excited and apparently weak. No other marked symptoms were noticed during the several hours the animal was observed

A similar quantity of *æsculin* produced fluorescence of the eyes, but no other apparent effect.

b. 0·033 gram ($\frac{1}{2}$ grain) of the gelsemium substance, prepared by precipitation with hydrochloric acid, being injected into the peritoneum of a frog, was quickly followed by violent agitation; the animal became rigid, and reflex action was markedly diminished. In *five minutes* the animal was apparently lifeless; there was rigidity of the abdominal muscles, which slowly relaxed. After forty minutes, the heart had ceased to beat, was relaxed and not irritable.

c. A similar quantity, injected into the posterior lymph sack, was quickly followed by great agitation and general prostration. In fifteen minutes active voluntary movements appeared, and there was marked fluorescence of the entire eye-ball. After forty minutes the heart was found still beating, but ceased fifteen minutes later.

In another experiment, a like quantity caused a complete cataleptic condition and death within ten minutes.

d. 0·033 gram of *æsculin* injected into the peritoneum of a similar frog produced *no apparent effect*, other than a marked fluorescence of the eyes, which continued some fifteen hours.

For these physiological experiments, I am much indebted to Dr. Edward T. Reichert. These results, in regard to the gelsemium principle, confirm in a measure those previously obtained by Dr. Isaac Ott (*American Practitioner*, 1877).

Conclusions.—It is needless to add that the only conclusion from the foregoing comparative results is that the principles examined *are very different substances.* Hence the name *gelsemic acid* will be retained provisionally for the gelsemium principle.

Gelsemine.—As supplementary to our former paper on the subject, some of the more important properties and reactions of gelsemine may be mentioned.

In its pure state gelsemine is a colourless, odourless solid, having a persistent bitter taste. It has not yet been obtained in the crystalline state. At something below 100° C. it fuses to a colourless liquid. Gelsemine completely neutralizes acids, forming salts, most of which are freely soluble in water and alcohol.

The pure alkaloid is soluble, under ordinary conditions, in 644 parts of water. It is freely soluble in ether and in chloroform.

The most characteristic reactions of the solid alkaloid are the following:

1. *Sulphuric acid* dissolves gelsemine with a reddish or brownish colour to a solution which after a time assumes a pinkish hue. If the solution be warmed on a water-bath, it acquires a more or less purple or chocolate colour.

If a small crystal of *potassium bichromate* be slowly stirred in the sulphuric acid solution, reddish-purple streaks are produced along the path of the crystal. If the potassium salt be used in the form of *powder*, or, as advised by Sonnenschein and Robbins, be replaced by *ceric oxide* (CeO_2 formerly Ce_3O_4), the purplish or reddish-purple coloration manifests itself more promptly and strongly, and may be obtained from even the one ten-thousandth grain or less of the pure alkaloid. For the detection of these minute quantities, however, it is essential that only very minute quantities of the acid and powder be employed.

This reaction of gelsemine—as remarked by Sonnenschein and Robbins, who first observed it with the cerium compound—resembles somewhat that of strychnine; but these alkaloids could not thus be confounded.

2. *Nitric acid* causes gelsemine to assume a brownish-green, quickly changing to a deep *green* colour, which slowly diffuses itself through the liquid. Almost the least visible quantity of the alkaloid, if touched with only a very minute drop of the acid, will yield this green coloration in a marked degree.

This reaction readily distinguishes gelsemine from strychnine and the other alkaloids.

Solutions of the *salts* of gelsemine are colourless, and have the strongly bitter taste of the alkaloid. These solutions yield precipitates with a number of different liquid reagents, even in some instances when highly dilute; but in no instance is the reaction peculiar to this alkaloid.

Physiological action.—0·008 gram ($\frac{1}{8}$ grain) of gelsemine, administered hypodermically to a cat, caused very marked symptoms in fifteen minutes, and death in one hour and a half.

0·010 gram, given to a frog, produced, after half an hour, great prostration, followed by tetanic convulsions and death in about four hours.

0·033 gram of the alkaloid, in the form of chloride, was injected into the peritoneum of a frog. The animal soon opened its mouth convulsively, the jaws fell at intervals, and there was quickly great muscular prostration. In twenty minutes the body was completely relaxed; the muscles not irritable under pricking; reflex action was greatly dimished, and life seemed to be extinct. On opening the thoracic cavity it was found that the heart had been arrested in diastole and was not irritable.

Gelsemium Poisoning.—The cases of gelsemium poisoning thus far reported have been, with two or three exceptions, the result of accident or ignorance. The preparation of the drug most frequently employed is the *fluid extract*, each fluid ounce of which represents 480 grains of the dried root. This preparation, as found in the shops, as we have heretofore shown (*Am. Journ. Pharm.*, 1877, 151), usually contains ·2 per cent. of gelsemine and ·4 per cent. of gelsemic acid.

Of *twenty-five* cases of gelsemium poisoning that we have collected (some private), *thirteen* proved fatal. The *fatal period* varied from *one hour* to about *eight* hours. Very small quantities of the drug may cause death. A case is reported in which a quantity of a tincture equivalent to about 12 *minims* of the fluid extract proved fatal to a child aged three years. In another instance, four doses of 15 *minims* each of the fluid extract, repeated at short intervals, caused the death of a healthy man in less than four hours after the last dose was taken. So, also, a teaspoonful of the same preparation proved fatal to a woman.

There is no chemical *antidote* known for this kind of poisoning. The application of *electricity* has in several instances proved very beneficial. In others, the use of *morphine* hypodermically has been attended with good results.

Chemical analysis.—In gelsemium poisoning the gelsemic acid and the alkaloid are both absorbed, and enter the blood apparently in the proportion in which they are found in the plant. Hence, in poisoning by the drug, it becomes necessary to direct the examination for the absorbed poison to the recovery of both these principles. This is the more important, since the acid is apparently not much less poisonous than the alkaloid, and so readily reveals its presence by its fluorescent properties.

The general method for the recovery of strychnine and like substances from the blood and tissues is about equally applicable for the recovery of the gelsemium principles. As these substances are readily soluble both in ether and chloroform, either of these liquids may be employed for the extraction. The gelsemic acid would, of course, be found in the ether extract from the prepared solution, while it still had an acid reaction; whilst the alkaloid would be extracted from the solution after it had been rendered alkaline.

In applying the tests for gelsemic acid to the ether residue from the acid solution it should be remembered that although the reaction of the nitric acid and ammonia test is common to gelsemic acid and æsculin, yet when obtained from an *ether* extract, it is characteristic of the former substance, since æsculin is not extracted by ether.

The blood and liver of a cat which had been killed, after several hours, by the drug, were examined, in the main, after this general method. The first ether extract, in both instances, was distinctly fluorescent, and on evaporation left the gelsemic acid, in part at least, in its crystalline state. The true nature of these crystals was readily established by the appropriate tests. So, also, about equally satisfactory evidence of the presence of gelsemine was obtained from the ether residues from the alkaline solutions.

As a conclusion from these and other similar results, it would appear that in gelsemium poisoning evidence of the presence of the poison in the blood may be more readily and fully obtained than in the case of any of the other vegetable poisons.

MANUFACTURE OF LACTIC ACID.*

BY CHARLES E. AVERY.

When milk turns sour spontaneously, the sugar of milk which it contains is converted into lactic acid, and Scheele, in 1780, first extracted lactic acid from sour milk.

Braconnet found the same acid in rice left under water to ferment, also in the juice of beet-root, which, after having undergone viscous fermentation, became sour and yielded lactic acid. He also found the acid in products of fermentation of many other vegetable infusions.

The same acid has been found in the sour water of starch factories, and in the well-known fermented cabbage of sauerkraut.

By lactic fermentation is understood the transformation of certain sugars, such as sugar of milk and glucose, into a syrupy acid, soluble in water, under the influence of a living being classed by the eminent French chemist and microscopist, Pasteur, among the bacteria.

Messrs Frémy and Boutron, Pelouze and Gelis, ascertained the best conditions for the production of lactic acid, and found it, they say, to require the aid of nitrogenous albuminoid matter in a state of decomposition, and for its continuance that the acidity should be kept down by neutralization. For this purpose they used oxide of zinc, carbonate of soda, or, as I prefer, the carbonate of lime, that is to say, whitening or marble dust.

Pasteur brought out the idea that the albuminoid matter was non-essential, that it could be substituted by inorganic salts, and that the real cause of the change was not decomposing albuminoids but a living ferment—establishing this latter fact, which before was a conjecture.

It is substantially here that I depart from the beaten track. I find albuminoid matter, though not, scientifically speaking, essential, is essential in a technical point of view. Moreover, it is not essential nor desirable that they should be decomposing albuminoids. I prefer them as fresh and free from putrefaction as possible. As I have no putrefaction in my solutions, the manufacture is no longer a nuisance; the odour with a pure ferment is even fragrant.

To obtain this fresh albuminoid matter at no further expense, and in large quantity, I leave in the glucose solution made from the corn meal the albuminoid residue. And from this substitution I obtain the advantage of cheapness, the advantage of healthfulness, a crude product free from the products of putrefaction, and hence more easily purified; and, lastly, the fermentation takes place in three or four days, instead of requiring ten days to a month, as by other processes.

Bensch purifies his lactate of lime by extraction with water, filtration, and recrystallization, the details at present being non-essential. The only thing worth mention is that he was able to purify his crude material. It will be seen that cane sugar is the source of his lactic acid, costing to start with eight to ten cents per pound, for any article not too dark and impure. To this sour milk and cheese are added, further increasing the expense, and the time required is a fortnight.

Considering the variability of the process, its unsavory nature and products, and the expense, it is not surprising lactic acid and the lactates have received little attention.

I find it is still a common impression among chemists that in the change of starch into glucose by the acid treatment, the transformation is very incomplete; that much of the starch remains as dextrine. This is not the case. By suitable precautions nearly all the starch should turn to glucose, and that this can be accomplished is shown by testing the solutions and residues with odine. Neither starch nor soluble starch is shown. Then by testing the solutions with six times their volume of alcohol, the substantial absence of dextrine may be shown.

Since we have some 70 per cent. of starch sugar in corn, and this converted into glucose will, by assimilation of water, increase in weight some ten per cent., we have as the theoretical yield of acid 77 per cent. Now, Bensch found 9 kilos of cane sugar to yield $10\frac{3}{4}$ kilos of neutral lactate of lime, and it is not surprising that a yield of 82 to 85 per cent. of neutral lactate has been found from 70 per cent. of starch, working by my process.

The process I adopt resolves itself into three portions: 1st, manufacture of solution for fermentation; 2nd, the fermentation; 3rd, the purification; and, lastly, there is the use of the product itself as a separate consideration.

I mix 80 to 160 pounds of oil of vitriol with 2000 pounds cold water, and stir in 2000 pounds ground maize; this corn meal may be from inferior corn, from corn more or less heated, soured, or otherwise changed. The average price of corn of good quality here is about one cent per pound, and much less in the West. Inferior qualities are of less cost. The vitriol can be bought at $1\frac{3}{4}$ cent per pound by single carboy, and would cost much less if chamber acid were used and made on the spot.

I let the meal mixture stand over night, and next morning add in portions 2000 pounds of boiling water. After boiling until the tests are satisfactory, I run the hot mixture into the fermentation tank, and neutralize with 1000 pounds carbonate of lime, stirring well. The carbonate of lime is of course in large excess. I then add 4000 pounds cold water, and a variable amount of lactic ferment; 1 or 2 per cent. seems to answer well, although a larger quantity induces fermentation more speedily, saving perhaps half a day, but less will suffice.

In a day's time the most vigorous action ensues, the carbonic acid released from the carbonate of lime escaping in large bubbles, giving the impression that the liquor is boiling. In three or four days' time, with good lactic yeast, the mass sets into crystals of lactate of lime, resembling thick mortar. I then dissolve the lactate in hot water, filter it, crystallize, press, and purify, much as in other processes, with two alterations, however. I use animal charcoal to remove odour and colour, and after acidulation, distil off the butyric acid that has been formed. By more vigorous precautions in the fermentation, I expect soon to be rid altogether of the butyric ferment, and had, indeed, already greatly reduced it, when a series of mishaps stopped for a time further progress.

From experimental results already obtained on the small scale, I have reason to believe that I can reduce the waste and cost of purification, especially in the direction of animal charcoal, and experiments will speedily be resumed in this direction. I am much assisted in this search by the comparatively clean, pure, crude material with which I start, unlike the foul mass obtained by other processes of practical value. As regards the healthfulness of lactic acid there can be no doubt. Articles containing it have been sought out as food by the human race all over the world. Sour milk, butter milk, and sauerkraut are well known to be wholesome. Their reputation the world over is good, and they are used by labourers and peasantry as regular articles of diet. If there were any doubts, these would be dispelled when I state that lactic acid is present in the flesh itself, and in the mother's milk; that lactic acid is an active agent in the digestion of food in the stomach, and a constituent of the gastric juice. For this reason it is given medicinally for the cure of dyspepsia, as in the well-known preparation of lactopepsine.

As to the value of lactic acid and acid lactates in raising bread, as substitutes for cream of tartar, there can be no question, for sour milk always has raised bread, and made good bread, and cream of tartar is a

* From the *Proc. Soc. Arts*, Boston. Reprinted from the *Weekly Drug News*, July 21, 1882.

substitute for lactic acid rather than lactic acid a substitute for it. At present prices of milk the cost is greatly reduced. The corn is not fed to the cow partly to be wasted in maintaining heat and life, and partly to be returned as fat and decomposed sugar; but by a simple change turns almost completely to lactic acid. In one respect, however, I think an advantage may be fairly claimed for the acid lactate of lime over cream of tartar, namely, it will be hard for any cook, no matter how careless, to make either sour bread or alkaline bread, and every cook has such failures with cream of tartar. In cream of tartar, or acid tartrate of potash, the acid molecule reacts on the saleratus to free the gas; unless the exact proportions be hit and the mixture be complete, the bread is alkaline wholly or in spots if the saleratus be in excess, and sour if the acid tartrate be in excess.

The acid lactate is a permanent salt, not readily changed to butyrate; not diliquescent; not too gum-like to resist powdering.

In Miller and other works of good standing it is stated the raw corn meal under like conditions had but partly changed to lactic acid in forty days. Technically speaking, corn meal cannot furnish lactic acid unless the starch be first transformed. Nor will it then give lactic acid in quantity unless the albuminoid matter be either added or left in the presence of the nitrogenous phosphatic salts, if the neutralizer of the ferment is not a fulfilment of all the conditions for large and varied yield; we must at present have albuminoid matter present. It has been fully shown that it is not essential that this albuminoid should be rank or putrid, but that better and quicker results were obtained with fresh vegetable albuminoids than with stale animal albuminoids. I have improved the purification by introduction of animal charcoal and distillation, and have made the operations inoffensive. With regard to cheapness, little needs to be said. With a yield of lactic acid equalling 50 per cent. of the weight of corn employed, with meal at 1 cent per pound, chalk or whiting at $\frac{1}{8}$ of a cent, and sulphuric acid at $1\frac{1}{4}$ cent, coal being assumed at 6 dollars per ton, the cost of materials for 1 pound of lactic acid is about $4\frac{1}{2}$ cents.

By shrewd location of the factory, and good buying in large quantities, these expenses may be largely reduced.

The operations of manufacture are not unlike those of the sugar refinery, and those are known not to be excessive.

CHINESE RHUBARB.*

Curiously enough the Chinese attach but small importance to that most valuable of roots, rhubarb. In so far as they themselves are concerned, other drugs take its place, although it seems beyond dispute that at one time they were of opinion that if supplies were cut off the detested foreigners of the north would all die of constipation. This anecdote is well vouched for; indeed, prior to the outbreak of war in 1839–40, the *terrible* threat was actually held out, Lin, or Keshan (the same Ki-chan subsequently met with by the Abbé Huc at Lla-Ssa, Thibet. This statesman was not executed as commonly supposed, for ceding Hong Kong), we forget which, was so firmly persuaded of the fact as to memorialize the Emperor regarding the advisibility of forbidding the export of rhubarb, and thus starve the foreigners into submission. But dropping anecdote, rhubarb grows wild in all the northern and western provinces, yet nowhere does it seem to be brought under cultivation, invariably being found in a wild state. Several varieties of rheum plant are indigenous to China, some being inestimably valuable, and others almost worthless. Shênsi roots are by far the most esteemed—those coming from the Kanchow district being perhaps the more prized of all. This rhubarb, the best in the market, can be readily distinguished from other kinds. The roots are large, smooth, and extremely fragrant; whereas those obtained in the province of Szechwan are smaller, rough on the exterior, deficient in flavour, and when cut give out little scent. Best Szechwan rhubarb commands only about one half the price asked for Shênsi rhubarb, while inferior qualities fetch from one-tenth upwards. In this connection it is interesting to note how strongly many Chinese hold by the belief in the utter inefficacy of roots grown in the southern provinces, which, according to their theory, are only good to sell to the English barbarians. As a fact, Russian merchants look at no rhubarb that does not bear on its face evidence of a northern derivation. In this, unfortunately, they are not imitated by their English rivals, who buy anything that is offered so long as the price is sufficiently tempting or holds out a prospect of additional profit. This points to the necessity of medical men and retail druggists exercising extreme care in the selection of their rhubarb, and perhaps, more important still, to buy only of persons in whose judgment and honesty they can place entire dependence.

Another good sample arrives at Tientsin from Hsining in Kansuh, after which town it takes its name. Chungch'i rhubarb is also greatly prized, while Chihuang, Taihuang, and Shanhuang, are about as worthless as well can be. Doubtless, however, as Mr. Detring remarks, a considerable percentage of inferior rhubarb is nothing more than dock plant root, sold under the fashionable name. Upon the properties of this sham we cannot speak authoritatively, but quite likely it possesses properties similar to those of the yellow dock and other European species of this order. It is not exactly pleasant to contemplate that the greater part of this rubbish is bought for the English market, but such nevertheless appears to be the case. The other producing districts besides those mentioned above are Chihli, Honan, and different parts of Thibet, from whence several very fine varieties, formerly sent overland, *viâ* Kiakhta through Russia, are obtained.

* From a paper on the Chinese Materia Medica, by F. Newcome, in the *Medical Press and Circular*, August 2.

AMERICAN MUSK.*

BY R. S. CHRISTIANI.

One of the most important substances for the perfuming of toilet soaps is musk; it is also the most expensive, and owing to the large amount of adulteration it is the most unsatisfactory article the manufacturer has to use.

Much of this trouble and expense can be avoided by the use of what I term "American musk," obtained from the musk rat (*Fiber zebithicus*), the well-known rodent, native of the United States and found in nearly all parts of it, frequenting the streams and marshes, and having habits similar to the beaver.

The musky secretion is found in two sacks, situated between the anus and the genital organs, and is emitted by the animal when excited. These animals are easily trapped and killed for their skins, which are shipped in large quantities to Europe at this season of the year. The fur though looking coarse, from the longer hairs, is very soft and fine beneath, and is dressed and coloured and largely used for the cheaper furs.

To the manufacturer of toilet soaps the American musk is almost invaluable, being nearly as good and as strong as the real. The reaction of the alkali, necessary to all soap, having a softening and modifying property upon the strong odour, which is also improved by the addition of the spice oils and other perfuming substances.

I have for many years used this substance in soaps, sachet powders, etc., but do not recommend it for essences, though much is used in the cheaper kinds. In using it in soaps I have found that time is required to improve the odour, and when a cake of soap so perfumed has been kept for a few months, it would require a very skilful perfumer indeed to distinguish the odour from that of the best tonquin musk.

* From the *Oil, Paint and Drug Reporter*, April 12, 1882.

The Pharmaceutical Journal.

SATURDAY, AUGUST 5, 1882.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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DECISION OF THE PRIVY COUNCIL AS TO THE PROPOSED ADDITIONS TO THE POISON SCHEDULE.

THE decision at which the Privy Council has arrived after consideration of the resolution submitted to it by the Council of the Pharmaceutical Society will doubtless be disappointing to those who were mainly instrumental in bringing about the action of the Society's Council. Of course it was not unknown that one of the chief reasons for recommending that spirits of salts, oil of vitriol, hellebore, etc., should be made poisons within the meaning of the Act was the systematic misuse of these materials by waggoners and other persons entrusted with the care of farmers' horses. The evil is no imaginary one; but if we may judge from the decision of the Privy Council, it is one that farmers and owners of horses will have to find some other remedy for besides the restriction of trade which was recommended to be enforced under the provisions of the Pharmacy Act.

From the pharmacist's point of view also a lesson may be learnt from the refusal of the Privy Council to give effect to the recommendation of the Council. It shows how little reason there is to hope for any protection of pharmaceutical interests by legislative enactments and how much more necessary it is that any such protection as those interests require should be provided by the united voluntary action of those most concerned. That the sellers of drugs should have a technical acquaintance with the articles they deal in is a proposition that will be readily assented to from the point of view of public interest alone, and from similar considerations it will be even more readily admitted that those entitled to prepare medicines for use by the sick should have a special qualification; but beyond this point it does not appear to be in harmony with the spirit of the age to push the demands for class protection. The recognition of the need for qualification being, therefore, all that seems to be obtainable from the legislature on the ground of regard of the public interest, it does not require much acumen to perceive that, if pharmaceutical interests require protection, the means of providing it is in the hands of those whose business it is to regulate and supervise the grant of that qualification. It is by such a mode of procedure as Mr. SCHACHT has devised in regard to educational training and the conditions under which examinations are conducted with a view to registration, that the protection of pharmaceutical interests is to be most thoroughly secured. That is a means which is already within the power of the Council and it is one which the Council should be supported in the application of to the very utmost. In this free trade age, when popular opinion, blinded by the glare of co-operative fallacies, has lost the faculty of judgment as to sound views of political economy, it seems almost hopeless to seek for a rational recognition of the value of pharmaceutical services on the basis of abstract principles, and nothing remains, meanwhile, but to make the best use we can of such powers as we have command of.

It is, in short, by enforcing to the utmost possible degree the stringency of the test by which qualification to carry on the business of the pharmacist is obtained that we may best hope to effect an improvement of the condition and status of those engaged in that business. It is highly improbable that we shall ever go back to the conditions of restriction which are still in force in some other countries. These conditions belong to a past epoch of society, and though they may for a while remain in countries where they have long been in existence, there is little prospect of their introduction in other countries where they have not before been operative. Even in Germany, where the restrictive system of regulation is most in force as regards pharmaceutical affairs, we have abundant evidence that it is maintained only by great effort, and that the growth of antagonistic influences is so rapid as to portend its overthrow at no very distant period. With such a tendency everywhere evident, what have pharmaceutical interests to look to for protection but the maintenance of individual qualification, and the joint efforts of all belonging to the business to secure that condition in the highest degree?

THE REGULATION OF PHARMACY IN WISCONSIN.

THE Wisconsin Pharmacy Act, which has furnished the opportunity for a pleasant courtesy, referred to at the meeting of the Council on Wednesday, is a very recent addition to the pharmaceutical legislation of the United States, having been passed in March last. In form it very closely resembles the Illinois Act of last year, and as it fairly represents one phase of American opinion as to the best way of regulating the supply of medicines and poisons, some space may be devoted to an analysis of it.

The Act commences by making it unlawful for any other person than a registered pharmacist to "retail, compound, or dispense drugs, medicines or "poisons, or to institute or conduct any pharmacy, "store or shop for retailing, compounding or dis-"pensing drugs, medicines or poisons," but it permits any unregistered person to own a business if he places the store or shop in charge of a registered pharmacist. The wide scope of the original prohibition is further modified by a later section, which exempts from its operation the supply by a physician to his patient of "such articles as may seem to him proper," the vending of patent or proprietary medicines, or of medicines in sealed packages, labelled with the name of the particular article and of the pharmacist or physician preparing it, as well as the sale of the "usual domestic remedies" by dealers.

The persons entitled to registration under the Act are such as were engaged in the business of dispensing pharmacists on their own account at the time of the passing of the Act, "Graduates in Pharmacy" and "Licentiates in Pharmacy." A "Graduate" is defined as a person who has had four years' practical experience in drug stores where the prescriptions of medical practitioners are made up and holds a satisfactory diploma or other credential from a regularly incorporated college or school of pharmacy. A "Licentiate" is a person who after two years' similar practical experience passes a satisfactory examination before the board constituted under the Act. Every assistant who has had two years' practical experience at the time of the passing of the Act, but does not possess a qualification for registration as a "registered pharmacist," if not less than eighteen years of age, is entitled to a certificate of registration as a "registered assistant," which certificate gives him the right to continue in his duties as clerk or assistant, but not to carry on business on his own account before he has had five years' experience.

The Board of Pharmacy consists of five examiners, chosen by the Governor of the State from "ten competent pharmacists," whose names are to be submitted for the purpose by the Wisconsin Pharmaceutical Society. Each successive year one member of the Board is to vacate his seat, by rotation after the first five years, and the vacancy is to be filled by the Governor nominating one of three persons selected by the Society; eventually, therefore, the appointments will be for five years. The Board is to meet at least once in three months and its business is to examine candidates, grant certificates of registration, cause the prosecution of persons violating the provisions of the Act, and to report annually to the Governor and the Pharmaceutical Association on the condition of pharmacy in the State.

The fees for registration are fixed very low, that for registration by examination being only five dollars, with the proviso that if the candidate fails the whole fee shall be returned to him. If the proportion of unsuccessful candidates be nearly as large as obtains sometimes in the examinations in Great Britain, this shifting of the penalty of failure might prove a Nemesis to too exacting examiners, since the payment of these functionaries is to come out of the proceeds of their operations, and it is expressly stipulated that none of the expenses shall come out of the coffers of the State. On the other hand, every registered person desiring to retain his position will have to transmit annually to the Board an intimation to that effect, together with a fee not exceeding two dollars.

Any person not being himself a registered pharmacist, nor employing one, who carries on business in contravention of the Act, will be liable to a penalty of fifty dollars; and any registered pharmacist who permits the dispensing of prescriptions, or the vending of drugs, medicines or poisons in his place of business, except under the supervision of a registered pharmacist or by a registered assistant, will be liable to a similar penalty. All suits for the recovery of penalties are to be prosecuted in the name of "the people of the State of Wisconsin" by the county attorney, and the penalties are to go one-half to the Board and the remainder to the school fund of the county in which the suit is prosecuted and judgment obtained.

The section of the Act relating to poisons provides that no person shall sell by retail "any poisons commonly recognized as such,"—and especially some that are mentioned by name,—without affixing a label bearing the name of the article, the word "poison," and the name and address of the seller. It is also made illegal to sell such poisons to a person under fifteen years of age, or to any one without first ascertaining that the poison is to be used for a legitimate purpose. The penalty for each offence under this section is five dollars.

Lastly, there is an adulteration clause with a penalty of not less than fifty or more than a hundred dollars for a first offence, and for each subsequent offence a penalty of not less than seventy-five or more than one hundred and fifty dollars, the offender paying the costs in all cases. Not only does the actual sophisticator come under this penalty, but every proprietor or conductor of a drug store is to be held responsible for the quality of the articles sold by him, except when they are sold in original packages, or consist of patent or proprietary preparations. An offender under this action is also liable to have his name struck off from the Register.

THE MANCHESTER PRICE LIST.

ALTHOUGH the most sanguine can hardly expect to see the time when the charges for dispensing and drugs shall become uniform, even amongst chemists living in the same towns or districts, there is much room for improvement in this respect. We are therefore pleased to notice the issue of a fourth edition of the List of Retail Prices recommended by the Council of the Manchester Chemists and Druggists' Association. Only two years have elapsed since the third edition was published, during a part of which interval it has been out of print, and in the appreciation of their work thus evidenced the Council of the Manchester Association will doubtless find a sufficient reward. The book bears the imprint of Mr. SILVERLOCK, and we presume it could also be obtained from the Secretary to the Association.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, August 2, 1882.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, Hills, Radley, Richardson, Savage, Schacht, Squire, Symes, Williams, Woolley and Young.

The minutes of the previous meeting were read and confirmed.

The President said he had received a letter from Mr. Hampson signifying his desire to withdraw from the Education Committee.

Diplomas.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Bain, John.
Caldecott, Clement Guest.
Dowdeswell, Jonathan.
Drew, Walter Clark.
Holmes, Francis.
Kinross, William Malloch.
Murray, George.
Wheatley, Joseph.
Yeatman, Frederick James.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Bain, John.........Bridge of Allan.
Dowdeswell, Jonathan.........Beaminster.
Kinross, William Malloch.........Newcastle-on-Tyne.

ASSOCIATES IN BUSINESS.

The following, having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Ellard, James.........London.
Emmerson, George John.........Leyton.
Stephens, Jonathan.........Devonport.
Surfleet, Walter.........London.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Allen, Samuel.........Worcester.
Arthur, Charles.........Edinburgh.
Bowering, John.........Taunton.
Comer, Ernest Edward.........East Dereham.
Cullwick, Herbert Ernest.........Knighton.
Deeks, William Thomas.........Shanklin.
Dillon, Charles Linder.........Hereford.
Evans, William.........Cardigan.
Fentiman, Charles Henry.........London.
Field, Henry.........Yeovil.
Foggitt, John Blackett.........Thirsk.
Frost, John Henry.........London.
Greenall, Thomas Holdsworth...Ashton.
Hall, Amos.........Stafford.
Hankinson, George Robert.........Grange-over-Sands.
Hanson, Christopher.........Buckhurst Hill.
Innes, David.........Stalybridge.
Loam, James Gilbert.........Liverpool.
Mann, Joseph.........Peterborough.
Meadows, John Martin.........Swindon.
Nichol, Anthony.........Carlisle.
Noble, Henry Edward.........Peterborough.
Norburn, Albert Edward.........London.
Northen, Charles.........Thorpe-by-Water.
Parker, Thomas Herbert.........Bedford.
Pearson, William.........Sinderland Green
Pickering, Wade.........Crowle.
Rodmell, John Gale.........Rochester.
Rowland, Thomas William.........Epping.
Sergent, William Thomas.........Croydon.
Shapcott, William Henry Pyne..London.
Thomas, John Henry.........Chester.
Thomas, Joseph Arden.........Cambridge.
Thomas, William Hendy.........Penryn.
Townsend, Henry Holden.........London.
Tyson, Thomas Balmforth.........London.
Warburton, Edward.........Farnworth.
Waymouth, Thomas Staddon...Exeter.
Wells, William George.........Maidstone.
Williams, William Jesse.........Crickhowell.
Wood, John Ridal.........Rotherham.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students of the Society":—

Beanland, John Milner.........Keighley.
Bennett, Albert.........Leeds.
Bolton, Richard Lee.........Leith.
Brown, Joseph.........Walker-on-Tyne.
Cain, James Harold.........Douglas.
Clark, George Alexander.........Portsoy.
Clarkson, Joseph.........Skipton-in-Craven.
Cooper, Albert.........Huntingdon.
Cope, William James.........Longton.
Coutts, William Alexander.........Pathhead.
Cumming, John.........Portsoy.
Dowswell, Charles Wesley.........Tewkesbury.
Evans, Daniel Ashton.........Llanbrynmair.
Fox, Albert.........Atherstone.
Fox, William Arthur.........Cleckheaton.
Franklin, Alfred James.........Brighton.
Grant, Alexander.........Blairgowrie.
Grant, Arthur Thomas, jun., ...Helston.
Hampson, William.........Leigh.
Hawkins, Lewis Walter.........London.
Head, George.........Bridgnorth.
Honiatt, Albert Thomas.........Hereford.
Johnson, Henry.........London.
Kemplay, Arthur.........Leeds.
King, Frederick Herbert.........Market Drayton.
Lowe, Osmond Henry.........Maidenhead.
Naylor, James Louis.........Brownedge.
Pelham, Sydney.........Basingstoke.
Pettigrew, James.........Glasgow.
Rees, Colin Atkins.........Dartmouth.
Shepard, William.........Newport (I. of W.).
Smith, Charles B.........Potton.
Theckston, James.........Ulverston.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The name of the following person who had made the required declaration and paid a fine of one guinea was restored to the Register of Chemists and Druggists:—

Henry Ballinger Ryley, 38, Skinnergate, Darlington.

Reports of Committees.

FINANCE.

The report and recommendations of this Committee were received and adopted, and sundry accounts were ordered to be paid.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow of a life member; applicant has received four previous grants.

£10 to a pharmaceutical chemist, member from 1853 to 1877, who has had two previous grants.

£5 to the widow of a former annuitant.

£10 to the widow of an associate, who has had four previous grants.

Other cases had been before the Committee, concerning which no recommendations were made.

The Secretary had reported the receipt of a letter from the Local Secretary at Worcester, stating that in company with another member he had made a canvass of the chemists in that city and obtained subscriptions to the amount of £6 15*s.* 6*d.*

The Council went into committee whilst the President explained the circumstances of one of the applicants for relief. On resuming, the report and recommendations of the Committee were received and adopted, the President drawing special attention to what had been done at Worcester.

LIBRARY, MUSEUM, LABORATORY AND HOUSE.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
June	Day . . .	422	27	5	16
	Evening . .	131	11	3	6

Circulation of books.	No. of Entries. Town.	Country.	Total.
June	178	115	293

Carriage paid, £2 11*s.* 2½*d.*

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Chemical Society of London, Journal. Sundry vols.
Royal Society of London, Proceedings. Sundry vols.
Deutsche Chemische Gesellschaft, Berichte. Sundry vols. From Mr. Walter Hills.
Gräbner (F.), Beiträge zur Kenntniss der Ptomaïne in gerichtlich-chemischer Beziehung, 1882.
Schwarz (E.), Der forensisch-chemische Nachweis des Gelsemins in thierischen Flüssigkeiten und Geweben mit Berücksichtigung seiner Unterscheidung von Strychnin und diesem verwandten Alkaloiden, 1882. From Professor Dragendorff.
Hellin-Criquelion (C.), L'exercice de la pharmacie au point de vue constitutionnel et légal, 1882. From the Author.
Massachusetts College of Pharmacy, [Sixteenth annual] Catalogue, 1882-3. From Dr. B. F. Davenport.

The Committee recommended the purchase of the undermentioned works:—

Brodie (Sir B.), Ideal Chemistry.
Napheys (G. H.), Modern Medical Therapeutics, 7th edition.
Neale (R.), Medical Digest, 2nd ed., 1882.

The Librarian had reported the need of better ventilation in the Library. The Committee had agreed that the matter should be left in the hands of the President, and that he should report and recommend to the Council.

The Librarian had informed the Committee that the annual meeting of the Library Association would be held at Cambridge on September 5, 6, 7 and 8. The Committee recommended that the Librarian should attend the meeting.

Curator's Report.

The Curator had reported the average attendance in the Museum to have been—

		Total.	Highest.	Lowest.	Average.
June . .	Morning	333	21	4	13
	Evening	120	11	0	4

The Curator had also reported that he had received an application from M. Eugène Collin, of Verdun, France, for the loan of a specimen of Canton stick rhubarb from the Pereira collection of Materia Medica. The request had been acceded to.

The Professors had attended and reported satisfactorily on their respective classes; Professor Attfield had also presented a statistical report as to the Practical Chemistry class.

The various alterations in the ventilating and cleaning of the premises had been further considered.

The Council went into committee to discuss certain matters arising on the report of the Committee. On resuming, the report and recommendations were unanimously adopted.

GENERAL PURPOSES.

The report of this Committee included the reports of the Professors as to the School of Pharmacy prizes, the report of the examiners appointed to conduct the competition for the Pereira Medal, etc., and Professor Bentley's report on the Herbarium Prize. The purport of these reports was as follows:—

Chemistry and Pharmacy.

Professor Redwood reported that at the examination at the termination of the second course of five months there were only two competitors, who, although they acquitted themselves fairly well as junior students, failed to gain the required number of marks to entitle them to any award. For the sessional examination for the silver medal there were seven competitors, of whom five furnished papers of considerable merit, and were entitled to recognition.

Materia Medica and Botany.

Professor Bentley reported that at the examination at the termination of the second course of five months there was only one candidate, there being very few eligible to compete. The answers of the candidate were, however, so good that he did not hesitate to recommend that he be awarded a bronze medal.

For the sessional examination for the silver medal and certificates the number of candidates had been over the average, and the marks obtained by the majority of candidates were unusually high. Altogether the examination was the best which had taken place for some years. He also reported most satisfactorily of the good conduct, punctuality, and regularity of attendance of the students generally.

Herbarium.

For the Herbarium Prize there had been five collections submitted, the best of which contained over six hundred specimens, and was excellent in every respect. The next two were about equal in order of merit, for the one contained the greater number of specimens, whilst the other was better prepared, and the Professor recommended that a bronze medal be awarded to each. The fourth and fifth collections each deserved a certificate of merit, the latter containing over five hundred specimens, but was not so well prepared as to entitle the competitor to a higher award.

Practical Chemistry.

Professor Attfield reported that fourteen students had competed for the prizes in his class, of whom five obtained sufficient marks to entitle them to medals or certificates. He also reported favourably of the general good conduct and diligence of the students.

Council Examination Prizes.

The examiners appointed to conduct these examinations reported that there were six competitors, five in London and one in Edinburgh. Three competitors were entitled to recognition.

The report included the usual letter from the Solicitor, stating the progress of matters which had been placed in his hands.

Several cases of alleged infringement of the Pharmacy Act had been brought before the Committee and in each case it was recommended that proceedings be taken.

This part of the report was as usual considered in committee.

On resuming, the report and recommendations of the Committee were received and adopted.

PRIZE AWARDS.

The following awards were made on the recommendation of the General Purposes Committee:—

Chemistry and Pharmacy.

[Ten months' course.]

Silver Medal	Frederick Wm. Short.
Certificates of Honour	Walter Clark Drew. Edward Marsh.
Certificates of Merit	Richd. Augustus Cripps. Thos. Goddard Nicholson.

Botany and Materia Medica.

[Five months' course.]

Bronze Medal	Henry Hamilton.

[Ten months' course.]

Silver Medal	Frederick Wm. Short.
Certificates of Honour	Equal: George F. Callaway. Thos. G. Nicholson. Walter Clark Drew. Equal: Rd. Augustus Cripps. Frdk. Jas. Yeatman.
Certificates of Merit	Edward Marsh. T. Staddon Waymouth. Edgar Haward.

Practical Chemistry.

Silver Medal	Frederick Wm. Short.
Bronze Medals	Frdk. James Yeatman. Richd. Augustus Cripps.
Certificates of Merit	Edgar Haward. Walter Clark Drew.

Herbarium Prize.

Silver Medal	Henry Hamilton.
Bronze Medals	Equal: Frdk. V. Butterfield. T. Goddard Nicholson.
Certificates of Merit	Henry Edward Skyrme. Edward Henry Farr.

Council Examination Prizes.

Pereira Medal (silver); and Books value £5, presented by Mr. T. H. Hills.

Frederick William Short.

Pharmaceutical Society's Medal (silver); and Books value £3, presented by Mr. T. H. Hills.

William Kirkby.

Pharmaceutical Society's Medal (bronze); and Books value £2, presented by Mr. T. H. Hills.

Frederick James Yeatman.

JACOB BELL MEMORIAL SCHOLARSHIPS.

The Committee appointed to make the award of the Jacob Bell Memorial Scholarships for the ensuing session, subject to the approval of the Council, reported that twenty candidates had presented themselves at the following centres:—Cambridge, 1; Canterbury, 2; Cardiff, 1; Carnarvon, 1; Darlington, 2; Lincoln, 2; Liverpool, 1; London, 8; Norwich, 1; York, 1. Of these, five had obtained more than the maximum number of marks requisite to entitle them to the award.

The envelopes bearing the mottoes of the successful candidates having been opened, their names were found to be

William Edward Crow
and
Edward Baily.

The report was received and adopted.

Upon the motion of the President, seconded by the Vice-President, votes of thanks were passed to Messrs. Clark and Gibson, who had examined the papers for the Council prizes, and to Messrs. Benger and Ekin, who had performed the same duties with regard to the Jacob Bell Memorial Scholarships.

A vote of thanks was also given to Professor Bentley for his report on the Herbarium competition.

SUPERINTENDENTS OF WRITTEN EXAMINATIONS.

The following gentlemen were appointed Superintendents and Deputy-Superintendents of written examinations for the ensuing year:—

Superintendents.

Aberdeen	Davidson, Charles.
Birmingham	Southall, William.
Brighton	Gwatkin, James Ross.
Bristol	Stroud, John.
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Hollway, Albert Brown.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, Richard Morgan.
Carnarvon	Lloyd, William.
Cheltenham	Smith, Nathaniel.
Darlington	Robinson, James.
Douglas, Isle of Man	Breary, William A.
Dundee	Hardie, James.
Edinburgh	Stephenson, John B.
Exeter	Delves, George.
Glasgow	Kinninmont, Alexander.
Guernsey	Arnold, Adolphus.
Hull	Bell, Charles Bains.
Inverness	Galloway, George Ross.
Jersey	Ereaut, John, jun.
Lancaster	Bagnall, William Henry.
Leeds	Reynolds, Richard.
Lincoln	Maltby, Joseph.
Liverpool	Symes, Charles.
London	Taylor, George Spratt.
Manchester	Wilkinson, William.
Newcastle-on-Tyne	Martin, Nicholas Henry.
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	FitzHugh, Richard.
Oxford	Prior, George Thomas.
Peterborough	Heanley, Marshall.
Sheffield	Ward, William.
Shrewsbury	Cross, William Gowen.
Southampton	Dawson, Oliver Robert.
Truro	Percy, Thomas Bickle.
Worcester	Virgo, Charles.
York	Davison, Ralph.

Deputy-Superintendents.

Aberdeen	Kay, James Petrie.
Birmingham	Churchill, Walter John.

Brighton	Savage, William Wallace.
Bristol	Pitman, John.
Cambridge	Hoare, William P.
Canterbury	Amos, Daniel.
Cardiff	
Carlisle	Hallaway, John.
Carmarthen	Davies, R. Morgan., jun.
Carnarvon	Francis, James.
Cheltenham	Barron, William.
Darlington	Hutchinson, Rev. E.
Douglas, Isle of Man	Brearey, Arthur W.
Dundee	Kerr, Charles.
Edinburgh	Ainslie, William.
Exeter	Lake, John Hinton.
Glasgow	Davison, Thomas.
Guernsey	Collenette, Adolphus.
Hull	Baynes, James.
Inverness	Galloway, George.
Jersey	Ereaut, John.
Lancaster	Hall, William.
Leeds	Smeeton, William.
Lincoln	Battle, John Scoley.
Liverpool	Sumner, Robert.
London	Bremridge, Richard. Holmes, Edward M. Knapman, John W.
Manchester	Wilkinson, George.
Newcastle-on-Tyne	Stuart, Charles Edward
Northampton	Mayger, William D.
Norwich	Corder, Octavius.
Nottingham	Parker, William H.
Oxford	Thurland, Thomas Henry
Peterborough	Saunders, James Edwin.
Sheffield	Maleham, Henry.
Shrewsbury	Blunt, Thomas P.
Southampton	Spearing, James.
Truro	Anstey, John U.
Worcester	Lunn, Thomas.
York	Sowray, Joseph.

Pharmacy in Wisconsin.

The President said he had recently had the pleasure of meeting in that house Mr. Dadd, President of the Wisconsin Pharmaceutical Association, and had to thank him for presenting the Society with a copy of an Act of Parliament recently passed by the State of Wisconsin, placing pharmacy on something like a proper legislative basis. Mr. Dadd had obtained a copy of the original document, officially certified by the Secretary of the State, which he had presented to the Society.

Mr. Williams asked what was the nature of the Wisconsin Act.

The President said it was a sort of compromise between liberty and restriction; the English and Americans were in favour of liberty, but the German element in Wisconsin was in favour of restriction.

The Vice-President said he was present when Mr. Dadd visited the premises to inspect the mode of examinations, and was very glad to hear him express the great pleasure he had experienced in witnessing those examinations. Mr. Dadd said that in America at present they had no pharmaceutical legislation except in the separate States; there was no Congressional action, which they desired to obtain. They had in America the same difficulties which had been experienced in England. He had been glad to hear Mr. Dadd's testimony to the high character of the Society's examinations, and he said it would be his endeavour on his return to get something of the same character established in his own State.

It was resolved that Mr. Dadd be thanked for the copy of the Act, and that a copy of the Journal and Transactions of the Society be sent regularly to the Wisconsin Pharmaceutical Association.

Pharmacy in Guernsey.

The President said it would be seen by the Journal of June 17, p. 1046, that there was now a Pharmacy Act in the Island of Guernsey, which provided that no person should, after a given date, dispense *aucune médicament*, unless he were either registered by the Pharmaceutical Society of Great Britain or by the École de Pharmacie of Paris. He was glad to inform the Council that much of the credit in connection with the obtaining of this enactment was due to Mr. Crossley, who had passed the Society's examination and was on the Register.

The Poison Schedule.

The following communication had been received from the Privy Council Office:—

"Privy Council Office,
"Whitehall, *July* 29, 1882.

"Sir,—I am directed by the Lords of the Council to transmit to you to be laid before the Pharmaceutical Society, the accompanying order of their lordships approving the resolution of that Society of the 1st February, 1882, so far as regards nux vomica, viz., 'that nux vomica and its preparations should be deemed a poison within the meaning of the Pharmacy Act, 1868, and also a poison in the second part of schedule A of that Act.'

"Their lordships after giving their careful consideration to the proposals contained in the resolution were of opinion that pending the consideration of the expediency of further legislation with reference to the sale of poisons it is not desirable to add to the restrictions on the sale of the acids and other articles referred to in the resolution.

"I am, Sir,
"Your obedient servant.
(Signed) "C. L. Peel.

"The Secretary and Registrar
"of the Pharmaceutical Society."

"At the Council Chamber, Whitehall.
"The 28th day of July, 1882.

"By a Committee of the Lords of Her Majesty's Most Honourable Privy Council.

"Present:
"Lord Privy Seal
"Lord Richard Grosvenor
"Mr. Mundella.

"Whereas by 'The Pharmacy Act, 1868, Section 2,' it is enacted that the Council of the Pharmaceutical Society of Great Britain, may from time to time, by resolution declare that any article in such resolution named ought to be deemed a poison within the meaning of that Act, and thereupon, the said Society shall submit the same for the approval of the Privy Council, and that, if such approval shall be given, then such resolution and approval shall be advertised in the *London Gazette*, and on the expiration of one month from such advertisement the article named in such resolution shall be deemed to be a poison within the meaning of that Act.

"And whereas the Council of the Pharmaceutical Society of Great Britain did, on the 1st day of February, 1882, resolve and declare, by virtue and in exercise of the powers vested in the Council of the Pharmaceutical Society of Great Britain, that, amongst other articles, 'Nux vomica and its preparations' 'ought to be deemed a poison within the meaning of the Pharmacy Act, 1868, and ought to be deemed a poison in the second part of the Schedule A of the said Pharmacy Act, 1868.'

"And whereas the said Society have submitted the said resolution for the approval of the Privy Council, and the lords of the Privy Council are of opinion that the said resolution, so far as regards nux vomica and its preparations, should be approved,

"Now, therefore, their lordships are hereby pleased to signify their approval of the said resolution, in so far as regards nux vomica and its preparations.

"C. L. Peel."

PHARMACY IN VICTORIA.

The following letter from the Pharmacy Board of Victoria was read:—

"Pharmacy Board, Victoria,
"Melbourne, *June* 5, 1882.

"To the President and Council,
"Pharmaceutical Society,
"Bloomsbury Square, London.

"Gentlemen,—Referring to your letter of the 10th November, 1881, in reply to a communication addressed to you on the 8th July, 1881, in reference to the certificate of the Pharmacy Board of Victoria receiving some recognition by the Pharmaceutical Society of Great Britain—

"The Board are of opinion that the nature of their request has been misunderstood, and would therefore again respectfully draw the attention of the Council to the subject.

"The concessions asked for by the Board are as follows:—

"1st. That those persons only who have passed the Major examination under the Pharmacy Act of Victoria, 1876, as directed by the 18th section, may be enabled to carry on the business of a chemist and druggist in England without further examination.

"2nd. That should any candidates holding the Victorian Major Examination Certificate elect to present themselves for the examination of the Pharmaceutical Chemists of Great Britain, some privilege should be given in recognition of their Colonial studies.

"The Board would respectfully point out that the course of study required by the Victorian Pharmacy Act for the Major Certificate is nearly identical with that required at Bloomsbury Square, and in asking for some recognition for those who have passed the Major examination the Board only seek an equitable adjustment between the Victorian Certificate and that of the Pharmaceutical Society of Great Britain.

"The exemption of holders of the English Certificate was specially made by the Pharmaceutical Society of Victoria when framing the Pharmacy Act.

"It is probable that but few of the students from Victoria will avail themselves of the privilege asked for; whereas numbers of gentlemen holding the Certificate of the Pharmaceutical Society of Great Britain are constantly arriving in Victoria, who qualify on the production of their certificate, a privilege the Board are desirous should still be retained in the Victorian Pharmacy Act.

"We have the honour to be, Gentlemen,
"Your obedient servants,
"JOSEPH BOSISTO, *President*,
"HARRY SHILLINGLOW, *Registrar*."

The PRESIDENT said it would be remembered that a similar communication had been received last year, and was referred to a Committee to report upon, the report being that at present the Council had no power to do what was asked. Of course it would be a question whether the Council would be disposed to ask for powers to accept the certificates of examining bodies outside of Great Britain. He believed the view of the Committee at that time was that, at all events for the present, and probably for some years to come, it was not expedient that such certificates should be received. A letter to that effect was sent last year, and this was a reply asking the Council to reconsider the subject.

Mr. CHURCHILL remarked that these gentlemen only asked that their Major examination should be considered equivalent to the Minor in England.

The PRESIDENT said he understood that in Victoria there were no "chemists and druggists," but all registered men had the title of "pharmaceutical chemist." Substantially it was asking that the Victoria qualifying examination should be recognized as a qualification for practice in Great Britain. The simple answer was that the Society had no power at present to do so.

Mr. RADLEY thought it would be desirable to have some such arrangement, if it could be managed satisfactorily.

The PRESIDENT remarked that at present the British Act did not even permit the recognition of certificates from Ireland.

Mr. WILLIAMS: Nor from any body in which the examinations were not controlled by the Society.

Mr. RADLEY said the Council had no power at present, but he did not see why it should not obtain power if the opportunity offered.

Mr. SAVAGE thought it desirable that as far as possible there should be reciprocity. The only thing necessary was to be sure that the examinations were of equal value.

The PRESIDENT said all depended on the value of the certificate. The Victoria Board had only lately been created, and though a syllabus of the examinations had been sent, the Council did not know anything about the way in which they were carried out. He had no doubt that in time it would be necessary for all English-speaking countries to have reciprocity in such matters; but the gentlemen in Victoria surely would not wish those who had a thoroughly high standard to lower it in any way. He did not say that the Victoria standard was lower, but that Board was a much younger body, and until it had gained some experience in the process of examination and education, it would probably be wise to hesitate before accepting its certificates. It was only of late years that men possessing the highest qualifications obtained on the continent had been accepted on the Medical Register of this country.

Mr. YOUNG sympathized with the remarks of Mr. Savage, and he thought that when a young country had grown into something like prominence, and its examinations were shown to be equivalent to those in this country, it would be well to accept its certificates, provided the Council had the power to do so.

The PRESIDENT said a reply should be sent to much the same effect as before, stating that the Council had no power at present to accede to the request, but that when it went to Parliament for fresh powers the general policy of reciprocity might be considered.

This was unanimously agreed to.

The VICE-PRESIDENT said it would be a great responsibility to ascertain what was the character of the examinations in question.

PRELIMINARY EXAMINATION.

The PRESIDENT said a communication had been received from the Hon. Secretaries to the Oxford and Cambridge Schools Examination Board describing the nature of the examinations which it was intended to institute in connection with schools throughout the country, and asking if certificates granted by that body would be accepted in lieu of the Preliminary examination. In the last paragraph inquiry was made if it would be considered satisfactory to allow the head master of a school in certain cases to supervise the examinations. He had gone carefully through the scheme with the Vice-President, Secretary and two members of the Board of Examiners, and they all agreed that certificates in class 1 might be accepted in lieu of the Preliminary examination, but they did not think it desirable that the head master of a school should be the sole supervisor of an examination conducted in his own school.

Mr. WILLIAMS said he could give no opinion on the scheme as a whole, but if it included all the subjects required in the Preliminary examination he did not see why the certificate should not be accepted.

The PRESIDENT said this appeared to be an attempt to bring the examination of schools under the ægis of the universities and as such was a movement which he thought ought to be encouraged. He then read a draft letter which he had prepared in reply.

The Council went into committee to consider this draft.

On resuming, it was unanimously approved, and the letter ordered to be sent.

Report of Examinations.

July, 1882.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major (12th)	7	3	4
„ (13th)	7	3	4
„ (19th)	6	2	4
	—20	— 8	—12
Minor (12th)	20	5	15
„ (13th)	20	6	14
„ (14th)	26	13	13
„ (19th)	21	8	13
„ (20th)	23	12	11
„ (21th)	25	14	11
	—135	—58	—77
Modified (12th) . . .	1	0	1
	156	66	90

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major (20th)	2	1	1
Minor (20th)	13	12	1
„ (21st)	14	7	7
	—27	—19	— 8
Modified (21st) . . .	1	1	0
	30	21	9

Preliminary Examination.

	Candidates. Examined.	Passed.	Failed.
July 4th	370	189	181

Four certificates received in lieu of the Society's examination:—

2 College of Preceptors.
1 University of Aberdeen.
1 University of Cambridge.

Examinations in Scotland.

It was resolved that the examinations in Scotland in 1883 should take place in January, April, July and October.

The Council Meeting in September.

The President announced that although summonses would be issued for a Council meeting in September it was not intended to form a quorum.

Erratum.—In the list of persons who passed the Minor examination on the 20th of July, page 93, column 2, after line 36, insert,

Thomas, John Henry ....Chester.

Proceedings of Scientific Societies.

SOCIETY OF CHEMICAL INDUSTRY.

Felspar as a Source of Potash Alum.*

BY JOHN SPILLER.

The aim and objects of this Society, as I understand them, will be not only to record the steps of progress made in actual chemical manufacture but to take account of "wasted ingredients," with a view to their possible economization in the future. It is under this latter head that I beg leave to offer a few suggestions bearing on the manufacture of alum, which have been sufficiently confirmed by laboratory work to prove my case, although I do not pretend to have turned them as yet to practical account.

Starting from felspar and the large class of rocks in which it is contained, such as granite, gneiss, porphyry, syenite, greenstone, mica-slate, and the basaltic rocks which together constitute a large proportion of the earth's surface, we find a mineral occurring which contains *more potash and alumina* than is present in common alum. If, then, in this native double silicate we could replace the SiO_2 by SO_3, we pass at once from insoluble felspar to alum. Every chemist knows of the method of decomposing silicates in mineral analysis by attacking them with hydrofluoric acid; but as it was my object to prepare a *sulphate*, and to work as cheaply as possible, I employed a mixture of fluorspar, felspar, and sulphuric acid. Alum is formed together with calcium sulphate and the gaseous fluoride of silicon. The last-named gas, passed into water, gives a finely-divided silica—most useful as a polishing powder—and hydrofluosilicic acid, for which there is already occasional use in the arts. Comparing now the percentage composition of felspar and alum, and taking for the former the mean of three analyses published by Watts ('Dictionary of Chemistry,' vol. ii., pp. 620–621) we get for common felspar, "orthoclase":—

	Alumina.	Potash.
Stolberg (Rammelsberg) . .	16·98 . .	14·42
Lomnitz (Valentine Rose) .	17·50 . .	12·00
Chamounix (Delesse) . . .	19·06 . .	10·52
Mean	17·85 . .	12·31

Or, together, say over 30 per cent. of ingredients useful in the manufacture of alum, which salt, when crystallized, contains only 10·83 per cent. of alumina, and 9·91 of potash; or 20·74 per cent of total bases. This looks hopeful from a manufacturer's point of view; for, taking the potash as regulating the yield, 100 parts of felspar should give nearly 124 parts of crystallized alum; and if the relative deficiency of alkali were supplied, then the yield (calculated from alumina) should be as high as 165 per cent.

In my own experiments I have not succeeded in getting more than an *equal weight*, but I have been working under disadvantage with samples of coloured felspar containing a considerable quantity of iron. From a piece of white granite I have obtained a fair quantity of alum, with very much less iron in solution; and to this point I had arrived when my attention was directed to a previous publication of the fundamental fact in the *Bulletin de la Société Chimique de Paris* for June 7, 1872. The particulars are as follows: At the Paris meeting M. Lecoq de Boisbaudran was describing a process for the extraction of cæsium and rubidium from lepidolite. He attacks the mineral with hydrofluoric acid, and separates the caesium and rubidium by taking advantage of the difference of solubility of the bitartrates. Then M. Guignet, in the discussion, says he "thought it might be possible for this extraction to utilize the action of *sulphuric* acid, and separate the alkalies in the state of alums, this proceeding having been used by him to extract the potash from felspars." The brief terms of this report (three lines only) do not afford much information, or make it clear that M. Guignet ever worked with a mixture of felspar and fluorspar, but he evidently aimed at economizing the potash in felspar, and may have succeeded in so doing.

Much more pertinent to this part of the subject are the experiments of Mr. F. O. Ward and Captain Wynants, who, in December, 1857, took out a patent for what they called the "Calcifluoric Attack." A full account of this process appeared in the "Reports" by the Juries of the International Exhibition, 1862, class ii., pages 50 to 54; and later, a company was formed to put it in operation at Connah's Quay, near Flint. The object seems to have been to extract potash from the primitive rocks rather than to make alum; but I am bound to say that the inquiries I have made (with the kind assistance of Mr. Eustace Carey) seem to show that the production of potash from the felspathic rock

* Read at a Meeting of the London Section, March 13, 1882.

was anything but a commercial success. Had it been worked continuously on a large scale, who knows but that we might have had by this time vast stores of lithium, cæsium, rubidium, and perhaps other yet unknown alkali-metals, concentrated from the by-products of such a manufacture?

Reverting now to my own experimental results, two or three points of practical interest may be mentioned.

1. I find it necessary to get rid of the excess of sulphuric acid by thoroughly heating the decomposed mass in a current of air before dissolving, on account of the extraordinary increase of solubility of the alum in acid liquors.

2. When granite is attacked by the nascent HF, the felspar and mica disappear long before the admixed quartz, most of the latter remaining in the residue.

3. The employment of sheet-lead vessels is not to be recommended, for the cost is great and the low fusion point of the metal restricts too much the degree of temperature which it is needful to apply in order to expedite the decomposition.

When the treatment is successfully accomplished there is the large amount of calcium sulphate to be dealt with, left as a bulky residue on treating with water. It struck me, therefore, that it would be more advantageous to use the mineral cryolite ($3NaF, Al_2F_3$), which is so plentiful in Greenland, in place of fluorspar as previously described. This would augment the amount of aluminic sulphate formed at the same time that it supplied the needful fluorine. Here, again, Persoz, Sauerwein, Thomson, and others have described the manufacture of crude alumina salts from cryolite *per se*, but none of these processes include the idea of making the hydrofluoric acid available for decomposing the native double silicates of potassium and aluminium mixed therewith. The relative proportions in which the felspar rock and cryolite have to be employed, as also the amount of sulphuric acid required, must be dependent upon the nature of the rock operated upon, the amount of admixed quartz, etc., and could be easily determined by making a few preliminary experiments upon a fair average sample of the rock about to be treated. A warm hearth, made slightly hollow, and lined with fire-bricks, or slabs of the rock itself, gently heated by reverberatory action, will probably be the best construction for conducting the operation on a manufacturing scale.

Next, as to the varieties of granite and porphyry which are likely to yield the highest percentages of potash, there are displayed in the Museum of Practical Geology about a hundred polished samples, which I have lately been to inspect. Amongst these I find that the granite from the Duke of Argyll's quarries in Mull appears to consist almost entirely of rose-coloured felspar. The blocks from the Mourne Mountains, County Down, are mostly white felspar; and large crystals of the same are seen in the white granites from Lanlivery (Cornwall), St. Barule (Isle of Man), and in the specimens from Castlean (near Penzance), and Lundy Island. Rubislaw and Cove (Aberdeen) produce almost pure felspar, containing 13 per cent. of potash. Peterhead granite is rich in felspar, but it is highly coloured with ferric oxide.

I am indebted to Professor J. S. Brazier, of the University of Aberdeen, for much valuable information respecting the granite quarried in his neighbourhood, and he has kindly sent me some of the waste chippings and *débris* from Messrs. Macdonald and Field's huge turning-lathes, such material as is used for mending the roads, but the small sample sent was a variety of grey granite which did not happen to contain much potash. More interesting information is contained in a letter which I am permitted to append.

Letter from Dr. Alexander Cruickshank to Professor Brazier.

"I have much pleasure in answering, as far as I can, your inquiries of February 4. In a note at bottom of page 265, vol. xxviii. of the *Transactions of the Royal Society of Edinburgh*," published 1877, in an elaborate paper on the "Felspars of Scotland," Professor Heddle, of St. Andrew's University, says: 'I find the grey granite of Aberdeen to consist of a great deal of oligoclase, little orthoclase, little quartz, very small quantities of muscovite (potash mica), and a good deal of Haughtonite (a new variety of mica).'

"In this paper Professor Heddle gives new analyses of oligoclase and orthoclase, and in vol. iii. of the *Mineralogical Magazine*, page 81, he gives an analysis of Haughtonite, while an analysis of muscovite is given in Professor Nicol's 'Mineralogy.'

"From these analyses I extract the percentages of potash in the minerals composing our granite.

	Contains. Per cent. K_2O.
Oligoclase, from Rubislaw Quarries . . .	3·77
Oligoclase, from Scolty Quarries	4·73
Oligoclase, from Dyce Quarries	1·34
Orthoclase, from Rubislaw Quarries . . .	13·05
Muscovite	11·80
Haughtonite, from Cove, near Aberdeen .	8·81

Mean, 7·15 per cent. of potash (K_2O).

"There is a rock called compact felspar or felstein (a mixture of orthoclase and quartz, says Professor Nicol, in his 'Mineralogy'), forming beds in the gneiss rocks, about half way between the Bay of Nigg and the Cove. It also occurs in a large mass on the Muchall's coast, where it is used for 'metalling' the Stonehaven Road. Again, it occurs near the top of Cairn William Hill, near Monymusk. I remember Dr. Shier telling us in the natural history class at Marischal College, forty years ago, that the compact felspar from some of these localities had been tried in the English potteries. It was found, however, to contain too great a percentage of silica for the purposes intended.

"I have long understood that the scrapings from the roads about Aberdeen (which are metalled with broken granite mixed with sand) are valued as a potato manure, from the large quantity of potash they contain.—Yours, etc.,

(Signed) "ALEXANDER CRUICKSHANK."

The whole subject appears, therefore, well worthy of extended investigation; and, like as the American potashes have been displaced to a great extent by the Stassfurt salts (native forms of KCl, sylvine, and carnallite), so, in time, it may chance that British sources of potash will take the place of the German supplies. On the commercial policy I beg to refer the members of this Society to the interesting column on page 25 of our new journal, wherein Dr. Grüneberg asks and argues the question: "How far would a Reduction of the Price of the Crude Potassium Salts give Impetus to the Consumption of the same in the Chemical Industries?"

Parliamentary and Law Proceedings.

DEATH FROM CHLOROFORM.

On Saturday, Mr. Carttar, West Kent Coroner, held an inquest on the body of Grace Harriet Butcher, aged 20, wife of Herbert Butcher, a medical student, of Turret House, Avenue Road, Bexley Heath. On Thursday night the deceased retired to bed, suffering from toothache, and to relieve the pain her husband rubbed some chloroform on her gums with his finger. He returned the phial containing the chloroform to the dressing-case, which he locked, placing the key in a different place to that from which he had taken it. He then retired to rest himself, and was not disturbed during the night by his wife, but on being called at seven o'clock the next morning he found Mrs. Butcher lying dead by his side, with her face on the pillow, his silk handkerchief in one hand, and the empty chloroform phial, which was two-thirds full overnight, in the other hand. She had been dead four or five hours.

The husband said he was a very heavy sleeper, but a candle was left burning in the bed-room all night.

Dr. N. A. Barrington said that he had made a *post-mortem* examination, in conjunction with a medical man who attended on behalf of deceased friends, and found the body well nourished, and the organs generally healthy, but the heart was flabby, showing deceased was not a good subject for receiving chloroform. The appearances were quite consistent with the history of the case as given in evidence. The death was due to excessive inhalation of chloroform. The bottles on the mantelpiece contained nothing that would account for the death of the deceased.

The jury returned a verdict, "That deceased died from misadventure through inhaling an overdose of chloroform, in attempting to gain relief from toothache."—*Morning Post.*

Poisoning by Laudanum.

An inquest has been held at Malton on the body of John Collier, until lately a master printer and stationer in the borough. The evidence showed that deceased had committed suicide by taking a large dose of laudanum. The jury returned a verdict of "Suicide whilst in a state of unsound mind."

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Future of Pharmacy.

Sir,—Your correspondent, "Pillmaker," has evidently been exercised with the problem which perplexes many minds, as to how a chemist is to get his living. Emerson has condensed the philosophy of it into a sentence—"Make yourself necessary to the world and mankind will give you bread."

"Pillmaker" seems to think that what the world wants is somebody to break the government stamp and retail Parr's pills in small quantities. That process would convert us from "pill makers" into pill vendors, and herein we should be at least a quarter of a century behind the hucksters, who have done this very thing for many years. Some of them have been aided and abetted by the supply of locally manufactured Parr's pills (I do not refer to any special neighbourhood), which never had a government stamp to be broken. In these cases the purveying chemists were pill makers—with a qualification.

But, sir, are we not fast becoming, if we are not already become, mere brokers of nostrums and openers of packages? The art of dispensing threatens to be simply the knowledge of the size of bottles, the ability to read the English label of an extract that must be procured in a particular town, and the capacity to count twelve small beans, supplied only, say from Kentucky. It will soon be time for some of the faculty to hold themselves forth to the public as merely advisers as to what quackery their patients should adopt, and instead of giving up their "dispensing" to chemists, they might well dress up their page boys and set them to hand over to their clients the packages as imported. The sham would at least stand acknowledged, and there would be a gain of truth to the world. It would be quixotic to attempt the subversion of such established remedies as Battley's solution or Brown's chlorodyne; but if in some town of adequate importance a bond of union could be formed sufficiently strong, and if there were courage bold enough for all the chemists in the town to refuse to dispense chemical and pharmaceutical preparations of definite composition, under cover of any person's label, and to maintain their sole and individual responsibility for all the medicines they prepare, an example would be set, and an illustration given, which would go some way to prove to the public, that not the nostrum, but the chemist is "necessary to the world"—*quod est demonstrandum.*

Ryde. Henry H. Pollard.

Sir,—I doubt very much if "Pillmaker's" scheme of buying the largest size of the most extensively used patents, and retailing them in small quantities, will ever be generally adopted. He proposes that chemists should measure and label patents, and thinks that outsiders would not care to spend so much time. Would any respectable chemist have the name of some new and much puffed patent on the same label with his own name and address? Of course there may be exceptions, but as the President of our North British Branch once said, "I find them in bad company."

I have no sympathy with chemists "cutting" patents. The huckster may charge 10*d*., but the chemist's price ought to be 13½*d*; by "cutting" he puts himself on "level terms" with such indifferent traders.

Regarding the general sale of the commoner drugs, I think the chemist who is "true to the interests of the trade" has little to fear. The other week, a lady customer came into my shop, to ask the price of chemical food; she said she got it at so-and-so's for so much. I assured her that the genuine article could not be bought wholesale at such a low figure, succeeded in getting her order, and have supplied her since. Keep drugs of standard purity only and there is no fear of our customers going elsewhere for salts or cream of tartar.

Edinburgh. John.

Leeches.

Sir,—For the past four years I have been trying experiments as to the preservation of leeches. Many means have been devised from time to time in the Journal, but few have been very successful. My plan is as follows:—I have one of Maw's bell-shaped aquariums half filled with water, also a few rough stones, about half a dozen in number and about the size of an orange. The water is changed twice only in twelve months. My object in doing this is because the temperature is varied but very little, and that very gradually, whereas when the water is changed once or twice a week, especially in winter, it is like transferring them from a warm to a very cold climate, and frequently I hear the complaint of chemists losing so many just after changing the water. I keep my aquarium in the shop, and although the water is only changed twice in a year, it is never foul but only has a slight fishy smell. Anyone adopting this plan will find it much to their advantage. When the stock of leeches is reduced to six in number, and before putting a fresh stock in the aquarium, I take out those six, as I find that they are just similar to bees, that is, when a stranger enters the hive they immemediately pounce upon it and destroy its life; so it is almost the same with leeches.

I have lost three leeches only in four years.

Devonport. J. A. Lamble.

J. Hickisson.—We are unable to comply with your request.

A. P. B.—You do not say what difficulty you experience in dispensing the prescription.

W. Wilkinson.—The question could only be determined after an examination of the precipitate.

Messrs. Wills and Wootton.—Your letter has been handed to the Secretary. A correction will be found in the official report on p. 118.

Cariad Raddy.—According to the recent researches of Mallet (*Phil. Trans.*, 1880), in which special care was taken to eliminate the influence of occluded oxygen, the atomic weight of aluminum is 27·019, taking oxygen at 15·961.

T. W.—Aqua menthæ viridis. See Disp. Mem., No. 101, *Pharm. Journ.*, [3], viii., 850.

Lux.—The formula has already been asked for more than once in this Journal unsuccessfully.

A. F. Sainsbury.—(1) Proctor's 'Lectures on Pharmacy;' (2) Gray's 'Supplement to the Pharmacopœia,' or Cooley's 'Cyclopædia of Practical Recipes.'

Communications, Letters, etc., have been received from Messrs. Davis, Proctor, Ronchetti, Macdermott, A £2 Victim, Wulfruna, Magister, J. E. J.

MADAGASCAR DRUGS.

BY E. M. HOLMES, F.L.S.

Although a list of the remedies used in Madagascar has already appeared in this Journal ([3], vol. xi., p. 853), and some remarks have been published concerning their uses (vol. xii., p. 669), no description has hitherto been given by which the various roots, barks, etc., might be identified should they hereafter enter into commerce. A considerable number, probably, do not possess active properties, and others are already well known. The remainder probably possess properties which may enable them to be turned to account in Madagascar as substitutes for European drugs, and on this account appear to merit such a brief description as will enable them to be distinguished from other drugs.

ROOTS.

FAMAMO OR FANAMAMO.—The root is woody, about ¾ inch in diameter in the upper portion, branched and tapering to ¼ inch or less, of a pale bright brown colour externally, and yellowish white within; the surface is rough with small paler warts of about the size of a pin's head.

The plant has been identified at Kew as *Mundulia Telfairii*, Boj., and belongs to a genus closely allied to *Tephrosia*, a genus which yields several fish poisons. It is for this purpose that Famamo is chiefly used, more especially in ponds or still waters. It is mentioned here because it may be presumed that it contains an active principle whose therapeutic properties might be worth investigation.

FISAVA.—A small woody root, undulated and about the size of a goose quill, with a thin smooth bark, pale brown externally, but dark brown in transverse section. The taste is aromatic and bitter, somewhat resembling that of cardamoms. The meditullium is hard and woody, and minutely porous. The Malagasy name signifies "disperser of mist." It is used for headache.

HAZOMAFÀNA.—This drug consists of woody stems varying from ¼ to ½ inch in diameter, with a reddish grey, minutely wrinkled bark, speckled all over with white dots. The bark is thin, very tough and composed of fine silky fibre, and in aspect, acridity of taste and herbaceous flavour so closely corresponds with ordinary mezereon bark that there can be little doubt that it is the produce of a species of *Daphne* (possibly *D. viridiflora*, Wall.). The pounded bark is given in doses of 1 drachm, mixed with salt and ginger, as a purgative. It probably possesses similar properties to *Daphne Mezereum*, and would be worthy of a trial as a substitute for it in the native materia medica.

HAZOMANGA.—The specimen of this drug in my possession consists of a piece of whitish exogenous wood, the details of the structure of which cannot well be seen from having been mined in all directions by insects, a fact somewhat remarkable, since the wood has a strongly camphoraceous taste and odour and considerable pungency. It is used for indigestion.

MAHATATIDY.—This drug consists of woody stem, about as thick as the little finger, with a thin whitish bark marked longitudinally with small ridges, the summit of the ridges being cracked so as to look like narrow elongated warts. A transverse section shows a very thin bark, in which minute crystals can be seen under a lens, and a white woody meditullium of ordinary exogenous structure. The taste resembles slightly that of pyrethrum, and has the same sialogogue effect. The name means "making to remember," an infusion of the plant being used to refresh the memory.

It probably belongs to the Rutaceæ, and might, perhaps, form a substitute for jaborandi in native materia medica.

MATSÀTSORANA.—Consists of pieces of stem about ¾ to 1 inch in diameter, with a hard, brittle, yellowish-brown bark, about two lines in thickness, smooth or marked with a few transverse rings and small oblong transverse warts and scars. The bark has a granular, and the meditullium a fibrous fracture, but owing to the cells being filled with starch, the structure is not easily seen, except that the white transverse surface under a lens is perceived to have scattered pores and numerous horny looking lines, transversely placed so as to form irregular zones, a feature by which it is easily recognized. The starch is peculiar, being oblong, spindle-shaped or irregularly angular, with a well marked longitudinal hilum, somewhat similar to the starch found in the Leguminosæ. The root has a faint aromatic odour and no perceptible taste, but is remarkable for its similarity in colour and general appearance to canella bark. It is used for dyspepsia.

MAINÀKIMÀFY.—A woody plant about the size of the fore finger, with a pale brown wrinkled bark and an astringent taste. A transverse section shows a bark about two lines thick, having the reddish marbled appearance peculiar to rhubarb and other polygonaceous plants. When the bark is scraped with the nail it reveals a thin yellowish-brown layer immediately below the epidermis. The whitish woody meditullium exhibits the ordinary radiate and porous structure of exogenous roots. The root probably possesses astringent and alterative properties similar to those of the common dock.

RAÌNGERAÌNGY.—Is a tapering greyish-brown root, about 1 inch in diameter and 3 or 4 inches long, with a spongy pith and a radiated woody ring between it and the thin bark, the latter being of a brown colour and having a rough scurfy surface. It has no odour, but a taste between that of aconite and pellitory in character, which developes slowly. The plant grows in a valley south of Andrangoloaka. The leaves are stalked and imparipinnate, with three or four pairs of oblong crenate-serrate leaflets, cordate and unequal at the base. The leaflets are smooth above, but underneath the veins have scattered yellowish hairs, which occur also on the petioles and rachis. The flowers I have not seen, but the plant evidently belongs to the Umbelliferæ.

RAISÀONJO.—This is a hard woody exogenous stem 1–2 inches in diameter, with a pale bright brown bark about one line in thickness. The wood, which is very hard, is seen under a lens to have numerous slender medullary rays. The bark is externally marked with transverse rows of oval or oblong warts, which, as the bark becomes older, run together into warty ridges. Internally it is pale and of a horny appearance. The taste, at first sweetish, soon becomes exceedingly acrid. It is given with "Ambilaza" in urinary diseases. It is called by the Malagasy, according to Dr. Parker, "Odinhèry," or the strongest "Ody" (charm or fetish). The plant has not yet been identified, but the character of the bark seems to point either to *Sapindaceæ* or *Euphorbiaceæ*.

ROVY.—This root is about the thickness of the forefinger, brownish-grey externally, slightly furrowed longitudinally, with a few transverse constrictions, each of which is marked by a crack on one side. The bark is whitish and spongy, and the yellowish woody meditullium is divided into numerous linear wedges by white medullary rays, easily discernible by the naked eye. The odour is somewhat earthy and the taste very bitter. In appearance and structure the root resembles that of some of the species of *Aristolochia* used under the name of guaco in South America. Possibly it may be the root of *Aristolochia acuminata*, Lam., the only species at present described as a native of Madagascar. (See Baker, 'Fl. Mauritius,' p. 322.) The root is used for indigestion, and is said to act as a purge.

Sanàtry consists of pieces of slender stems, of the size of a goose-quill and about 6 inches long, externally greyish-brown, striated and cracked longitudinally, with scattered warts of the size of a pin's head. The thin bark, pale inside, easily splits off from the tough woody portion of the stem; the latter in transverse section is seen to be pale yellow or nearly white and porous. The taste is bitter and slightly smoky. It is used as a remedy for bronchitis and catarrh, half or a whole piece being scraped and given in water. It is used more particularly for children.

Tangèn (*Tanghinia venenifera*, Poir.). — This celebrated seed, the ordeal poison of Madagascar, resembles an almond in the shell, except that it is rather broader in proportion, and has an open fissure on one side; the colour of the endocarp is also of a dull dirty brown. The kernel or seed is seen to be oily when pressed with the nail. (See Tangen Hakalava root.)

Tsìankoditra drevo.—This drug consists of a contorted rhizome, giving rise to numerous erect branches, which are attached to the rhizome by a kind of articulation, leaving a well-marked circular cicatrix or scar where they have fallen off, the base of the stem being slightly enlarged near the joint. Both the rhizome and stems have a pale brown papery epidermis. A transverse section of the meditullium under a lens shows a single row of wedge-shaped vascular bundles surrounding the pith, and then a series of transversely oblong bundles radially arranged. The bark is as thick as the meditullium, and contains a few rather brittle vascular bundles immersed in a friable parenchyma, the cells of which, under the microscope, show in a remarkable manner sclerogenous deposits and canals leading to the centre of the cell, and form an excellent object for illustrating this structure. The taste is bitter and slightly acrid. It is said to be used mixed with "Manavo-drevo."

Tsìhitrafòtotra (*Cassytha filiformis*, L., Lauraceæ).—The name means "roots not found," and indicates its parasitic nature. The drug consists of the slender thread-like stems of the plant. It has a mucilaginous taste, but no odour. It is employed in Mauritius in the form of decoction for intestinal derangement and as a tonic for scrofulous and rachitic infants. This is another eastern remedy whose use extends to Madagascar. In India the powdered plant mixed with sesamum oil is used to strengthen the hair, and by the Brahmins for cleansing inveterate ulcers, for which purpose it is mixed with butter and ginger. The juice mixed with sugar is considered a specific in inflamed eyes ('Treas. Bot.,' p. 234). Its properties are probably due to mucilage.

Tsilanky.—This drug consists of slender woody stems, about ¼ inch in diameter, with a thin yellowish longitudinally shrivelled bark, the circle of wood being formed of pale horny tissue, divided into radial wedges by the medullary rays. The pith consists of polygonal cells with well-marked pores. The effects of this drug are said to resemble those following the bite of the tarantula.

Tsilèondroàhy.—This is the root of an umbelliferous plant. Externally it is marked with small transverse ridges. The transverse section shows a central white spongy meditullium surrounded by a thick bark, the liber of which consists of vascular bundles arranged in radiating lines with parenchyma tissue between them, a dark resinous circle separating this portion from the meditullium. Another similar circle occurs between the latter and the thin brown epiphlœum. The taste is pungent and the odour like that of wild angelica (*A. sylvestris*, L.), to which plant the serrate leaflets also bear some resemblance.

Ramy.—This oleoresin has the odour of elemi and is probably the produce of *Canarium Colophania*, Baker ('Fl. Mauritius,' p. 44), from which an oleo-resin is obtained in Mauritius and employed in the form of plaster as a detersive. It corresponds in appearance with the Mauritius elemi in the Hanbury collection of materia medica, both in giving no coloration with bromine water and in leaving crystals after solution in cold alcohol.

BARKS AND WOODS.

Hafotra Fotsy.—This occurs in the form of strips of white fibrous bark, very tough and difficult to break and consisting of liber only. It has a slightly pungent odour; when chewed it has at first no taste, but a pungent acridity is slowly developed, which lasts for several hours and recalls the taste of mezereon so strongly that it seems probable that the bark is derived from a thymelaceous plant, notwithstanding the fact that the plant received under the same name at Kew proves to be *Abutilon angustatum*, Mart.

Havozo.—A dull brown bark, of which the inner surface is finely striated longitudinally and the outer minutely cracked and having small warts sparingly scattered over it. A transverse section shows a thin epidermis, beneath which lie several strata of stony cells; these give to the middle of the bark a granular texture, and at right angles to them thin medullary rays give a radiate appearance to the innermost portion of the bark. The odour of the cut or bruised bark is very powerful and exactly resembles sassafras, for which it might probably form an efficient substitute in native materia medica. It probably belongs to the Lauraceæ and may possibly be the *Hernandia peltata*, or *Sassafras mauritiana*, Boj. ('Hort. Maur.' p. 273). See Baker's 'Flora Maur. and Seychelles,' p. 294.

Mandravasorotra (*Betsileo*).—This is a pale fawn-coloured or dirty-white bark, closely resembling canella bark in appearance and structure. It occurs in the form of unrolled quills about ⅝ inch in diameter. The bark varies from ⅛-¼ inch in thickness; the outer surface has the thin periderm removed and is marked with numerous small circular depressions and a few scattered warts with a smooth depressed apex. The transverse section shows under a lens a dense white parenchyma with minute circular cavities or depressions in which glistens an oleoresinous fluid (?) which apparently, when exposed to the air, yields minute crystals. The taste and odour both strongly resemble those of

Cinnamodendron corticosum, the taste being more pungent than that of canella bark.

It is used medicinally for stricture and dysuria and as a stimulant in chronic diseases.

No species of either canella or cinnamodendron is mentioned by Baker in the 'Flora of Mauritius and the Seychelles,' nor by Bouton in his 'Plantes Médicinales de Maurice.' In Madagascar the bark is used in stricture and dysuria or as a stimulant in chronic diseases.

A bark under the same name, from Betsileo province, possesses the following characters:—Bark, dull brown, externally nearly smooth, with a few faint transverse furrows, minutely striated longitudinally on its inner surface; a transverse section shows a thin dark outer line of minute cells, beneath which lies a layer of stony cells which radiate into the yellowish woody tissue of the liber in the form of pale lines distant about $\frac{1}{6}$ inch from each other. The taste and odour strongly resemble mace, with a faint resemblance to the odour of bruised carrot leaves. The layer of stony cells gives a granular fracture to the outer portion of the bark. Although probably a lauraceous bark, it evidently is the produce of a different tree from the ordinary mandrava sarotra bark; it is not identical with the Havozo bark.

Nato.—A thin bark, from which the periderm has been removed. Externally it is of a sienna brown tint and of a bright red brown on its inner surface. A transverse section is of a much paler colour. It readily splits up longitudinally into laminæ which consist of hard agglutinated fibres. The taste is astringent and slightly bitter. It is used in Madagascar to dye cloth of a red colour, but if not poisonous might form a useful astringent.

(*To be continued.*)

THE MELTING POINTS OF PETROLEUM OINTMENTS, AND A TRIP INTO THE OIL COUNTRY.*

BY SAMUEL A. D. SHEPPARD.

There has been a desire, for some time past, especially among physicians, for a petroleum ointment that shall have a higher melting point than most of those now in the market.

It has already been intimated that petroleum ointment will have a place in the coming United States Pharmacopœia, and the only question which still appeared to be open was the melting point. Statements had been made to the effect that an ointment of high melting point could not be made without the admixture of foreign substances, and, in general, the knowledge of the preparation and properties of these products was so fragmentary that it was deemed advantageous to determine, by personal observation, the following points:—

1st. Can petrolatum be made by filtration of any desired melting point between 95° F. and 120° F.?

2nd. If such be the case, is the process so practical and the supply of crude material from which it may be made so abundant that, if the article should be directed to have a melting point not exceeding 120° F., pharmacists can readily obtain it?

With this interest in view, the writer left Boston at 3 p.m., March 14, and arrived in Corry, Pennsylvania, the next day at noon.

An invitation had been received some months before from Messrs. Clark and Warren, oil refiners, of Corry, to visit the oil country, and have carried on by them any experiments on this subject, in any way desired, at their works, where all the facilities for such experiments were ready at hand or could be easily furnished at short notice.

Mr. R. C. Clark, the senior partner of the firm, met me at the depôt, and during the seven days spent in Corry and vicinity he devoted his entire time to me, himself performing nearly all the experiments, and giving his constant personal attention to all of them, sometimes till late into the night, in order that I might see the work done in the most satisfactory manner.

He gave me in every possible way all the facilities needed in the investigation, and materially assisted me, a stranger in the oil region, to obtain information on any and all points that happened to arise, and I embrace this public opportunity to thank him, especially, for his courtesy, and also to thank his partner, as well as Mr. William H. Abbotts, of Titusville; Mr. W. R. Weaver, of the Emery Oil Company, Bradford; Mr. E. B. Frew, and Mr. Babcock, both connected with the United Pipe Lines at Warren; Mr. Edward E. Kattell, of Binghamton, N. Y.; Mr. S. C. Lewis, of the Chesebrough Manufacturing Company, New York, and many other gentlemen whom I met, all of whom, without exception, cheerfully and courteously gave me information with regard to various points connected with the subject.

Wednesday afternoon was occupied in thoroughly discussing the subject with Mr. Clark and others, and in making a careful inspection of the Oil Refinery Works of Messrs Clark and Warren, in order to familiarize myself with the proposed materials, implements, and processes.

Having had previous knowledge of the nature of what is known as B. S. oil, my plan as laid out on Wednesday evening was about as follows:—

To distil and filter such B. S. oil as I could dip out of the bottom of Clark and Warren's crude oil six-thousand-barrel tank.

To go over to Warren, some 25 miles distant, to get a supply of B. S. oil from the United Pipe Lines that had been standing several years, and to distil and filter this sample. To go over to Bradford, the great centre of the present oil-producing district, and examine personally the oil wells, and talk with oil men at the wells and in Bradford, and to obtain specimens of the heavy, crude, amorphous paraffin that sticks to the sucker-rods and clogs the pipes at the wells. Lastly, to experiment in any way that seemed best on my return to Corry.

This plan was carried out nearly as stated.

The agents of the United Pipe Lines in Warren were very courteous, and readily granted the request to take a half barrel of B. S. oil from their large wooden tank, saying that there was some 4 feet of the "stuff" in the tank, and if any plan could be devised to create a demand for it, all the oil men in this section would be pleased, as it is a nuisance everywhere, and the bulk of it is increasing every year in every tank. All the persons with whom I talked told the same story. The article is a nuisance; the bane of the oil men.

This half-barrel sample was expressed to Corry, and time being limited, we went direct from Warren to Bradford. Here as much time as was necessary was occupied in going around to the oil wells, in getting samples, and in consultation with oil men as to the quantity and quality of the B. S. oil and the sucker-rod production, or "rod wax," which articles seem to me to be both simply crude amorphous paraffin, differing in density and in the admixture of lighter products.

The "rod wax," which the oil producers simply designate as "paraffin," seems to be found in both "pumping wells" and "flowing wells;" but it is not often found at a depth much lower than 250 feet below the surface.

To clear the pipes of the "pumping wells," it is necessary to draw the "sucker rod" and use a jet of steam. In the "flowing wells," when the "rod wax" has accumulated sufficiently to stop the flow, the pressure of the gas below will, after a time, force the accumulation out into the flowing tank—in other words, the well "cleans itself."

* From *New Remedies*, May, 1882.

This happens every few days or weeks or as often as may be.

The "rod wax" from the "flowing wells" is hence found at the bottoms of the "flowing tanks;" that from the "pumping wells" on or under the derrick floors, or wherever it may have been thrown to get it out of the way.

There are in the Bradford district nearly twelve thousand wells; at each of these wells there is usually one or more tanks. The Pipe Lines refuse to receive into their pipes some twenty barrels, more or less, from the bottoms of each of these tanks. This sediment in known as B. S. oil; a portion of it is water, but the greater part of it is a mixture of crude, amorphous paraffin, with a greater or less quantity of the lighter products. Its density is according to the character of the crude oil and the length of time the tank has been used.

In addition to the "producer's tank," there are scattered all through the district immense iron tanks, each holding from twenty to thirty thousand barrels of crude petroleum. From the hill overlooking Bradford, we could count nearly one hundred of these large iron tanks, and as we rode from Bradford to Carrolton, many more. In each of these tanks is a sediment of B. S. oil.

The amount of this sediment, B. S. oil, not known to be on hand is probably not less than three hundred thousand barrels. An estimate made by reliable parties of the amount of "rod wax" that could be obtained at a fair price was from five to ten thousand barrels a year, the most of which is now thrown away.

Having obtained material with which to work, experiments were commenced at the refinery in Corry. Mr. Clark had had made a small sand pump, holding about 2 gallons, with a long rope attached. This could be used to get oil from the bottoms of the tanks.

The sand pump here mentioned may be described as follows:—It was an upright galvanized iron cylinder some 6 or 8 inches in diameter and 20 inches long, open at the top, its bottom closed by a valve so arranged that as the cylinder sank down into the oil the valve remained open, and the cylinder sank through the various strata of oil as it would were it bottomless; but immediately on an attempt being made to draw the cylinder upward, the valve closed, and the cylinder could be drawn up to the surface, filled with oil from any stratum desired. Small iron legs, 3 inches long, prevented the lower edge of the cylinder from reaching the bottom of the tank, the object being to thus prevent the taking up of water, a stratum of which is at the bottom of each tank.

He had also arranged a small still of about 15 gallons' capacity, a cheese-box still, some 20 inches in diameter and about 15 inches high, with iron piping $\frac{7}{8}$ of an inch in diameter, to serve as inlet and outlet tubes, the vapour of the lighter products being carried through the wall to the outside of the building through a similar iron tubing, and thence through some 30 or more feet of iron tubing as a condenser. The temperature of the atmosphere being somewhat below freezing, this made a pretty fair condenser, cold water being poured on occasionally.

A small pipe was arranged to conduct a jet of steam to the bottom of the inside of the still.

The still was incased in brickwork; the heat applied was that obtained from an ordinary wood fire, great care being used not to allow the heat to get too strong.

With the sand pump some 7 gallons of the sediment were drawn from the bottom of Clark and Warren's crude-oil tank with which to charge the still. This oil was not a good specimen of B. S. oil, because it had been standing only about one month, and was not so thick as could have been desired.

Very shortly after the heat was applied to the still, benzin commenced to run. As the distillate came over, its gravity was tested every few minutes. The first run stood at about 70° Baumé; it very soon came down to 65° and to 60° Baumé.

I was told that I could not judge fairly of the quantity and gravity of the light products, owing to the smallness of the quantity and the character of the stock used; but I was not so much interested in the distillate as in the residuum.

When the distillate stood at about 50° B., a small jet of steam was turned on, the force being afterwards increased somewhat. The use of steam serves to help drive off the lighter products more completely and at a lower temperature.

At 40° B., wax was struck, and the distillation was stopped by removing the heat from the still. To "strike wax" is a term used to denote that point in the process of distillation at which the distillate shows the presence of paraffin wax, by the latter congealing on the cool edges of the condensing tubes or otherwise.

The still was allowed to stand undisturbed until it was presumed that its contents were sufficiently cooled not to take fire on exposure to the air, yet not long enough to get cold. Mr. Clark stated that there would have been great danger of fire, had the residuum been drawn off at once, when the heat was removed, as the temperature was probably from 500° to 600° F., or higher. The residuum was then drawn off slowly into an open pan. Its temperature was 320° F.; quantity about 2½ gallons.

An ordinary heavy tin cone-bottom percolator, with a stop-cock, had been arranged in a box closed on three sides, one of the three sides being arranged as a door.

The percolator was 11 inches in diameter, and its perpendicular sides were 22 inches in height.

A perforated metal diaphragm, 3 inches in diameter, was placed over the outlet tube; this diaphragm was covered with a piece of unbleached cotton, over which was placed some ordinary cotton batting. Thus prepared, the percolator was ready to receive the animal charcoal and the residuum.

Coarse animal charcoal had been heated to a red-heat for about one half-hour to free it from bone odour. This charcoal was now only quite warm, so cool that it could be easily handled with the bare hands. The warm charcoal was packed firmly in the percolator to the depth of 6 inches, and the hot residuum, having stood now in the air about a half-hour, was poured on. The open side of the box, in which the percolator was arranged, was so placed as to receive a current of hot air, and thus the temperature of the air in the box was kept constantly at from 180° to 200° F.

The first run from the percolator was quite light-coloured. It soon commenced to grow darker in colour, and by the time a half-gallon had passed, it was evident that a second filtration would be necessary.

The product was very sweet and free from odour, but was not so heavy as desired (having a melting point of 100° F.), and it was decided not to spend any more time on it, but to get another lot of 10 gallons of oil from the bottom of the tank, and distil and proceed with the distillation until the distillate should have a gravity of but 37° B.

This was at once done; the temperature of the residuum when running from the still was 380° F., and, when cooled, it had a melting point of 102° F., and the melting point of the filtered product was the same.

Experiments were made to test the melting points at various stages in the process of filtration, but, in the quantity that we were handling, there was comparatively little difference, though the general rule of oil men, that "repeated filtrations lessen the cold test," proved true. In other words, the more filtering, the higher the melting point.

Two lots of 10 gallons each of the B. S. oil, from Warren, were distilled and filtered. The gravity of this oil was 36° Baumé.

The distillation of the first lot was carried on until the distillate had a gravity of 40° B. The temperature of the residuum, when running from the still, was 360° F., and the filtered product had a melting point of 100° F.

The distillation of the second lot was carried on until the distillate had a gravity of 34° B. The temperature of the residuum, when running from the still was 380° F., and the melting point of the filtered product was 110° F.

One lot of 3 gallons of crude paraffin that causes the clogging of the wells, "rod wax," was distilled and filtered.

The residuum from it was about 80 per cent. of the amount used. The temperature, when running from the still, was 400° F., and the melting point of the filtered product was 138° F.

A lot, consisting of a mixture of 2 gallons of the sediment from Clark and Warren's tank and 1 gallon of rod wax was distilled and filtered. The temperature of the residuum, when running from the still, was 405° F., and the melting point of the finished product was 130° F.

One lot, consisting of a mixture of 2 gallons of the sediment from Clark and Warren's tank and ½ pound of commercial paraffin wax was distilled and filtered. The temperature of the residuum, when running from the still, was 380° F., and the melting point of the filtered product was 110° F.

The object of this experiment was to have a sample known to contain crystalline paraffin wax, and, by future examination, to judge of the homogeneous character of a preparation when the admixture was made previous to distillation. There is so much cracking or splitting up in these paraffins that it is not always easy to say what may occur till an experiment has been made.

A quantity of *very dirty* rod wax had been brought from one of the wells in Bradford. It was the worst specimen that we could find. This was placed in an open pan in a very warm place, allowed to stand thirty-six hours, strained through cotton, and filtered through animal charcoal. The melting point of the finished product was 140° F.; colour and odour very good, and, by repeated filtrations, it was made nearly white.

An experiment was made by filtering a small lot of very nice inodorous petrolatum through ordinary animal charcoal. The filtrate was quite offensive in odour, especially when warmed.

A similar experiment was tried with ground, unburned bones, and gave a product that, when hot, was simply disgusting in its odour, as, of course, I expected it would be.

Complaints have frequently been made by dermatologists that the petroleum ointments of the markets are sometimes irritant in their action. This can probably be explained by the fact that sufficient care is not always used to have the animal charcoal, which is used for filters, properly purified. It can be purified by heating it to 500° to 700° F., for, say, half an hour, the heating being done a comparatively short time before using the charcoal. If the charcoal be not freed from impurities, the petroleum product, when filtering through it, will be likely to absorb the condensed noxious gases, and thus may become, not only an offensive, but an irritant instead of an emollient application.

A specimen of what is known as "tar" was obtained from the oil works of Messrs. Downer and Co., at Corry. It is the residuum left in the petroleum still when the distillation had been carried to 23° to 18° Baumé. From this "tar," by destructive distillation, paraffin oils and wax are obtained, coke being left in the still. By congelation and pressure, the paraffin wax is separated from the oils. No experiments were made with this "tar," as it did not seem to have a bearing on the subject in hand.

The writer has now on hand specimens of all the crude materials used in the foregoing experiments, and also of the products obtained therefrom.

Of one fact the writer was thoroughly convinced, as he watched the slow, tedious processes of filtration through animal charcoal. It was that, in the future, pharmacists will probably use, for some purposes, a petroleum ointment that is not so thoroughly decolorized as the nice articles now found in our markets.

The process of filtration is the expensive part of the manufacture of this article. A general estimate that would be fair, would probably be that from 300 parts of residuum, but 100 parts of the nice light straw-coloured goods can be obtained; it being necessary to use so much charcoal that the 200 parts are absorbed by it, for the charcoal absorbs about one-half its weight of the residuum. If an article not quite so nearly decolorized could be used, it could be furnished by the manufacturers at a much lower price than they are now obliged to ask for it, and the question now arises, Is the very light-coloured product really any better than one slightly coloured, yet equally free from odour?

The writer does not feel competent to answer, but he thinks that it is a question worthy of consideration, for it seems probable that if a somewhat darker-coloured product, equally free from odour, should be found equally good as a base for ointments, it could be furnished at a low price, say 8 to 10 cents a pound less than is now paid for good lard. The residuum can be deodorized without the use of animal charcoal, and the opinion was freely expressed by intelligent persons, familiar with the subject, that the residuum deodorized, not filtered, is a good dressing for wounds.

Leaving Corry at noon, March 22, I went to Binghamton, N. Y., and the next morning had a very pleasant and instructive visit of a couple of hours at the Binghamton oil refinery. Mr. Edward E. Kattell, one of the proprietors, courteously showed me the whole process of the manufacture of petrolina, the petroleum ointment put on the market by them. They do not use the residuum from the still in making petrolina, preferring to make it by deodorizing a mixture of "rod wax" and some lighter product in proper proportions, and filtering the deodorized mixture through animal charcoal. The lighter product used is either crude petroleum oil or some one of the paraffin series of oils that may be somewhat unsalable.

Mr. Kattell thinks that the supply of rod wax is limited, but that should it become scarce, they would make the goods from heavy B. S. oil, by distilling it and then deodorizing and filtering the residuum, whereby they can get an ointment that shall have a melting point of 115° F.

Mr. Kattell does not think that an ointment of a higher melting point than 115° F. can be made without the use of rod wax, but a comparatively small quantity of rod wax would be sufficient to stiffen the 115° F. goods made from "tank bottoms" B. S. oil, so that they would have a melting point of 120° to 125° F., and there is no probability that the supply of rod wax will entirely cease.

Passing through New York on my way home, I called at the office of the Chesebrough Manufacturing Company to gather information on the subject of the melting points of petroleum ointments. Mr. Chesebrough was not in, but I had the pleasure of a very pleasant interview with Mr. S. C. Lewis, the vice-president of the company. He discussed the matter at some length, and gave in detail the position of the company in regard to the melting point to be adopted in the coming pharmacopœia. It was, that, from information gathered by them from many reliable sources, the consumers of the article will be best satisfied if they can have two preparations, the one having a melting point of 100° F., and the other 115° F. He also stated that the company is ready to furnish an article that should have any melting point desired below 125° F., and at the same time be entirely homogeneous, with no admixture of paraffin wax. He courteously invited me to visit their manufactory at some future time, though he could not of course reveal the trade secrets of the company. He stated that his opinion, as a manufacturer, was that if a melting point higher than 115° F. should be adopted, it would probably cause the market to be flooded with preparations that would not be homogeneous, but would have an undesirable granular character, as he thought manufacturers would resort to other ingredients as admixtures, that would deteriorate the quality.

The writer would have liked to have visited Philadelphia in order to see the process for the manufacture of cosmoline, but was not able to do so.

The conclusions arrived at may be summed up as follows:—

Although the term paraffin may be and is properly applied chemically to any one of the long series of hydrocarbons, commencing with marsh gas and running up through the benzins, the illuminating oils, and the lubricating oils to paraffin wax, the usage of trade really confines the term paraffin to those of the series that are solid or semi-solid at ordinary temperature. It is in the latter sense that the term will be used in the following remarks.

Petroleum, as it comes from the earth, may be said to be capable of division into three parts by distillation, viz., into what may be practically termed two series of oils: the benzin oils and the paraffin oils and paraffin wax.

The division between the two series of oils may be said to occur in the process of distillation when very carefully conducted, when the gravity of the distillate has been reduced to about 42° to 41° Baumé.

The benzin oils are colourless or white oils, and have a peculiar benzin odour. They are also said to have a definite boiling point.

The paraffin oils are yellow or straw-coloured oils, and have a greasy or waxy odour.

The oils in the paraffin series are very easily split up into other and lighter products of the same series by the skilful application of heat.

The article desired as a base for ointments by physicians and pharmacists is really amorphous paraffin mixed with a certain amount of one or more of the above-mentioned series of paraffin oils, but entirely free from admixture with any of the benzin series or the *crystalline* paraffin wax.

The benzin oils, if present, give an objectionable odour, and the crystalline paraffin wax, if present, will, in time, especially if the article be exposed to a low temperature, render it granular and cause it to separate, thus losing that homogeneous character so desirable in an ointment.

The question now is how to obtain this desired article. From all crude petroleum oils paraffin settles to a greater or less degree, so that if a tank containing two hundred and fifty barrels has been used at a well for three or four years, it may be expected to contain at the bottom of the tank a deposit, ranging in depth from 4 to 8 inches, of a mixture containing a large proportion of paraffin. This paraffin is always in an amorphous condition, the crystalline character being found only in those products that have been subjected to the process of distillation.

Observations show that this amorphous paraffin and the harder varieties that clog the pipes may be easily obtained in quantities sufficient for all the demands of medicine and pharmacy. We have, therefore, ready formed for us in Nature's laboratory the article we desire, but it is contaminated by oils of the benzin series, with odorous and colouring matter; the oils are gotten rid of by careful distillation, and the other by filtration through animal charcoal.

The harder variety, "rod wax," is the article that may be used to advantage to increase the melting point of petroleum ointment. Its melting point being about 140° F., and it being an amorphous and not a crystalline paraffin, it can be mixed, when purified, with goods of a lower melting point, to make a homogeneous article, as is shown by samples of such mixture that have stood more than a year. It is better, however, that the admixture be made previous to distillation. It is necessary that the animal charcoal, used as a filtering medium, be freed *by recent burning* from condensed noxious gases or other impurities.

To obtain petroleum ointment of a desired melting point it is necessary to *start* right, that is, to select such crude material as will, by distillation or purification in some way, give a residuum having the wished-for melting point. It is the opinion of the writer that to obtain an article having a melting point anywhere from 100° to 120° F., such crude material can be obtained easily, abundantly, and at a fair price, and that if a demand should be created for such an article, the demand will be quickly supplied.

The above conclusions are given as the opinions of the writer, derived from careful thought and experiment in the past, and now confirmed by observations and experiments under circumstances where it would seem that just conclusions might be formed.

While the writer does not presume that he has developed any hitherto unknown facts, and certainly will not object to any just criticisms, he hopes to add a little interest to the study of this subject, and to stimulate research in a direction to which pharmacists in the past have given too little thought and attention.

STUDIES ON THE ALKALOIDS.

BY DR. W. KOENIGS.*

ANNOTATED BY M. DE BECHI.

(*Continued from Vol. XII., page 745.*)

4. *Relations between Alkaloids and the Pyridic Bases.*

Recent works upon the acids obtained by oxidation of different alkaloids and belonging to the pyridic series, seem of great importance in respect to the constitution of these interesting bodies.

In 1867, Huber,† by treating nicotine with bichromate of potash and sulphuric acid, obtained an amide acid, $C_6H_5NO_2$, which he found subsequently‡ to be pyridinocarbonic acid, $C_5H_4N.CO_2H$, and which distilled with lime gave an oily base, C_5H_5N; soluble in water. Weidel§ obtained the same acid by oxidation of nicotine with fuming nitric acid; he found that it gave pyridine by distillation with quicklime, but he attributed to it the formula of $C_{10}H_5N_2O_3$, instead of $C_6H_5NO_2$. Luiblin|| showed the formation of a pyridino-carbonic acid by the oxidation of nicotine with potassium permanganate. By treating quinine, cinchonine, quinidine, and cinchonidine with the permanganate, Hoogewerff and van Dorp,¶ and Ramsey and Dobbie** obtained pyridino-tricarbonic acid. An isomeric acid has been obtained by Weidel†† by treating berberine with concentrated nitric acid.

Piperidine, $C_5H_{11}N$, yields pyridine, C_5H_5N, by oxidation (Kœnigs).‡‡ Lastly, Gerichten§§ obtained a pyridino-carbonic acid by means of an alkaloid of opium, narcotine. Monobasic apophyllic acid, $C_8H_7N_4$, obtained by Woehler and Anderson by oxidation of cotarnine, $C_{12}H_{13}NO_3$, is decomposed, when heated, into an oil having an alkaline reaction and chinoline odour (Woehler).|||| When heated to 240°-250° C. with concentrated hydrochloric acid, chloride of methyl separates, and a bicarbonated acid of pyridine is formed, identical with the cinchomeronic acid

* 'Studien über die Alkaloide.' By Dr. W. Koenigs. Munich: F. Straub, 1880. With annotations and additions referring to recent researches by M. de Bechi. Translated from the *Moniteur Scientifique*. The additions are included within brackets.

† *Annalen*, vol. cxli., p. 271.

‡ *Berichte*, 1870, p. 840.

§ *Annalen*, vol. clxv., p. 328.

|| *Berichte*, 1877, p. 2136; *Annalen*, vol. cxcvi., p. 129.

¶ *Annalen*, vol. cciv., p. 84.

** *Journ. Chem. Soc.*, London, vol. xxxiii.; *Transactions*, 1879, p. 189.

†† *Berichte*, 1879, p. 415.

‡‡ *Idem*, 1879, p. 2341.

§§ *Idem*, 1880, p. 1636.

|||| *Annalen*, vol. l., p. 24.

obtained by Weidel* by oxidizing the cinchona bases with nitric acid. Gerichten, therefore, considers apophyllic acid to be a methylic acid ether of cinchomeronic acid:—

$$C_5H_3N\left\langle\begin{matrix} CO_2H \\ CO_2.CH_3 \end{matrix}\right.$$

and he admits that cotarnine includes the group $(CO_2.CH_3)$. Up to this time then, pyridine or its carboxylic derivatives have been obtained from nicotine, the cinchona bases, berberine, narcotine and piperine.

[Gerichten† has studied cotarnine and its derivatives and arrived at the following results. Apophyllenic acid, already obtained by Wöhler, is prepared by oxidizing cotarnine by means of nitric acid. The yield is bad, only 10 to 15 per cent. of the cotarnine employed. It crystallizes in rhomboctahedra, is rather soluble in hot water, slightly soluble in cold water, and insoluble in alcohol and ether. It melts at 241° to 242° C., with evolution of carbonic acid. It is monobasic. Heated with hydrochloric acid to 240° to 250° C., it loses methyl, giving cinchomeronic or pyridinocarbonic acid.

$$\underset{\text{Apophyllenic acid.}}{C_5H_3N\left\langle\begin{matrix} COOH \\ COOCH_3 \end{matrix}\right.} + HCl = CH_3Cl + \underset{\text{Cinchomeronic acid.}}{C_5H_3N\left\langle\begin{matrix} COOH \\ COOH \end{matrix}\right.}$$

Cinchomeronic acid becomes yellow at 250° C., and melts at 266° to 268° C. Its most characteristic property is its behaviour with acetate of copper, which does not give a precipitate in the cold. Upon heating the solution it becomes turbid, and clears again upon cooling. Prolonged boiling, however, produces a permanent azure blue crystalline precipitate.]

It is customary to consider the alkaloids to be a large class of bases more or less related, and also to distinguish them by placing them in groups formed of the bases met with in the same plants, and which present common physiological and chemical properties.

The same thing is done in respect to many other (non-nitrogenated) bodies of the vegetable kingdom, which can be changed from one into another (for example, many carbohydrates into dextrine, the camphors and terpenes into cymol, etc.). The same relations have been found between alkaloids derived from the same plants, as, between caffeine and theobromine; morphine and codeine; conhydrine and coniine; hydrocotarnine and cotarnine; harmaline and harmine; strychnine and brucine; cinchonine and quinine; cinchonidine and quinidine; these last alkaloids have all given the same pyridino-tricarbonic acid by oxidation. It can therefore be admitted that the other bases of opium and the alkaloids in general would give pyridic derivatives by proper treatment. A proof that atropine and coniine will behave similarly seems to be supplied by a recent work of Harnack and Meyer.‡ These authors have found in the leaves of jaborandi, besides pilocarpine, $C_{11}H_{16}N_2O_2$, analogous to nicotine in its physiological action, a new alkaloid, jaborine, which acts like atropine; they have besides verified the researches of Poehl,§ who has found that by distilling pilocarpine with potash, a base volatile at 160° C. is obtained, very probably identical with coniine, and which perhaps accrues from the jaborine contained in the crude product, besides pyridic bases (which are also found in the mother-waters of the preparation of pilocarpine).

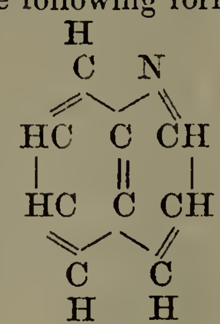
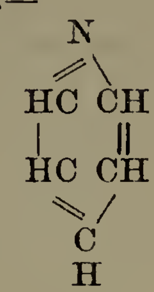
From all this, it seems that pyridine may be the nucleus around which all the alkaloids ought to be grouped, like the aromatic bodies around benzine. Some vegetable bases are known, it is true, which are not derived from pyridine, as, for example, betaine, sinapine and muscarine, which have a close relation to the oxyethylenic bases, and caffeine and theobromine, which, from the great quantity of nitrogen they possess, approach nearer to the animal than the vegetable bases. The first are not generally ranked in the class of alkaloids, which includes especially vegetable bases of which the constitution is too little known to permit them to be reckoned amongst the classified bodies. If it were desired to reckon only this kind of bodies amongst the alkaloids, the best definition would be the following:—

Under the name alkaloid is understood organic vegetable bases which are pyridic derivatives.

The pyridic nucleus would then be analogous to the benzoic nucleus, and the fruitful theory of Kekulé could be applied, probably with all its consequences. Twelve years ago, Koerner put forward the hypothesis that pyridine might be a benzine, in which a CH group is replaced by N, and that chinoline has a similar resemblance to naphthaline. This supposition has been shown to be true by the transformation of hydrocarbostyril or orthoamidophenylpropionic acid:—

$$C_6H_4\left\{\begin{matrix} NH_2 & (1) \\ CH_2.CH_2CO_2.H & (2) \end{matrix}\right.$$

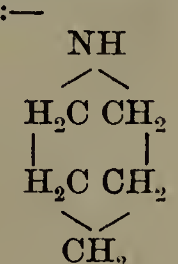
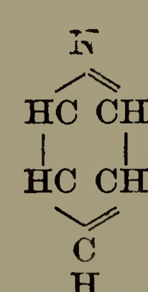
into chinoline, and this by oxidation can be converted into pyridine-dicarbonic acid. These relations are expressed by the following formula:—

Chinoline. Pyridine.

I have been induced to study the oxidation of piperidine, nicotine and coniine and to prepare some non-oxygenated bases by means of cinchonine and quinine, and I will here state the ideas which I have conceived concerning the relations between alkaloids and pyridic bases.

Piperidine, a secondary base, can be converted by oxidation into pyridine, a tertiary base, and it seems to me that the best way to explain the great stability of piperidine in the presence of hydrochloric acid at a high temperature is to admit that piperidine is a hydrogenated addition product of pyridine, having consequently for its formula:—

Piperidine. Pyridine.

According to Cahours and Etard,* nicotine, $C_{10}H_{14}N_2$, treated with potassium ferrocyanide, gives a base containing 4 H less, which they named isodipyridine,

$$C_{10}H_{10}N_2.$$

By treating tropine, $C_8H_{15}NO$, one of the decomposition products of atropine, with hydrochloric and acetic acids to 180° C., Ladenburg† obtained a base with a coniine odour, tropidine, $C_8H_{13}N$, which is formed with elimination of water. This reaction is analogous to that produced by Wertheim, who obtained coniine with conhydrine and phosphoric anhydride:—

$$\underset{\text{Conhydrine.}}{C_8H_{17}NO} - H_2O = \underset{\text{Coniine.}}{C_8H_{15}N}$$

It seems to me probable that tropidine is a collidine, two atoms richer in hydrogen. The composition of these bases shows the great analogies which exist between them: collidine, $C_8H_{11}N$; tropidine, $C_8H_{13}N$; coniine, $C_8H_{15}N$; the first two are secondary bases, and the third a tertiary base. Now, according to Ador and

* *Annalen*, vol. clxxiii., p. 76.
† *Berichte*, 1880, p. 1635; 1881, p. 310.
‡ *Annalen*, vol. cciv., p. 67.
§ *Berichte*, 1879, p. 2185.

* *Comptes Rendus*, vol. xc., p. 275.
† *Berichte*, 1879, p. 941.

Beayer,* collidine is obtained by distillation of ammonia-aldehyde and, according to Wischnegradsky,† it ought to be considered as trimethylpyridine. The researches of Harnack and Meyer, upon the relations existing between these three bases, increase the probabilities.

It can be therefore admitted that the non-oxygenated alkaloids, or the bases obtained by their decomposition, are to the pyridic bases what the terpenes are to cymene. According to this alkaloids would contain reduced pyridic nuclei, which seems demonstrated by the fact that in plants bases are often found which only differ among themselves by a small number of atoms of hydrogen, as, for example, harmaline and harmine, hydrocotarnine and cotarnine, cinchotine and cinchonine. It might also be admitted that the bases richer in hydrogen have either been formed by a more advanced reduction, or from alkaloids produced originally or their mother-substances.

It is known that the camphors are closely allied to the terpenes and cymene, and I think that, in many cases, some similar relations exist between oxygenated and non-oxygenated alkaloids, as well as between the pyridic and chinolic bases and their polymers. For example, the conversion of conhydrine into coniine, and tropine into tropidine, is analogous to the formation of terpenes with borneol and phosphoric anhydride. By treating cinchonine with oxychloride and pentachloride of phosphorus, I have obtained a chloride, $C_{19}H_{21}N_2Cl$, which, treated with alcoholic potash furnishes a base, $C_{19}H_{20}N_2$, the relations of which with chinoline have not been yet settled. The formation of these products is analogous to that of borneol camphene, $C_{10}H_{16}$, and of chloride of borneol, $C_{10}H_{17}Cl$, by means of borneol, $C_{10}H_{18}O$.

The manner in which the oxygen is united in the oxygenated alkaloids is not known. Morphine, which is a tertiary base, contains, according to Polstorff and Broockmann,‡ three hydroxyls, for it gives, with chloride of benzoyl, a tribenzoylic compound. According to Wright and Rennie,§ only dibenzoylic-morphine can be obtained; in codeine, one of the groups OH of morphine is replaced by methyoxyl, OCH_3, and the very great oxidizability of morphine in an alkaline solution recalls certain properties of pyrogallol; in an ammoniacal solution, for example, morphine is oxidized by atmospheric oxygen into the condition of oxydimorphine, $C_{34}H_{36}N_2O_6$ (Polstorff and Broockmann).

Cotarnine, $C_{12}H_{13}NO_3$, very probably contains a CO_2CH_3 group, and the third atom of oxygen in the condition of methyoxyl. From these examples, it will be seen that oxygen is not always found in the alkaloids as in the camphors, in the condition of carboxyl $(CO)''$, or hydroxyl $(OH)'$ although this is probably generally the case. Camphors are derived from cymene, and alkaloids from pyridic bases and their polymers, by addition of hydrogen or water. At present we have no idea of the mother-substances by means of which those two great categories of bodies (camphors and alkaloids), so widely distributed in the vegetable kingdom, are formed, but it seems that an annular skeleton of atoms must be necessary for the formation of these bodies; in the case of alkaloids, it is a pyridic nucleus; for camphors a reduced benzene ring. Several facts, however, which seem to contradict this opinion, cannot be passed over in silence, such as that pyridic derivatives have not been obtained by the oxidation of certain alkaloids, such as morphine or coniine. This finds an analogy in certain products of oxidation of oil of turpentine, terebic and terpenylic acids, which do not contain the benzene nucleus. Generally, the difficulties of converting an alkaloid, or its basic products of decomposition, into reduced pyridic derivatives, augments with the number of free hydroxyls and atoms of added hydrogen.

* *Annalen*, vol. clv., p. 294.
† *Berichte*, 1879, p. 1501.
‡ *Berichte*, 1880, p. 96.
§ *Idem*, 1880, p. 1996.

I readily admit that these general opinions concerning the constitution of alkaloids require to be rectified by numerous researches, which, I hope, will be of great utility to medicine and pharmacy, especially if the difficulties which have hitherto prevented the accomplishment of the synthesis of these interesting bodies can be surmounted, a synthesis which can only be accomplished when our knowledge of the formation of these products shall be more advanced. The examples of salicylic acid, and homatropine illustrate the utility of researches which, generally undertaken for theoretic ends, have led to some very important industrial applications.

Wallach* has recently obtained some interesting bases by the action of pentachloride of phosphorus upon substituted acid amides. These bases are non-oxygenated tertiary diamines, which present, from a physiological and chemical point of view, great analogies to the natural alkaloids.

(*To be continued.*)

THE BARK OF FRAXINUS AMERICANA.†

The white or American ash grows from Nova Scotia and New Brunswick to the western shores of Lake Superior, southward to Florida and Louisiana, and westward to Eastern Nebraska and Kansas. It attains a height of 60 to 80 feet, the trunk being from 4 to 6 feet in diameter. The wood is light, tough, very strong and elastic, and is extensively used in the manufacture of agricultural implements, carriages, oars, cabinet-work, etc. The bark is collected from the trunk and root, the latter being preferred. As seen in commerce it is usually in pieces varying from 3 to 6 millimetres (⅛ to ¼ inch) in thickness, from 25 to 75 millimetres (1 to 3 inches) in width, and sometimes 15 centimetres (6 inches) in length. The suberous tissue being generally removed from the old bark, this is externally whitish or greyish-yellow, sometimes reddish or brown-red, frequently with irregular longitudinal ridges and warts from adhering cork; internally it is yellow and smooth. Its transverse fracture is very fibrous, its odour is slightly aromatic, and its taste bitter and slightly acrid.

John M. Bradford, Ph.G., determined the amount of extract obtainable by different menstrua. The experiments appear to have been made with air-dry bark, and the amount of moisture left in the extracts does not appear to have been ascertained. In each case 1000 grains of the powdered bark were exhausted by percolation, and the resulting liquor evaporated in a water-bath; the yield was as follows:—

1. Menstruum: strong alcohol, yield: 22·4 per cent. extract.
2. Menstruum: alcohol 4 parts, water 1 part, yield: 26·2 per cent. extract.
3. Menstruum: alcohol 4 parts, water 2 parts, yield: 28·2 per cent. extract.
4. Menstruum: alcohol 4 parts, water 3 parts, yield: 29·0 per cent. extract.
5. Menstruum: alcohol 4 parts, water 4 parts, yield: 31·6 per cent. extract.
6. Menstruum: alcohol 3 parts, water 4 parts, yield: 31·6 per cent. extract.
7. Menstruum: alcohol 2 parts, water 4 parts, yield: 31·6 per cent. extract.
8. Menstruum: alcohol 1 part, water 4 parts, yield: 31·8 per cent. extract.
9. Menstruum: water (percolate turbid), yield: 28·8 per cent. extract.

All the extracts had a bitter taste, and the bitter principle is therefore soluble both in alcohol and water. The alcoholic extracts were soluble in water, leaving no per-

* *Annalen*, vol. clxxxiv., p. 1.
† Abstract from two Theses presented to Philadelphia College of Pharmacy. Reprinted from *American Journal of Pharmacy*, June, 1882.

ceptible residue, but yielding a slightly cloudy solution from suspended resin.

The bark exhausted with ether, and the ether evaporated spontaneously, yielded a fatty matter lighter than water, and having a green tint, which changed to a yellow-red colour on heating to the boiling point.

On distilling the bark with water a minute quantity of volatile oil and a white substance was obtained, the latter subsiding in the distillate. The bark was also found to contain starch, gum, tannin and a bitter principle.

Howard M. Edwards, Ph.G., examined a sediment from the wine of white ash bark, and found in it an acid and a neutral resin, sugar, gum and other matters.

In analysing the bark, the powder was exhausted with a weak alcohol of 15 per cent., the liquid was evaporated to a syrupy consistence and mixed with alcohol, which produced a light-red precipitate of gummy matter having a sweetish and slightly pungent taste, the pungency being probably due to a little resin. The filtrate was concentrated and precipitated by water, a pungent resin, having an acid reaction, separating, while the filtrate gave decided indications of the presence of an alkaloid both by Mayer's test and by solution of iodine. This last filtrate was precipitated by subacetate of lead, a thick yellow precipitate being obtained, and the filtrate, after having been freed from lead by sulphuretted hydrogen, yielded precipitates with tannin, picric acid and ammonia. After adding ammonia, the liquid was shaken with ether, which dissolved the precipitate, leaving the ammoniacal solution slightly red. The ethereal liquid, on being evaporated spontaneously, left no crystals, the alkaloid being contaminated with other substances. The amount of alkaloid being so small, I was not able to carry the investigation further. The alkaloid showed an alkaline reaction with litmus and had a bitter taste; it is doubtless the active principle of the drug.

A decoction of the bark was found to contain sugar and starch; but neither tannin nor gallic acid was found; the reactions, which were at first thought to be those of gallic acid, were afterwards shown to be due to colouring matter and acid resin. Ferric chloride gave a bluish-black colour; but gelatin and tartar emetic gave no precipitates. (J. M. Bradford obtained a precipitate with gelatin.)

The decoction was precipitated by acetate of lead, the precipitate washed, suspended in water, decomposed by H_2S, filtered, heated and then tested: ferric chloride gave a blue colour; gelatin solution, tartar emetic, lime solution and ferrous salts gave no reaction; but sodic hydrate gave a brown colour.

The volatile oil, obtained by distillation with water, was aromatic and had a bland taste.

The following pharmaceutical preparations were made:—

The *tincture*, made with 20 per cent. alcohol, four troy ounces to the pint, was bright red, slightly aromatic, of a bitter taste, and exposed to the cold became slightly turbid.

The *fluid extract*, made with a menstruum composed of water 11 parts, glycerin 1 part and alcohol 4 parts, was deep red or blackish red, very bitter and slightly pungent.

The *extract* was made with 20 per cent. alcohol; yield, 7 parts from 24 parts of the drug; it is of a blackish-red colour and has an extremely bitter and burning taste.

THE ACTIVE PRINCIPLE OF ADONIS VERNALIS.*

BY DR. V. CERVELLO.

The use of the Ranunculaceous plant, *Adonis vernalis*, L., in some forms of heart disease has led to some physiological experiments from which it would appear that it is capable of exercising an action similar to that of digitalis, with the advantage that it is not cumulative, its administration during a considerable time being without danger. But hitherto nothing definite has been known with respect to the constituent or constituents of the plant to which the action is due. The author, as the result of a chemical investigation of the plant, states that it contains only one active constituent, a glucoside, which he has named "adonidin."

In the preparation of adonidin the plant is cut into small pieces, which are macerated during two day in dilute (50 per cent.) alcohol; the liquid is filtered, the filtrate treated with basic acetate of lead, separated from the resulting precipitate by decantation and evaporated on a water-bath to a syrupy consistence. The residue, which is very bitter and has an acid reaction, is carefully made slightly alkaline by the addition of ammonia solution, and then heated with a strong solution of tannic acid, which is added as long as any precipitate is formed. The precipitate is a compound of the active constituent and tannic acid, difficultly soluble in water. This is collected on a filter, washed with a small quantity of water and dried between paper. To decompose this tannic acid compound zinc oxide and some alcohol are added and the whole is heated in a water-bath until the liquid is evaporated, when the mass is treated with strong alcohol, filtered and the residue on the filter washed with much alcohol. The filtrate is yellow and contains the adonidin not quite pure. To purify it the solution is evaporated by a gentle heat to a small volume and ether added, when inactive coloured matter is precipitated together with a trace of adonidin. Upon evaporation of the mixture of alcohol and ether by a moderate heat a residue is obtained, which represents pure adonidin and is finished by drying in a vacuum over sulphuric acid.

The quantity of adonidin obtained in this way, from two kilograms of *Adonis vernalis* was small; this the author does not consider due to any defect in the method of preparation, but to the fact that the compound, which is extremely energetic, is contained in the plant in relatively small proportion.

Adonidin is non-nitrogenous, colourless, odourless, amorphous, and extremely bitter. It is soluble in alcohol, but only slightly so in ether and in water. It is precipitated by tannic acid, the precipitate redissolving in much water. It is insoluble in dilute hydrochloric acid in the cold, but on being heated with the dilute acid it splits up into sugar and a substance insoluble in ether.

The author is not in a position to say whether the decomposition product has any action upon the organism, analogous to the case of digitaliretin, obtained under similar conditions from digitalin by Schmiedeberg.

With respect to the physiological action of adonidin the author sums up the results of his experiments by stating that it may be described as identical with that of digitalin, with the single exception that it is far more powerful. He also confirms the statement that it is not cumulative.

* Abstract of a paper in the *Archiv für Experimentelle Pathologie und Pharmakologie*, xv., 235.

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Concluded from page* 90.)

SYRUPUS IPECACUANHÆ STIBIATUS (*Antimonial Wine of Ipecac*).

Tartrate of antimony and potassium . .	3
Tincture of ipecac (1 : 10)	100
Syrup	2000
Water	q.s.

Dissolve the tartrate of antimony and potassium in a little water; add the solution to the tincture and syrup

* From *New Remedies*, April, 1882.

contained in an evaporating dish, and evaporate, on a water-bath, until the product weighs 2000 parts.

SYRUPUS JUGLANDIS COMPOSITUS (*Compound Syrup of Butternut Leaves*).

[Vanier's Antirhachitic Syrup.]

Extract of butternut leaves	4
Extract of brown (grey) cinchona	2
Alcohol	4
Port wine	6
Syrup	180
Iodide of potassium	1
Oil-sugar of anise (1 part of oil and 50 parts of sugar)	3

Mix the extracts with the alcohol, port wine and 10 parts of syrup. Dissolve the iodide of potassium and the oil-sugar of anise in 170 parts of syrup and mix the two liquids.

SYRUPUS JUGLANDIS COMPOSITUS CUM OLEO MORRHUÆ (*Compound Syrup of Butternut Leaves with Cod-Liver Oil*).

Compound syrup of butternut leaves	19
Cod liver oil	1

Mix them.

SYRUPUS LACTUCARII (*Syrup of Lactucarium*).

Lactucarium	1
Sugar	q.s.
Water	q.s.

Rub the lactucarium with a little sugar, and 180 parts of water; then heat to boiling and filter the liquid.

In 10 parts of the liquid dissolve 19 parts of sugar.

SYRUPUS LENITIVUS (*Lenitive Syrup*).

Hydrochlorate of morphine	1
Cherry-laurel water	100
Syrup	3839
Tincture of cochineal (1 : 8)	60
	4000

Dissolve the hydrochlorate of morphine in the cherry-laurel water and mix the solution with the other ingredients.

SYRUPUS MANNÆ (*Syrup of Manna*).

Manna	3
Sugar	16
Water	12

Dissolve the manna and sugar in the water and strain.

SYRUPUS MANNÆ COMPOSITUS (*Compound Syrup of Manna*).

[Syrupus Sennæ Compositus. Syrup of Senna and Manna].

Senna	24
Fennel	3
Manna	50
Sugar	200
Water	q.s.

Pour 100 parts of boiling water upon the senna and fennel, allow to macerate half an hour, then strain and pass enough water through the strainer to obtain 108 parts of liquid. In this dissolve the manna and sugar. Finally strain.

SYRUPUS FERRI OXIDI (*Syrup of Oxide of Iron*).

Solution of chloride of iron (ferric), specific gravity 1·480-1·484	12
Water of ammonia	14
Sugar	85
Distilled water	q.s.

Mix the solution of chloride of iron with 120 parts of distilled water. Add to it slowly, under constant stirring, the water of ammonia previously diluted with 140 parts of distilled water. Collect the precipitate, wash it with distilled water until it ceases to produce a cloudiness in test-solution of nitrate of silver, and mix it with the sugar in a porcelain capsule. Warm the mixture for a few hours on the water-bath, occasionally stirring, then boil it gently, with occasional addition of distilled water, until one drop diluted with distilled water yields a clear, light-brown solution. Then dilute the syrup with warm distilled water until it weighs 136 parts.

Preserve the syrup in well-stopped bottles in a dark place.

One part of the syrup diluted with 5 parts of water should not produce a precipitate.

Fifty parts of the syrup contain 1 part of ferric oxide.

SYRUPUS CALCII PHOSPHATIS (*Syrup of Phosphate of Calcium*).

Phosphate of calcium	1
Phosphoric acid	3
Syrup	q.s.

Digest the phosphate of calcium with 6 parts of syrup and the phosphoric acid on the water-bath, occasionally stirring until the salt is dissolved; then add 400 parts of syrup.

SYRUPUS RHAMNI CATHARTICI (*Syrup of Buckthorn*).

Juice of buckthorn berries, fermented and clarified	8
Sugar	15

Dissolve the sugar in the juice.

QUINIÆ TANNAS NEUTER (*Neutral Tannate of Quinine*).

Sulphate of quinine	1
Diluted sulphuric acid, about	1
Tannic acid	4
Solution of acetate of ammonium	3
Distilled water	q.s.

Dissolve the sulphate of quinine in 70 parts of distilled water, with the aid of diluted sulphuric acid, avoiding an excess. Add to the solution the tannic acid, previously dissolved in 100 parts of distilled water, and afterwards the solution of acetate of ammonium, previously diluted with 8 parts of distilled water.

[The solution of acetate of ammonium is prepared by saturating water of ammonia (specific gravity 0·956–0·960) with acetic acid (specific gravity 1·051–1·055), about 9 parts of the latter being required for 10 parts of the former.]

Let the mixture stand for five hours, occasionally stirring. Collect the precipitate upon a filter, and wash it with small quantities of distilled water successively poured on, until a little of the precipitate removed from the filter, and dried, seems to have a bitter taste. Then dry it by exposure to air, and rub it to powder.

The resulting tannate of quinine is a yellowish-white, odourless, and almost tasteless powder, containing 8 to 10 per cent. of water, and which should yield 19 to 21 per cent. of anhydrous quinine, when it is assayed by the following process:—

Mix 1 part of tannate of quinine, in a test-tube, with 10 parts of solution of soda (of 6 per cent.), and warm the mixture on the water-bath for fifteen minutes. Add to it, when cold, 30 parts of chloroform, shake well, and transfer the whole to a separating funnel. As soon as the chloroform has become clear, let 15 parts of it run out and evaporate this portion upon the water-bath to dryness. Then weigh the residue.

This residue, corresponding to a quantity of anhydrous quinine contained in one-half part of the tannate, when dissolved in a little water acidulated with sulphuric acid, then treated with 2 parts of ether and an excess of ammonia, should yield a clear liquid separating into two layers.

The Pharmaceutical Journal.

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Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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PAPERS TO BE READ AT THE MEETING OF THE BRITISH PHARMACEUTICAL CONFERENCE.

THE following is a list of the titles of papers to be read at the approaching Pharmaceutical Conference at Southampton. It has reached us only at the moment of going to press and consequently it is only by inserting it here that we are able to publish the list this week. We regret to notice that the papers expected from Mr. J. E. HOWARD and from Mr. GREENISH have been withdrawn; but notwithstanding their loss it may, we think, be fairly assumed, on the basis of the list now presented, that the character of the communications brought before the British Pharmaceutical Conference will be fairly maintained. All the papers here mentioned may be looked upon as dealing with purely pharmaceutical subjects, and we are especially glad to notice that the somewhat trying experience of Mr. PROCTOR last year has not prevented him from coming to the front again in a less troubled arena than that of pharmaceutical politics.

1. A New Styptic of Indigenous Growth. By Professor QUINLAN, M.D., etc.

2. The Solubility of Morphia Salts. By Mr. D. B. DOTT.

3. Terpin Hydrate: its Preparation and Crystallography. By Mr. R. H. PARKER.

4. Variations in Strength of Commercial Samples of Tinctura Opii, B.P., and Extractum Opii Liquidum, B.P. By Mr. J. WOODLAND, F.L.S., F.C.S.

5. The Purity of the Salts of Silver as met with in Commerce. By Mr. J. WOODLAND, F.L.S., F.C.S.

6. The Purity of Commercial Chloride of Gold. By Mr. F. W. BRANSON.

7. Note on a Commercial Sample of Liquor of Iodide of Iron containing some Impurities probably added with a view of retarding or hiding its Oxidation. By Mr. B. S. PROCTOR.

8. Note on Methyl Orange as an Indicator of the Neutrality of Salts having an Acid Reaction with ordinary Test-papers. By Mr. B. S. PROCTOR.

9. Some Experiments on English Oil of Lavender. By Mr. W. A. SHENSTONE, F.I.C., F.C.S.

10. Vegetable Organisms in Solutions of certain Inorganic Salts. By Mr. A. H. BOTHAMLEY.

11. The Solubility of Boric Acid in Glycerine. By Mr. D. HOOPER.

12. The Iodides of Bismuth. By Mr. F. W. FLETCHER, F.C.S.

13. On some Reactions of Arsenic. By Mr. W. A. H. NAYLOR, F.C.S., and Mr. J. O. BRAITHWAITE.

14. Notes on Brazilian Drugs. By Dr. C. SYMES, F.C.S.

15. Some Results of the Action of the Digestive Ferments on Drugs. By Mr. G. BROWNEN, F.C.S.

16. First Report on the Difference between the Essential Oils of Cinnamon and Cassia. By Mr. A. H. JACKSON, B.Sc.

17. Remarks on Aconitum Napellus and Allied Species. By Mr. E. M. HOLMES, F.L.S.

18. On a New Method of Making the Volumetric Solution for Estimating Hardness of Water. By Professor C. R. C. TICHBORNE, Ph.D., etc.

19. On Ammoniated Extract of Ergot. By Mr. A. W. GERRARD, F.C.S.

20. On the Alkaloidal Value of Belladonna Plants at Various Periods of Growth. By Mr. A. W. GERRARD, F.C.S.

21. Contribution to the Pharmacy of the Pomegranate. By Mr. L. SIEBOLD, F.I.C., F.C.S.

A PROPOSED NEW MODE OF CONDUCTING THE PRELIMINARY EXAMINATION.

A SCHEME for the granting of junior certificates on the basis of examination conducted under the control of the Oxford and Cambridge Schools Examination Board has lately been drawn up in a tentative form by that body with a view of establishing a general system of examination to serve in lieu of the ordinary entrance examinations to the various professions. It appears that the Board, having been asked to institute such a system of examination, has passed a resolution in favour of doing so, provided satisfactory evidence is furnished that such a proceeding is desired by the masters of schools, further that the certificates granted under the system will be accepted by the public bodies interested, and lastly that adequate supervision of the candidates can be provided.

As regards the first point the Board has ascertained that such an examination is very generally desired by schools, and the Board has received many suggestions from schoolmasters respecting the details of the contemplated scheme. Most of those suggestions have been adopted and embodied in the provisional regulations which have been drawn up by the Board, and the question now to be determined is, how far the various bodies which demand the passing of a preliminary examination as the first step towards admission to the practice of the particular pursuits with which they have to do, will be willing to grant exemption from their own preliminary examinations in favour of candidates holding a certificate which has been gained at an examination conducted according to the regulations of the Oxford and Cambridge Examination Board and provided that each certificate shows that the applicant has passed in such subjects as are equivalent to those required for the preliminary examination. In order to ascertain what is the disposition of the various bodies in this respect the Secretaries of the Board have been instructed to communicate with those bodies, submitting a draft of the provisional regulations proposed and a statement of the subjects which the Board considers to be equivalent to those required in the preliminary examinations of the several bodies.

The Pharmaceutical Society, being one of those bodies which require the passing of a preliminary examination as a step towards the qualification they grant, it has been applied to in this manner by the Board, with a request that the subject should be brought before the Council, and a reply given as soon as possible, stating the opinion of the Council in regard to the project.

The Preliminary examination of the Pharmaceutical Society is so important a feature of the ordeal through which a candidate for pharmaceutical qualification has to pass and that examination is capable of being made to exercise such a beneficial influence upon the educational system, as well as upon the future of pharmacy in this country, that it becomes highly desirable to consider this scheme for carrying out the examination in a different, and may be better, manner than heretofore.

According to the draft which has been submitted for general consideration, it is proposed that the examination shall commence on the 23rd day of July, 1883, and that it shall extend over six days, according to a time table specifying the days allotted to particular subjects. The examination is to be conducted entirely by means of printed papers to be set at Oxford, Cambridge, or such other centres as the Board may appoint, and at every school the authorities of which desire that these papers shall form part of a school examination. In regard to this latter case the very important proviso is made that the papers must be worked under the superintendence of a supervisor appointed by the Board. In the letter addressed to the Pharmaceutical Society in common with other bodies, it is suggested that with the view of reducing the expense of the examination it might be desired in certain cases to make the head masters of the schools responsible for the supervision of the candidates, and it is asked whether such an arrangement would be considered satisfactory. On the face of the matter we can scarcely conceive what cases would render such a course either desirable or satisfactory and the responsibility thus thrown upon the head masters of schools would be one of a very serious and difficult nature.

In carrying out the scheme it is proposed that any of the boys under education at a school shall be admitted to the examination on the application of the head master of the school, made not less than two months before the time fixed for its commencement. The examination to include Latin, Greek, French and German as the first group of subjects; Arithmetic and additional Mathematics as the second group; Scripture Knowledge, English, English History and Geography as the third group; Physics and Chemistry as the fourth group. In order to obtain a certificate a boy will be required to satisfy the examiners in five subjects taken from not less than three groups, of which the groups 1 and 2 must be two, and the boys will be required to answer the questions so as to satisfy the examiners that they have an adequate knowledge of English grammar and orthography. In each subject there are to be two classes, and the certificates will specify the age of the boy, the subjects in which he has passed, and the class he has obtained in each. A fee of one guinea is to be paid for every boy examined when the examination is held at a school, and if a boy is examined away from his own school an additional fee of ten shillings is to be paid.

These are the general features of the scheme, and as regards the Preliminary examination of the Pharmaceutical Society, the subjects considered to be equivalent to those which it requires are Latin, Arithmetic and English, class one or two. It will be seen from the report of the Council proceedings last week that the Council is considering the scheme, and has entered into communication with the Board upon the subject.

WHO IS RESPONSIBLE FOR POISONING BY IMPURE WATER?

A CASE of very great interest has recently been before the Assizes at Leeds, in which the corporation of Huddersfield was proceeded against for negligence and failure in the performance of a statutory duty to supply pure and wholesome water. The complaint against the water was that as supplied for use in the plaintiff's house it contained lead to such an extent that he had been made dangerously ill and had suffered serious physical injury. Upon that ground he claimed damages from the corporation, and in the hearing of the case it became clear not only that the injuries of the plaintiff were real, but that they had resulted from the presence of lead in the water supplied by the defendant corporation. The only point of issue between the plaintiff and defendants was the question whether the impurity arose in the mains or in the service pipe, and if in the latter whether the corporation was responsible. It was agreed to reserve this point for further consideration and on the evidence the jury found a verdict for the plaintiff with two thousand pounds damages.

So far as the report of the evidence can be relied upon it appears that the water supplied to Huddersfield is soft water and that some portion of it is drawn from a source that is subject to contamination with sulphuric acid; but whether the presence of lead in the water is attributed to this circumstance or not is scarcely clear. One of the witnesses stated that he had pointed out certain objectionable features in some part of the water supply which the corporation had not paid attention to; but the particulars are not stated and we must therefore defer any further account of the case until fuller information is obtained.

Proceedings of Scientific Societies.

ROYAL INSTITUTION OF GREAT BRITAIN.

Electric Railways.

BY PROFESSOR W. E. AYRTON, F.R.S.

We have grown so accustomed to the regular announcement—"serious accident on such and such a railway, several passengers injured"—that we have almost come to regard railway accidents as inevitable, just as parents mistakenly think the measles and whooping cough necessary accompaniments of childhood. But speed no more means disaster than a densely crowded city means disease. The first effect of overcrowding is undoubtedly to produce fever and other complaints. If, however, the knowledge and practice of the laws of hygiene increase more rapidly than the population of a town, the death rate, as we have seen, diminishes, instead of augmenting. And so it is with locomotion; the stage-coach journeys of our ancestors were slow enough for the most staunch conservative, and yet the percentage of the passengers injured on their journeys was far greater than even now with our harum-scarum railway travelling. The number of passengers has increased enormously, but the safety has increased in an even greater rate. If then we can devise methods introducing still greater security, a far larger number of passengers may travel at a far greater speed and with less fear of danger than at present.

Accidents constitute one charge against railway conveyance, but there is another, and that is the cost. Cheap as railway travelling now is, compared with the departed stage-coach locomotion, the price of the tickets is still far too high for railways to fulfil, even in a small degree, one of their most important functions, and that is transporting labourers from parts of the country where labour is scarce, to others where it is abundant and labourers in demand.

But how is a happier state of things to be realized? We cannot expect the railway companies to lower their fares merely to benefit humanity. If, however, we can prove to them that the present system of railways is neither the most remunerative to themselves nor the most beneficial to the community at large, we may hope to win the attention of railway directors, whose stock question is, and quite rightly, "Will it pay?"

Those of you who have read the life of Stephenson know what a protracted fight he had to carry one of his most cherished ideas, and that was the employment of a locomotive engine to draw the train instead of a stationary engine to pull it with ropes or chains. His adversaries saw the disadvantage of adding the weight of the locomotive to the weight of the train, whereas Stephenson was especially struck with the enormous waste of power in the friction of ropes or chains passing over pulleys. [Experiments were then shown proving, *first*, that the mass of the locomotive necessitated the engine having a greater horse-power to get up the speed of the train quickly as well as a greater horse-power to keep up the speed; *secondly*, that the friction and wear and tear of ropes, such as were employed on the London and Blackwall Railway, would have been an insuperable hindrance to the development of railways.] From this was deduced that, since in Stephenson's day the only feasible mode of communicating the power of a stationary engine to a moving train was by means of ropes, his decision to adopt the locomotive was perfectly correct at the time it was made.

Attempts have been made to propel trains by blowing them through tubes, or by blowing a piston attached to the train through a tube, but such attempts at pneumatic railways have nearly all been abandoned. The employment of air compressed into a receiver on the train by fixed pumping engines stationed at various points along the line, and employed to work compressed air-engines on the carriages has been effected with considerable success by Colonel Beaumont, especially for tram-lines. The weight of the compressed air engine is, however, still very considerable. Any system of pumping water through a pipe and employing the water to work a hydraulic engine on the train is hardly worth considering, seeing that the mechanical difficulties of keeping up a continuous connection between the moving train and the main through which the water is pumped seem insuperable. Gas engines worked with ordinary coal gas, stored perhaps under pressure, might be employed on the moving train, but the advantage arising from the absence of boiler and coal would be more than compensated for by the fact, that the weight of a gas-engine per horse-power developed is so much greater than that of a steam-engine. None of these systems, then, of dispensing with a locomotive is by any means perfect, and the success of the recent experiments on the electric transmission of power has turned the attention of engineers to the consideration, whether electricity could not successfully supplant steam for the propulsion of trains and tram-cars; whether it could not, in fact, supply an efficient means of transmitting power, the absence of which caused Stephenson to abandon ropes in favour of a heavy locomotive engine.

The whole question, like every similar one, is mainly a question of expense; and what we have to consider is, whether electric transmission on the whole leads to greater economy than can possibly be obtained by the employment of any kind of locomotive. The average weight of a locomotive is about that of six carriages full of people; ten carriages compose an ordinary train, hence the presence of the mass of the locomotive adds at least 50 per cent. to the horse-power absolutely necessary to propel the carriages alone, and therefore at least 50 per cent. to the amount of coal burned. But there is another most serious objection to the engines, perhaps even more important than the preceding. The heavy engine passing over every part of the line necessitates the whole line and all the bridges being made many times as strong, and therefore many times as costly, and the expense of maintenance consequently also far greater, than if there were no locomotive. And it is not possible to make the engine much lighter; for it would not have then sufficient adhesion with the rails to be able to draw the train; in fact, you cannot diminish the weight as long as the train is propelled with only one or two pair of driving wheels as at present. The employment of electricity, however, will enable a train to be driven with every pair of wheels, just as the employment of compressed air enables every pair of wheels to brake the train.

To propel a train we must either utilize the energy of coal by burning it, or use the energy possessed by a mountain stream, or the energy stored up in chemicals, and which is given out when the chemicals are allowed to combine, or we must employ the energy of the wind. Practically we employ at present only the first store for propelling railway trains—the potential energy of coal; and that is to a great extent the store on which we shall still draw, even when we employ electric railways. For experience shows that with the modern steam-engine and dynamo at least one-twentieth of the energy in coal can be converted into electric energy; and that this is at least twenty times as economical as the direct conversion of the energy of zinc into electric energy by burning it in a galvanic battery.

But it may be asked, did not Faraday's discovery in 1831 that a current could be produced by the relative motion of a magnet and a coil of wire settle this point half a century ago? Theoretically—yes; practically, however, the problem was very far from being solved, because the dynamo machine was very unsatisfactory, and it was not until Pacinotti, in 1860, suggested the solution of the problem of obtaining a practically continuous current from a number of intermittent currents, and until Gramme, about 1870, carried out Pacinotti's

* Abstract of a Lecture delivered on Friday, March 24, 1882, at the Royal Institution, and before the Royal Dublin Society, March 31.

suggestion in the actual construction of large working machines, that the mechanical production of currents became commercially possible. [Experiments were then shown illustrating the complete electric transmission of power, a gas-engine on the platform giving rapid motion to a magneto-electric machine, and the current thereby produced sent through an electro-motor at the other end of the room, which worked an ordinary lathe.]

In electric transmission of power there is not only waste of power from mechanical friction, but also from electric friction arising from the electric current heating the wire, through which it passed.

It was then explained and demonstrated experimentally that this latter waste could be made extremely small by placing so light a load on the electro-motor that it ran nearly as fast as the generator or dynamo which converted the mechanical energy into electric energy; actual experiments leading to the result that for every foot-pound of work done by the steam-engine on the generator quite $\frac{7}{10}$ of a foot-pound of work can be done by the distant motor.

One reason why electric transmission of power can be effected with so little waste is because electricity has apparently no mass, and consequently no inertia; there is, therefore, no waste of power in making it go round a corner, as there is with water or with any kind of material fluid. Another reason why electro-motors are so valuable for travelling machinery is on account of the light weight of the motor. Experiment shows that one horse-power can be developed per 50 lbs. of dead weight of electro-motor; a result immensely more favourable than can be obtained with steam, gas, or compressed-air engines.

In addition to the loss of power arising from the heating of the wires by the passage of the current there is another kind of loss that may be most serious in the case of a long electric railway, viz. that arising from actual leakage of the electricity due to defective insulation. To send an electric current through a distant motor, two wires, a "going" and "return" wire must be employed, insulated from one another by silk, gutta-percha, or some insulating substance; and if the motor be on a moving train there must be some means of keeping up continuous connection between the two ends of the moving electro-motor and the going and return wire. The simplest plan is to use the two rails as the two wires, and make connection with the motor through the wheels of the train; those on one side being well insulated from those of the other, otherwise the current would pass through the axles of the wheels instead of through the motor. It is this simple plan that is employed in Siemens' Lichterfelde Electric Railway, now running at Berlin; the insulation arising from the rails being merely laid on wooden sleepers having been found sufficient for the short length, $1\frac{1}{2}$ mile. The car is similar to an ordinary tram-car, and holds twenty passengers. [Photographs were then projected on the screen of this and of the original electric railway laid by Siemens in the grounds of the Berlin Exhibition of 1879, and exhibited in 1881 at the Crystal Palace, Sydenham.] It was explained that on this latter railway, which was 900 yards long, both the ordinary rails were used as the return wire, and that the going wire was a third insulated rail rubbed by the passing train. [Photographs were then projected on the screen of Siemens' electric tram-car at Paris, used to carry fifty passengers backwards and forwards last year to the Electrical Exhibition.] In this the going and return wires were overhead and insulated, connection being maintained between them and the moving car by two light wires attached to the car, and which pulled along two little carriages running on the overhead insulated wires, and making electric contact with them. [Experiments followed, proving that although two bare wires lying on the ground could be quite efficiently employed as the going and return wire, if the wires were short and the ground dry, the leakage that occurred if the wires were long and the ground moist was so great, as to more than compensate for the absence of the locomotive.] Consequently Professor Perry and myself have for some time past been working out practical means for overcoming these difficulties, and we have arrived at what we hope is an extremely satisfactory solution. Instead of supplying electricity to one very long, not very well insulated rail, we lay by the side of our railway line a well insulated cable, which conveys the main current. The rail, which is rubbed by the moving train, and which supplies it with electric energy, we subdivide into a number of sections, each fairly well insulated from its neighbour and from the ground; and we arrange that at any moment only that section or sections, which is in the immediate neighbourhood of the train, is connected with the main cable; the connection being of course made automatically with the moving train. As then leakage to the earth of the strong propelling electric current can only take place from that section or sections of the rail which is in the immediate neighbourhood of the train, the loss of power by leakage is very much less than in the case of a single imperfectly insulated rail, such as has been hitherto employed, and which being of great length, with its correspondingly large number of points of support, would offer endless points of escape to the motive current.

Dr. Siemens has experimentally demonstrated that an electric railway can be used for a mile or two; Professor Perry and myself, by keeping in mind the two essentials of success, viz. attention to both the mechanical and electrical details, have, we venture to think, devised means for reducing the leakage on the longest railway to less than what it would be on the shortest.

For the purpose of automatically making connection between the main well-insulated cable and the rubbed rail in the neighbourhood of the moving train, we have devised various means, one of which is the following:—

A copper or other metallic rod forming an auxiliary rail, rests on the top of and is fastened to a corrugated tempered steel disc (of the nature of, but of course immensely stronger than the corrugated top of the vacuum box of an aneroid barometer), and which is carried by and fastened to a thick ring made of ebonite or other insulating material. The ebonite ring is itself screwed to the circular cast-iron box, which latter is fastened to the ordinary railway sleepers. The auxiliary rail and the corrugated steel discs have sufficient flexibility that two or more of the latter are simultaneously depressed by an insulated collecting brush or roller carried by one or by all of the carriages. Depressing any of the corrugated steel discs brings a stud, which is electrically connected with the metallic rod or auxiliary rail, into contact with another stud electrically connected with the well-insulated cable.

As only a short piece of the auxiliary rail is at any moment in connection with the main cable, the insulation of the ebonite ring will be sufficient even in wet weather, and the cast-iron box is sufficiently high that the flooding of the line or the deposit of snow does not affect the insulation. The insulation, however, of the stud, which is permanently in connection with the main cable, must be far better. For this purpose we lead the guttapercha, or indiarubber, covered wire coming from the main cable through the centre of a specially formed telegraph insulator, and cause it to adhere to the inside of the earthenware tube forming the stalk. And as, in addition, the inside of each contact box is dry, a very perfect insulation is maintained for the lead coming from the main cable. Consequently as all leakage is eliminated except in the immediate neighbourhood of the train, this system can be employed for the very longest electric railways. In a modification of the contact box, the insulated rail instead of extending all along the line is quite short and is carried by the train, and by its motion presses forwards and downwards a metallic fork on the contact box, thus making contact between the two studs. [Other diagrams were explained, illustrating modifications of the contact boxes, in one case the well-insulated cable is carried inside the flexible rail, which then takes the form of a tube. In another case the cable is insulated with paraffin oil instead of with guttapercha or indiarubber.]

The existence of these contact boxes at every 20 to 50 feet also enables the train to graphically record its position at any moment on a map hanging up at the terminus, or in a signal box or elsewhere, by a shadow which creeps along the map of the line as the train advances; stops when the train stops; and backs when the train backs. This is effected thus:—as the train passes along, not only is the main contact between the two studs automatically made, as already described, but an auxiliary contact is also completed by the depression of the lid of the contact box, and which has the effect of putting, at each contact box in succession, an earth fault on an insulated thin auxiliary wire running by the side of the line. And just as the position of an earth fault can be accurately determined by electrical testing at the end of the line, so we arrange that the moving position of the earth fault, that is the position of the train itself, is automatically recorded by the pointer of a galvanometer moving behind a screen or map, in which is cut out a slit representing by its shape and length the section of the line on which the train is. In addition, then, to the small sections of 20 feet or more into which our auxiliary rubbed rail is electrically divided, there would be certain long blocked sections, 1 mile or several miles in length, for each of which on the map a separate galvanometer and pointer would be provided. [Experiments were shown of the system of graphically automatically recording the progress of a train.]

In the preceding systems there are several contact boxes in each section of the insulated rubbed rail, and several sections of the insulated rail in each section of the line blocked, but in the next system the rubbed rail is simply divided electrically into long sections each of as great a length as the particular system employed to insulate the rubbed rail will allow. In this case we arrange that the electric connection between the main cable and the rubbed conductor shall be automatically made by the train as it enters a section, and automatically broken as the train leaves a section. The model before you, shown in the accompanying figure, is divided into four sections, each about 11 feet in length, and you see from the current detectors that as the train runs either way it puts current into the section just entered, and takes off current from the section just left.

[Experiments were then shown of the ease with which an electric train could be made to back instead of going forwards, by reversing the connections between the revolving armatures and the fixed electro-magnets of the motor; also that the accidental reversal of the field magnets of the main stationary generator, although it had the effect of reversing the main current, produced no change in the direction of motion of an electric engine, the direction of motion being solely under the control of the driver.]

But more than this, not only does the train take off current from the section 1 when it is just leaving it, and entering section 2, but no following train entering section 1 can receive current or motive power until the preceding train has entered section 3. [Experiments were then shown proving that with this system a following train could not possibly run into a preceding train even if the preceding train stopped or backed.] Now why does the following train when it runs on to a blocked section pull up so quickly? The reason is because it is not only deprived of all motive power, but is powerfully braked, since when electricity is cut off from a section the insulated and non-insulated rail of that section are automatically connected together, so that when the train runs on to a blocked section the electro-motor becomes a generator short circuited on itself, producing, therefore, a powerful current which rapidly pulls up the engine. [Experiments were then shown of the speed with which an electro-moter, which had been set in rapid rotation and then deprived of its motive current, pulled up when its two terminals were short circuited.]

Whenever, then, a train, it may be even a runaway engine, enters on a blocked section, not only is all motive power withdrawn from it, but it is automatically powerfully braked, quite independently of the action of the engine-driver, guard, or signalman. No fog, nor colour-blindness, nor different codes of signals on different lines, nor mistakes arising from the exhausted nervous condition of overworked signalmen, can with this system produce a collision. The English system of blocking is merely giving an order to stop a train; but whether this is understood or intelligently carried out is only settled by the happening or non-happening of a subsequent collision. Our Absolute Automatic Block acts as if the steam were automatically shut off and the brake put on whenever the train is running into danger; nay, it does more than this—it acts as if the fires were put out, and all the coal taken away, since it is quite out of the power of the engine driver to re-start his train until the one in front is at a safe distance ahead.

But all trains will undoubtedly be lighted with electricity; must, then, the train be plunged into darkness when it runs on to a blocked section to which no electric energy is being supplied? No! If some of the electric energy supplied to the train when it is on an unblocked section be stored up in Faure's accumulators, such as are at present used on the Brighton Pullman train, the lamps will continue burning even when the train has ceased to receive electric energy from the rubbed rail.

When, then, we commit the carrying of our power to that fleet messenger to which we have been accustomed to entrust the carrying of our thoughts, then shall we have railways that will combine speed, economy and safety; and last, but not least to us Londoners, we shall have the entire absence of smoke, the presence of which nearly causes the convenience of the Underground Railway to be balanced by the pernicious character of its atmosphere.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

Notes on the Useful American Myrtles.*

BY JOHN M. MAISCH.

After referring to the statement in Mr. Riise's paper on bay rum (see before, p. 39), relating to the varieties of the bayberry tree, scarcely to be distinguished botanically, the author continues:—

There being a large number of myrtles indigenous to the West Indies and many also to South America, it may not appear inappropriate to give a brief account of those American species which yield useful and more or less medicinal products. Since by far the largest number of these plants possess aromatic properties, and many of them are also astringent, it may be presumed that the majority of them could be employed medicinally; but in this sketch I shall confine my remarks to those only which have, at various times, attracted some attention in Europe or in this country.

The order Myrtaceæ has affinities, more or less intimate, with a number of other orders, and its limits are variously defined by different botanists, so as to embrace a larger or smaller number of tribes or sub-orders. Between seventeen hundred and eighteen hundred species belong to it, all of which, with but few exceptions, inhabit tropical countries.

The *Barringtonieæ*, comprising tropical trees with opposite undotted leaves, are at present generally separated from the myrtles. They are often emetic and

* Read at a Meeting of the Association at Altoona, June 14, 1882.

stupefying, or bitter and astringent, and in some species an unpleasant odorous principle is prevalent.

The sub-order *Granateæ* or *Puniceæ* contains only a single species, the well-known pomegranate, which is indigenous to Western Asia, from Northern India to the Mediterranean, and is now cultivated everywhere in sub-tropical countries and the warm temperate zone. It is destitute of aromatic properties, the bark of the root and trunk as well as the rind of the fruit being anthelminthic and containing considerable tannin. Some botanists place this tree into a separate natural order, while others have united it with the order of Lythraceæ.

The sub-order *Lecythideæ* is likewise free from aromatic properties and is remarkable for the large woody fruits, which in some species open by a kind of lid, on which account they have been called *monkey-pots.* The seeds contain a considerable quantity of fixed oil, sometimes over 50 per cent., and are often edible, being of an almond-like flavour, though those of a few species are reputed to be more or less deleterious in their raw state. The well-known *Brazil nuts* or *Para nuts,* known as *touka* in Cayenne, as *juvia* on the Orinoco, and as *castanha do Pará* in Brazil, are the seeds of *Bertholletia excelsa,* Kunth. The so-called *Sapucaya nuts* are produced by *Lecythis Zabucajo,* Aublet, and of nearly the same flavour are the seeds of *Lecythis Ollaria,* Lin. The fruit of *Couroupita guianensis,* Aublet, is globular, attains a diameter of 6 or 8 inches and is known as *cannon ball, boulet de canon*; it contains in its nearly ripe condition a sweet acidulous pulp, furnishing a refreshing beverage, useful in febrile diseases. These trees are indigenous to South America.

The sub-order *Chamælaucieæ* has, like the following sub-orders, evergreen and mostly glandular-punctate leaves. The plants known as *fringe-myrtles* are shrubby, of a heath-like aspect, with small leaves, are indigenous to Australia and are not used medicinally.

The sub-order *Leptospermeæ* comprises, with very few exceptions, Australian trees and shrubs, with opposite or alternate leaves. The volatile oil of one species, *Melaleuca minor,* Smith, is the well-known *oil of cajaput.* The volatile oil distilled from the leaves of *Mel. ericæfolia,* Sm., *Mel. linariæfolia,* Sm., *Mel. Leucadendron,* Lin., and perhaps of other species, are very similar. The last-named species is known in Australia as *tea tree,* because the leaves are employed like tea; the *white tea tree* is *Mel. genistæfolia,* Sm. The leaves of different species of *Leptospermum,* like *L. scoparium,* Sm., *L. Thea,* Willdenow, and others are similarly used.

But the sub-order has attracted universal attention through the *Eucalyptus globulus,* Labillardière, which through its rapid growth, and perhaps also through the exhalation of its volatile oil, has been found useful in sub-tropical marshy countries for destroying malaria. The leaves of all species of this genus yield volatile oils, which sometimes differ widely in odour and composition. Several species yield astringent exudations, drying into a kino-like substance; the exudation of others contains more gummy matter, and of one or two species it is of a saccharine nature; the bast fibres of certain species have been found serviceable in the manufacture of paper.

Of the sub-order *Myrteæ,* there are not less than fifty-three species described by Grisebach, growing in the British West Indian Islands, all of which are more or less aromatic. The number growing in all the West Indian islands and in South America is much larger. The species best known throughout the civilized world is doubtless the clove, *Caryophyllus aromaticus,* Linné (s. *Eugenia caryophyllata,* Thunberg; *Myrtus caryophyllus,* Sprengel) which, though originally indigenous to the Molucca Islands, is now perfectly naturalized in the West Indies and South America. The unexpanded flower-buds, which constitute the cloves of commerce, contain, besides a considerable amount of tannin, an aromatic volatile oil, of which the eugenol or eugenic acid constitutes the most important part, and very similar constituents are met with in the less aromatic pedicels, known in commerce as *clove stalks,* and in the fruit known as *mother cloves* and *anthophylli.* That the allspice, the fruit of *Pimenta vulgaris,* Wight et Arnott, s. *Eugenia* (*Myrtus,* Lin.) *Pimenta,* De Cand., likewise contains a volatile oil, chemically identical with the oil of cloves, is well known; besides the fruit, the leaves are employed in the West Indies as a spice and in medicines, and the young straight shoots of the plant are largely exported to be used for walking canes. The same volatile oil seems to be present in the closely allied *Pimenta* (*Amomis,* Berg) *Pimento,* Grisebach, which differs from the preceding chiefly by its five-lobed calyx and by its longer ovate-oblong (instead of globular) fruit. The bayberry tree of the West Indies, *Pimenta acris,* W. et A., has, likewise, pentaphyllous flowers and a more ovoid fruit; however the coriaceous leaves are distinctly reticulate on the upper surface, and less distinctly so beneath, while the preceding species does not show any projecting veins above. The typical form of the bayberry tree has the young branchlets somewhat four-angled, while the variety pimentoides, which was formerly regarded as a distinct species, *Myrcia* (*Amomis,* Berg) *pimentoides,* DeC., s. *Myrtus* (*Eugenia*) *citrifolia,* Poir., has acute branchlets decurring from the petioles, and usually broader and more obovate leaves. The oil of bay, distilled from the leaves of the species mentioned, has been in the American market for about twenty years; that it contains eugenol was proven by Mr. R. Rother in 1876 (*Chic. Pharmacist,* p. 130), and this was corroborated by Professor Markoe in 1877 ('Proc. Am. Phar. Assoc.,' p. 435). The fruit contains the same volatile oil, and not unlikely also the flower-buds; at least the tree is known as *clove* in some of the West Indian Islands (Grisebach). These species and varieties possess almost identical stimulating properties, and may be substituted for one another in their applications as medicine or as spice, almost indiscriminately, or at least as far as the difference in flavour will permit.

The clove-like odour is not confined to the species mentioned before, but is met with in other plants, and doubtless depends upon the presence of eugenol. *Eugenia* (*Myrtus,* Gomez) *pseudo-caryophyllus,* DeC., and *Calyptranthes aromatica,* St. Hilaire, both indigenous to Brazil, and known there as *craveiro da terra,* possess this flavour, and the young flower-buds, particularly those of the latter, have been recommended as a good substitute for cloves; a clove-like flavour is observed in all its parts, and the ovate fruit is extensively employed both for culinary purposes and also in medicine.

While it is undoubtedly true that botanical relationship is often indicative of similar properties and composition, yet the odorous compounds met with in the volatile oils of nearly related species are often very dissimilar, if not in relation to their chemical nature, at least in their sensible properties, more particularly in their odour. Thus, for instance, *Myrcia* (*Myrtus,* Vahl) *coriacea,* De Cand., which grows in many of the West Indian Islands, so closely resembles the bayberry tree that it has been confounded with it by as thorough a botanist as Swartz, but the leaves have a lemon-like odour, entirely distinct from the allspice-like flavour of the former, and it is very obvious that the volatile oil or the spirit distilled from them must have very different properties from those of good oil of bay or of bay rum. The leaves, like those of other myrtles, vary considerably in shape, and are either oval, roundish-elliptic, or obovate, obtuse or emarginate, and usually opaque, though marked with impressed dots, some of which become finally pellucid; the veins are not conspicuous. and are usually joined near the revolute margin. There are several varieties, differing in the pubescence of the branchlets and petioles, in the length of the peduncles, and the number of flowers borne by them. The leaves possess antiseptic and astringent properties, the bark is employed for tanning, and the wood is used for dyeing yellow, green and brown.

Eugenia (*Myrtus*, Swartz) *glabrata*, De Cand., is acidulous aromatic in all its parts, more particularly the black oblong berries.

Eugenia (*Myrtus*, Swartz) *procera*, Poir., which is found in Jamaica and adjacent islands, and also in Southern Florida, has pellucid-punctate leaves, which finally become leathery and opaque and then have but a slight odour, while the flowers are very fragrant.

Eugenia (*Myrtus*, Sprengel) *fœtida*, Persoon, of Guiana, has leaves possessing a disagreeable odour, a property rarely met with among the myrtles.

Anamomis (*Myrtus*, Swartz; *Eugenia*, Willdenow), *fragrans*, Grisebach, grows in mountainous regions from Jamaica southward to Guiana; its rigid variable leaves are of a strong balsamic flavour, and are employed both externally and internally. The variety *cuneata*, s. *Eug. emarginata*, Macfillan, is known as *zebra wood.*

The odour of the flowers of *Eugenia* (*Myrtus*, Swartz) *virgultosa*, De Cand., indigenous to Cuba and Jamaica, resembles that of rhubarb.

Eugenia (*Myrtus*, Swartz) *disticha*, De Cand., is known in Jamaica as *wild coffee*, because the red ovoid berries, which are about ½ inch long, resemble the fruit of coffee and the fresh seeds have a similar taste.

Eugenia (*Myrtus*, Swartz) *Gregii*, De Cand., has oblong or roundish-ovate berries of a leathery texture and a strongly acrid-aromatic flavour. Acrid-aromatic properties are likewise found in the root and seeds of *Eugenia* (*Myrtus*, Sprengel) *angustifolia*, Lam., which grows in San Domingo.

The yellow depressed-globose berries of the Brazilian *Eugenia* (*Myrtus*, Martius) *dysenterica*, De Cand., are of an agreeable acidulous taste, but are apt to produce diarrhœa. The red or yellow berries of the West Indian *Eugenia floribunda*, West, are sweet and acidulous, are eaten raw and cooked, and on fermentation yield a pleasant vinous beverage. Eatable berries are also produced by several other West Indian species of *Eugenia*, the most important of which appear to be *Eugenia* (*Myrtus*, Swartz) *ligustrina*, Wild., s. *Myrtus cerasina*, Vahl., with a black two-seeded fruit called *pitangueira do mato* in Brazil; *Eugenia* (*Myrtus*, Swartz) *lineata*, De Cand., with a scarlet-red cherry-like but several-seeded fruit; and *Eugenia uniflora*, Lin., s. *Eugenia Michelii*, with a red-furrow one-seeded fruit, which is known in some parts as *Cayenne cherry*, and in Brazil as *pitangueira*; the last-named species is also distributed over a considerable portion of tropical South America, and has been naturalized in the East Indies. In like manner are also used the violet-purplish plum-sized berries of the Brazilian *Eugenia* (*Myrtus*, Martius) *cauliflora*, De Cand., known as *jabuticaba*.

One of the myrtles of tropical America has been introduced into and naturalized in most other tropical countries, where it is highly valued on account of its fruit, which resembles a medium-sized pear, with a downy, veined, brittle and thin rind, and containing a whitish, yellowish or reddish pulp, of a very agreeable sweet, acidulous and aromatic flavour. The fruit is known as *bay plum*, *guava* or *guayava*, and in Brazil as *aracá mirim* and *aracá goiaba*. It comes from a small tree, the *Psidium Guava*, Raddi, under which name two or three nominal species are comprised, chiefly distinguished by the shape of the fruit; this is either pyriform or globular, the latter apple-shaped or red guava being regarded as rather inferior to the former, or white guava. The unripe fruit is astringent, and is employed like other astringents; the young leaves and buds have similar properties, also the root and the bark, and are used both internally and externally. The white guava is most esteemed for eating in the raw state; but the pulp of both varieties is used in the West Indies in the preparation of two kinds of preserve, which are known as guava jelly and guava cheese, and furnish a not unimportant article of commerce.

The dark red spherical, well-flavoured fruit of *Psidium Cattleyanum*, Sabine, has the size of a large plum, and on account of its purplish pulp is known as purple guava, and in Brazil as *arácaseiro do campo*; it is indigenous to Brazil and naturalized in China.

Psidium guineense, Swartz, is cultivated in the West Indies for its somewhat smaller, dark yellow and internally red berry, and the fruit of *Eugenia* (*Myrtus*, Sprengel) *pseudo-psidium*, Jacquin, is esteemed there under the name of *bastard guava.*

Psidium montanum, Swartz, the *mountain guava* of Jamaica, has a globular fruit, scarcely ½ inch in diameter, which, like the flowers, has a bitter almond odour. A species of St. Vincent, *Psidium Guildingianum*, Grisebach, with small berries, only ¼ inch thick, has in its habit considerable resemblance to *Myrcia coriacea* and *Pimenta acris*, but the rigid leaves are devoid of pellucid dots.

Campomanesia (*Psidium*, Aublet) *aromatica*, Grisebach, has yellow globular eatable berries, and a foliage of a balm-like odour. The similar fruit of *Campomanesia lineatifolia*, Ruiz et Pavon, is known in Peru as *palillo*, and that of *Camp. cornifolia*, Kunth, in New Grenada, as *guyavo de Anselmo.*

In this connection should also be mentioned the *rose apple* and *Malay* or *Otaheïte apple*, which have been naturalized in the West Indian Islands, and there, as in tropical Asia, their native country, are highly valued on account of their agreeable taste and rose-like odour. The former, *Jambosa vulgaris*, De Cand., s. *Eugenia* (*Myrtus*, Kunth) *Jambos*, Lin., is a globular or oval yellowish or reddish berry, about 1½ inch in diameter; the latter *Jambosa* (*Eugenia*, Lin.; *Myrtus*, Sprengel) *malaccensis*, De Cand., is pear-shaped or top-shaped, 3 or 4 inches long, of a crimson or blackish-red colour externally, and with a white, juicy pulp.

The bark and leaves of both species possess strongly astringent properties, and the seeds are aromatic and acrid. The fruit of several other species indigenous to tropical Asia is employed there like those mentioned.

The jambolana, *Syzygium* (*Eugenia*, Lam., *Calyptranthes*, Wild.) *Jambolanum*, De Cand., is also naturalized in Jamaica and other West Indian islands. The dark red oval and somewhat curved fruit is of the size of a large cherry, has an astringent, acidulous taste, and is employed in gargles; the bark, notably that of the root, is astringent and aromatic. Several other species of this genus, mostly indigenous to tropical Asia, bear eatable berries.

The plants of the genus *Myrtus*, to which the frequently cultivated common myrtle of Southern Europe, *Myrtus communis*, Lin., belongs, have, likewise, aromatic and astringent properties, and their berries are in some cases eatable, like *Myrtus Luma*, Mill., whose fruit is very palatable; *Myrtus microphylla*, Humb. et Bonpl., the red berries of which are of the size of a pea and very sweet, and *Myrtus Ugni*, Molina, which has thicker brown-red berries, of a faint rosemary odour; these species are indigenous to Chili and Peru, and the leaves of the *ugni* are used as a substitute for tea. The *guayavo arayan* of the Orinoco valley is *Myrtus salutaris*, Kunth, the root of which is highly valued as an astringent.

Somewhat similar properties are possessed by a Chilian plant called *cheken* or *chekan*, which enjoys a local reputation, and the use of which in Europe and in North America has been recently revived. *Eugenia Cheken*, Molina, is a small shrub, about 4 feet high, with a rough, brown, strongly astringent bark; the leaves are sessile, about an inch long, elliptic or roundish, somewhat narrowed at both ends, delicately feather-veined, light green and smooth; the peduncles are axillary and terminal, five or six-flowered; the berries are globular, about ¼ inch thick, externally black, and contain two somewhat heart-shaped seeds. The barks and the leaves have been employed internally in indigestion, diarrhœa and various other affections of the bowels and kidneys, and externally, in the form of fomentations, in ophthalmic inflammations, rheumatic and other pains, and more recently, as inhalations of the vapours from the aqueous infusion, in bronchitis, laryngitis and diphtheria.

Very few myrtles are indigenous, but none peculiar to the United States. The five species, enumerated in Chapman's 'Flora,' are small trees, confined to Southern Florida. They are *Eugenia dichotoma*, De Cand.; *Eug. procera*, Poir.; *Eug. monticola*, De Cand.; *Eug. buxifolia*, Willd., and *Calyptranthes* (*Myrtus*, Lin.) *Chytraculia*, Swartz. Not a single myrtle has been found indigenous to California, though the climate is well suited for the growth of different species of *Eucalyptus*, and doubtless of other genera of this interesting and useful natural order. The States bordering the Mexican Gulf may likewise be adapted for the acclimatization of some of the numerous myrtles.

NEW YORK ACADEMY OF SCIENCES.

Sulphur Deposits in Utah and Nevada.*

BY ISRAEL C. RUSSELL.

Sulphur deposits, of sufficient extent to attract attention from their economic importance, have been visited by the writer at three localities in the Great Basin. These are located at Cove Creek, Millard county, Utah; near Humboldt House, Humboldt county, Nevada; and at Rabbit Hole on the eastern edge of the Black Rock desert in north-western Nevada.

Of these deposits the most interesting to the geologist are those occurring at Cove Creek, in Southern Utah, This locality is on the eastern border of the Great Basin, and at the western edge of the region of the high plateaus, recently described by Captain Dutton. Eastward of it is a high range of trachytic mountains that sweep around to the north-west and north-east, forming a crescent-shaped alcove in the western face of the range, the points of which are about ten miles apart. Between the horns of this crescent and three or four miles southwest of the Ranch Fort at Cove Creek, is a conical mountain of basalt, having the ruin of a cinder cove at the summit; for convenience, we shall call this old volcano the Cove Creek crater. From the perfection of its outlines this crater seems so be of a very recent date, but is clothed with a scattered growth of cedars, and judging from its general appearance and the amount of weathering it has sustained, it is probably older than the post-Bonneville craters near Fillmore, Utah. The Cove Creek crater is now in the condition of a nearly extinct fumerole, as hot air and gases are said to escape from cracks and fissures near the summit of the mountain. The area between the base of the crater and the mountains to the eastward of Cove Creek, is occupied by subaerial gravels, excepting along the immediate base of the eastern range, where volcanic tuffs appear at a number of localities. Along the line where the alluvian slopes upwards to meet the tuffs and volcanic rocks, is where the majority of sulphur mines have been opened.

Prospecting for sulphur was begun at Cove Creek about ten years since by Mr. C. A. Semler, and has been carried forward by him with much energy ever since. At the present time fifteen mines have been located, a few of which have been developed to a slight extent, and a large number of prospects opened. The mines, however, have not yet been worked sufficiently to make the sulphur from this locality an article of commerce.

From the hasty examination that I was enabled to make, I find that the sulphur deposits at Cove Creek arrange themselves in three convenient groups, the divisions depending, however, more on the nature of the cavities that have received the sulphur, than on any difference in the manner in which it has been introduced. In one instance the sulphur occupies a nearly extinct solfatara; again we find it impregnating and cementing beds of volcanic tuff; and at other times, the sides of fissures are sheathed with a brilliant drusy lining of sulphur crystals. In all of these instances it is evident that the sulphur has been derived from deeply seated sources, having been expelled in a gaseous form, and condensed and crystallized in the cavities and fissures in the cooler rocks above.

In the mine named the Cleveland by Mr. Semler, situated about two miles southward of the fort at Cove Creek, the sulphur occurs in quantity, filling the crater of a solfatara. The bottom of the little valley in which the Cleveland is situated, is nearly circular, with a diameter of about 1200 feet, and is totally destitute of vegetation. Over the level surface of this strange little desert the sulphur outcrops in many places, forming ledges of sulphur, and a number of prospects show an abundance of quite pure material. A shaft was sunk in the centre of this deposit, to the depth of 25 feet, all in pure sulphur, as I am informed by Mr. Semler. The material taken from this shaft has been returned to it, in order to guard against the burning of the mine, and the broken fragments are now cemented into a solid mass by the sulphur that has been deposited in the interstices between the broken masses. The deposition of sulphur is still in progress, the prospecting holes becoming lined in a few days with most beautiful plumb-like crystals of pure sulphur. The temperature in all the openings in this sulphur bed is high. At the surface of one of the prospecting holes which had been refilled with broken fragments, the thermometer read 104° F., and through all the openings vapour and heated gases are constantly escaping. In cold weather the clouds of vapour forming above this mine may be observed from a distance of a mile or two. The drops of moisture that condense on any cold object held for a moment in the excavations, are intensely acid, and from their taste seem to contain a large proportion of sulphuric acid. No chemical examinations of these acid drops, or of the gases that are constantly escaping from the openings, could be made. It is noticeable, however, that no odour of sulphuretted hydrogen can be detected about the mines, but from a few simple tests, and from the presence of dead animals in a large number of the openings, it seems evident that carbonic acid is exhaled in large quantities.

The sulphur at this locality covers a circular area of about 1000 feet in diameter, and from the prospects that have been reported cannot be less than 25 feet thick. This is not pure sulphur, however, but certainly carries a large percentage of earthy matter. The conclusion arrived at from a hurried inspection of this interesting locality is that the sulphur fills a nearly extinct solfatara, into which it has been conducted from below, seemingly by direct sublimation, or what is perhaps more probable, by the decomposition of sulphurous gases and the deposition of the liberated sulphur. A careful examination of the fumes that are exhaled from these openings would certainly be of much value in determining the chemical history of sulphur deposits.

Of the second class of mines—those in which the sulphur impregnates beds of volcanic tuff—we have examples in the Mariposa and Prince Albert, situated at the base of the mountains, two miles east of the fort at Cove Creek. At these localities the tuff is stratified, and contains scattered pebbles of quartzite and limestone, and is impregnated over a large area with sulphur, which fills all the interstices of the rock. Judging by the eye alone, much of the tuff contains from 10 to 40 per cent. of sulphur, while in localities the work is far richer than this. Overplacing the tuff are alluvial cones of gravel that are in some places cemented by sulphur in the same manner as the strata of tuff beneath, thus showing that the beds now carrying the sulphur have acted simply as condensers for the sulphur, which in every case has been derived from a deeper source.

The third class of sulphur deposits—those in which the

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sulphur forms a lining of crystals on the sides of fissures —are illustrated by the Philadelphia and Mammoth mines. At the first of these, situated one mile north of Cove Creek, the sulphur occurs in drusy crystals, covering the sides of small intersecting fissures in trachyte. The work has here been much broken along a line of faulting, which may be traced northward to the top of the Cove Creek crater. The Mammoth mine is of a similar character, but formed in a dark carboniferous limestone. This mine is located on the top of the divide, between Cove Creek and Dog Valley to the northward. While standing on this pass the line of faulting on which the Mammoth mine is situated may easily be traced southward to the valley of Cove Creek, and across the valley it is again seen as a bold fault scarp, with a throw to the westward ascending the side of the volcanic crater that we have already mentioned several times. The fault crosses this cove just to the east of the summit, and has given the eastern slope of the mountain a steeper inclination than is shown by the western side. Northward from the Mammoth mine the same line of faulting is continued for many miles, and shows a recent scarp all along the eastern border of Dog Valley. The fault scarp that ascends the side of the volcanic cove, and also the recent scarp in Dog Valley are the results of slight and very recent movements along an ancient line of profound displacement. The volcanic mountain south-west of Cove Creek has been built over this old line of fracture. The sulphur in the Mammoth mine has been deposited in the fissures made by the faulting of the strata, and in the seams and openings between the layers of limestone. The rock on the borders of these fissures, beneath the thin lining of sulphur, has been altered to a brown earthy mass to the depth of about half an inch. The mines like the Philadelphia and Mammoth, that have been opened on lines of fracture in solid work, show but little sulphur, and on the whole cannot be considered as giving promise of any large deposit below the surface. In these mines also the temperature is high, but not so great as at the Cleveland.

The beds of volcanic tuff, in which the sulphur has been deposited, probably rest on harder rock that has been fissured, thus allowing the sulphur-bearing vapours to escape upwards, as in the case of the Philadelphia mine, but no section showing the tuff beds above such fissures has been exposed. As these beds of tuff occur for many miles along the base of the mountains, we may hope that the conditions for charging them with sulphur have been many times repeated. Next to the Cleveland mine, we should certainly look to the beds of tuff along the base of the mountains eastward of Cove Creek, for the principal supply of sulphur for economic purposes from this region.

Owing to the exhalation of various gases in nearly all the prospects that have been opened, we find in the bottoms of the excavations large numbers of dead insects, together with the remains of mice, bats, rabbits, etc., that have been smothered by the escaping gases. In many of the openings a choking sensation is felt, and the amount of gas, which seems to be largely carbonic acid, is so great that a person can remain in them but a few seconds; even in shallow prospects the workmen have to fan each other, in order to remain in the openings long enough to do their work. These mines can only be opened from the surface, and even by this method they cannot be worked to any considerable depth, owing to the high temperature of some of the prospects, and the constant escape of noxious gases.

Associated with the deposits of sulphur are beds of gypsum, and also irregular deposits of "alum." Just what the nature of the "alum" may be has not been determined by analysis. These beds usually overlie the sulphur deposits, the alum being sometimes 2 feet thick and the gypsum as much as 8 feet. Hot springs occur in the same field, which, together with the fumerole, at the top of the old crater, bear evidence to the expiring volcanic energy of the region.

Sulphur deposit at Humboldt Station, Nev.—The sulphur at this locality fills nearly vertical fissures, that are directly associated with a very recent basaltic butte that rises in the centre of the Humboldt Valley, near Humboldt Station, on the Central Pacific Railroad. The filling of these fissures with sulphur seems due to the same kind of solfataric action as is still in progress at Cove Creek, but at this locality the fissures are cold and the volcanic action extinct. These deposits of sulphur are of small extent, but a few years since they were opened and worked in a small way. At present they are abandoned, as the discovery of much richer deposits about thirty miles to the northward, on the border of the Black Rock Desert, has rendered their working unprofitable.

The Rabbit Hole Sulphur Mines.—These mines derive their name from the Rabbit Hole Springs, situated a few miles southward of the sulphur deposits, on the eastern border of the Black Rock Desert, in northern Nevada. The hills that rise to the eastward of the principal mines are of stryolite, bordered along their western base by beds of nearly white volcanic tuff or breccia, which is represented on the maps of the Fortieth Parallel Survey as being of Miocene age. These breccias have been greatly altered, and cemented by opal and other silicious infiltrations since their deposition, so that they now form brittle silicious rock with pebbles and fragments of older rocks scattered through the mass. In many places these porous tuffs and breccias are richly charged with sulphur, which fills all the interstices of the rock and sometimes lines large cavities with layers of crystals 5 or 6 feet in thickness. In the Rabbit Hole district sulphur has been found in paying quantities for a distance of several miles along the border of the desert, but the distribution is rregular and uncertain and is always superficial, so far as can be judged by the present openings. As in the Cove Creek mines, the sulphur at Rabbit Hole has been derived from a deeply seated source, and deposited from a vaporous condition in the cooler and higher rocks in which it is now found. Judging from the silicious material that cements the tuffs, it is evident that the porous rocks, in which the sulphur is now found, were penetrated by heated waters bearing silica in solution previous to the deposition of the sulphur. These mines occur in a narrow north and south belt along a line of ancient faulting, which is one of the great structural features of the region. The association of faults with sulphur bearing strata of tuff is here essentially the same as at the Cove Creek mines. At the Rabbit Hole mines, however, no very recent movement of the ancient fault could be determined. This absence of a recent fault scarp, together with the fact that the mines are now cold and do not give off exhalations of gas or vapour, shows that the solfataric action at this locality has long been extinct.

At all the localities visited the sulphur has been derived from sources far beneath the surface from which it has been expelled by heat, and escaped upwards through fissures that were formed along lines of faulting, and has been condensed on the sides of fissures, and in the interspaces of the cooler rocks near the surface. Whether the deposition of the sulphur took place by direct sublimation or by the decomposition of sulphuretted hydrogen, has not been determined. The date at which the sulphur was introduced into the rocks where we now find it, is in all cases very recent, and at the Cove Creek mines is still in progress.

Work at the Rabbit Hole mines is now being carried forward by a day shift of seventeen men, the production of sulphur being about 6 tons per day. The value of the sulphur produced is about forty-five dollars per ton in San Francisco. The sulphur, after being mined and assorted, is placed in upright cast-iron retorts, having a general resemblance to the common form of blast furnace, with a capacity of about 2½ tons. When the retorts are charged the openings at the top, through which the sulphur-bearing rock is introduced, are closed, and superheated steam admitted at the side. The steam pressure is at first about 70 pounds to the square inch, but as the sulphur begins to melt, the pressure is allowed to subside to 60 or perhaps 50 pounds. When the sulphur melts it passes through a grate, and is collected in a kettle beneath the retort, from which it is allowed to flow in a very liquid brown stream, into a receiving pan, with a capacity of about 12,000 pounds, where impurities that were previously held in suspension are allowed to settle to the bottom. From the receiving pan the sulphur is run into molds, shaped like the frustrum of a cone, each of which has a capacity of from 200 to 250 pounds. When allowed to stand a few days after cooling, those cylindrical masses break into irregular lumps, in which condition it is delivered to the sulphur refinery at San Francisco.

Parliamentary and Law Proceedings.

Prosecution under the 17th Section of the Pharmacy Act, 1868.

At the Clerkenwell Police Court, on Friday, the 28th ult., George Theodore Imeson, of 172, Caledonian Road, London, N., was charged with having, on the 20th of July, sold to Mr. Templeman, the Assistant Secretary of the Chemists and Druggists' Trade Association of Great Britain, a preparation of opium not labelled with the name of the seller.

Mr. Glaisyer appeared for the prosecution, and Mr. Attenborough, barrister, defended.

The case was under the 17th Section of the Pharmacy Act, 1868, which provides that it shall be unlawful to sell any poison either by wholesale or retail unless the box, bottle, or wrapper in which such poison is contained be distinctly labelled with the name of the article, the word "poison," together with the name and address of the seller of the same. On the 20th ult., Mr. Templeman went to the shop, 172, Caledonian Road, and there purchased from the defendant personally two pennyworth of laudanum. The bottle containing the poison was labelled "Laudanum, Poison. Saunders and Co., Chemists and Dentists, 172, Caledonian Road, London, N., Post and Money Order Office." The defendant was also the postmaster and he was rated as occupier of the premises, but his name does not appear on the Register of Chemists and Druggists, and he has therefore no right to sell poisons.

Mr. Glaisyer then directed the attention of the magistrate to the decision of Mr. Justice Grove and Mr. Justice Lopes, in the case of Templeman *v.* Trafford, who held that the seller within the meaning of the Act was the person who had actual control of the shop where the sale took place.

Mr. Attenborough, in defence, quoted from the case of Templeman *v.* Trafford, which he argued was not at all applicable to the present one, inasmuch as in that case there was no name over the door of the shop, the poison was labelled with the name of a chemist residing at some distance from the shop where the poison was sold. Mr. Imeson, as an unregistered person, might have infringed another section of the statute by selling poisons, but he contended that the requirements of the section under which these proceedings were taken had been complied with, since the name Saunders and Co. appeared on the facie board and also on the bottle, and that enabled them to trace the sale of poisons to that address, the prosecutor had failed to prove that such a firm as Saunders and Co. did not exist.

The Magistrate: We have heard that a Mr. Higham lived at that address, then came the defendant, but there has been no mention of Saunders and Co. residing there. He was clearly of opinion that there had been an infringement of the Act, and the defendant must pay the full penalty of £5 and costs.

Mr. Glaisyer applied for extra costs, which were not allowed.

Obituary.

Notice has been received of the death of the following:—

On the 20th of June, Mr. Charles Wood, Chemist and Druggist, Market Place, Wigan. Aged 37 years.

On the 18th of July, Mr. George Long, Pharmaceutical Chemist, High Street, Peckham, S.E. Aged 52 years.

On the 20th of July, Mr. Joseph Wright, Chemist and Druggist, Bridge Street, Leeds. Aged 49 years.

Correspondence.

The Future of Pharmacy.

Sir,—The question, as it appears to me, is, How is a chemist to get his living, maintain the dignity of his profession, and compete with the numerous stores now in existence, these stores being supplied by the same people that supply us, but on very different terms?

I had given to me the other day, confidentially, a list, which is a piece of ordinary ruled paper, with the articles and prices written on both sides; made out by a very influential wholesale drug house, whose name I must withhold, but the principals of which have been brought before us in a very prominent manner, and I presume it is for the sake of their reputation amongst chemists generally that they withhold their name from the list which is specially made out for stores' orders. Some of the articles I will give you, with prices:—

Dill Water	8 oz.	bottles	3s. 6d.	per dozen.
Essence of Ginger . .	1	,,	4s.	,,
,, . .	2	,,	7s.	,,
Essence of Senna . .	4	,,	6s.	,,
,, . .	8	,,	11s. 6d.	,,
Glycerine, B.P. . .	2	,,	3s.	,,
,, . .	4	,,	5s. 6d.	,,
Vin. Ipecac.	2	,,	3s. 9d.	,,
,, ...	4	,,	6s. 6d.	,,
Spirits of Camphor, Nitre and Sal. Volatile	2	,,	6s.	,,
,,	4	,,	10s. 6d.	,,
Com. Conc. Sarsaparilla	4	,,	10s.	,,
Cough Linctus . . .	4	,,	4s. 6d.	,,
,, . . .	8	,,	8s.	,,

All less 10 per cent. discount.

Castor oil, 4 oz., 2s. 6d.; 8 oz., 4s. 6d.; 10 oz., 5s. 6d.; 12 oz., 6s.; 16 oz., 8s., per dozen.

Cod liver oil, 8 oz., 10s. 6d.; 16 oz., 18s., per dozen.

These are only a few from a list of sixty-three, and with the ordinary receipts of a chemist and druggist, I think it is impossible for him to compete with these prices. It seems to me, that when we, as a body, find a wholesale house of any description supplying stores, and necessarily giving them the advantage over us, we should, so to speak, "Boycott" that firm. I for one, would not, if I knew it, spend sixpence of my money with any firm that, to my knowledge, supplied stores, and would strongly recommend this plan to the trade generally. From observing the trade advertisements in stores' lists, we should find a great many of those who did supply them. If this plan could be unanimously adopted, wholesale houses would find that a fair and legitimate trade amongst chemists and druggists was far more satisfactory and remunerative than supplying stores at large discounts.

We cannot blame stores, but the people who supply them at special terms and thus giving them the great advantage of offering goods to the public at the same prices as we buy them, or very nearly so, and until we can in some way let those firms find that we will not deal with them, stores will flourish.

Perhaps these few remarks may give rise to some idea that will be beneficial to us in the future of pharmacy.

Wulfruna.

Magister.—You do not appear to be aware that the examination criticized by you was conducted by the College of Preceptors, whose papers you speak of approvingly.

Communications, Letters, etc., have been received from Messrs. W. I. Richardson, Thompson, I. Pike, W. J. McIntosh, J. H. Garrett, Aquam.

THE INTERNATIONAL ELECTRIC EXHIBITION.

(*Continued from page* 102.)

The next Englishman to tread in Mr. Swan's steps in this field was Mr. St. George Lane-Fox. The following description of this inventor's lamp by the Paris Committee is very full and clear, but further details as to the manner in which the contacts are made will be found of interest and will therefore be given after the description. "The Lane-Fox lamp is ovoid in shape, the neck being in length intermediate between the two lamps last described (Swan and Maxim). The carbon is in the form of a horseshoe, and is circular in cross-section. It is made from the root of an Italian grass, largely used in France for making brooms. After carbonization the filaments are classified according to their resistances. They are then heated in an atmosphere of coal gas, by which carbon is deposited upon them, as in the filaments of the lamps last described. The filament in the lamp is supported by platinum wires, to which it is attached by sleeves of carbon encircling both. These wires pass through tubes in the top of a hollow glass stem. Just below the extremities of these tubes are two small bulbs containing mercury, forming the contact between the platinum wire sealed into the glass above and the copper conductor which enters from below. These conductors are held in place by plaster, which fills the base of the lamp."

The filaments are joined to short cylinders of carbon or graphite by means of holes drilled a little way into them; these holes are filled up with a cement composed of genuine Indian or Chinese ink and finely divided plumbago. At the other end of the cylinders holes are drilled to meet the ends of the filaments, but the inventor states that this is not absolutely necessary. In these latter holes short lengths of platinum wire are inserted, cemented as before; each length of platinum wire need not exceed $\frac{1}{4}$ of an inch in length. The other ends of the platinum wires are fused into tubes of lead glass and the wire ends come into the small glass globes filled with mercury. The mercurial contacts are arranged as stated by the committee.

The Italian grass from which the filaments are manufactured is stated by the inventor to be the *Andropogon Ischæmum* or *Chrysopogon Gryllus*. The grass is prepared by boiling in a 5 per cent. solution of caustic soda or potash; the outer skin is thus loosened and scraped off. The fibre is straightened by stretching it while still damp, and the straightened fibre is bound on a block of carbon, buried in plumbago in a sealed crucible and the crucible and its contents raised to a white heat. The fibres are thus ready for mounting as before described. If the resistance of the carbonized fibres proves to be too high Mr. Lane-Fox ingeniously incandesces them in a "Woulfe's" bottle contrivance through which a stream of coal gas or hydrocarbon vapour is passing continuously. The filaments are in connection with a measuring apparatus, and when the resistance is found to be nearly right, the filaments are mounted in their holders and the process repeated until the resistance reaches the exact figure necessary.

The Lane-Fox lamp was found by the Paris Committee to have a mean resistance cold of 55 ohms; at 16 candles this resistance became reduced to 27·4 ohms, and at 32 candles to 26·59 ohms. The current required when yielding 16 candles was 1·593 ampères with an electromotive force of 43·63 volts; at 32 candles the current was 1·815 ampères and the electromotive force 48·22 volts; 10·61 16-candle lamps were yielded per horse-power and 8·65 32-candle lamps, being 173·58 and 276·89 candles per horse-power.

The Lane-Fox lamp is worked by the Anglo-American Brush Electric Light Company. The luxurious richness of the installations of Lane-Fox lamps in the Alhambra Court at the Crystal Palace made the Brush Company's exhibit one of the most popularly attractive sights of the exhibition. The display was certainly an impressive demonstration of the ornamental capabilities of the incandescent electric lamp, such as cannot be imagined by those who had not the fortune to see it.

The next lamp that is commercially available to the public is the Maxim lamp, owned by the Maxim-Weston Electric Light Company, formerly known as the Electric Light and Power Generator Company. This lamp is of American origin, and is not yet so well known in this country as the preceding lamps; it, however, appears to be making its way slowly. It is one of the four lamps reported on by the Paris Committee. The following is the committee's description of the lamp. "The Maxim lamp is also globular in form. It has a short neck; within the neck rises a hollow cylinder of glass, supporting upon its summit a column of blue enamel, through which passes the conducting wires of platinum which carry the carbon. The filament is made of cardboard cut by a punch in the form of an M, in section, therefore, rectangular, and several times as broad as it is thick. It is carbonized in a mould, through which a current of coal gas is passed. After carbonization the filament is placed in an attenuated atmosphere of hydrocarbon vapour and heated by the current. The vapour is decomposed and its carbon is precipitated on the filament. In this way not only are the inequalities obliterated, but the resistance of the filaments may be equalized and brought to any standard required." The committee found the cold resistance of the Maxim lamp to range from 63 to 84 ohms, the mean resistance of the ten specimens tested being 72 ohms. The hot resistance when giving a light of sixteen candles was 41·11 ohms mean and 39·60 ohms at thirty-two candles. The current in ampères when yielding sixteen and thirty-two candles was 1·38 and 1·578 respectively. The electromotive force in the same order was 56·49 and 62·27 volts. These figures give 9·48 16-candle and 7·50 32-candle lamps per horse-power, or a total of 151·27 and 239·41 candles per horse-power in the two cases.

As a result of their experiments the committee come to the following four conclusions:—

1. The maximum efficiency of incandescent lamps in the present state of the subject, and within the experimental limits of this investigation, cannot be assumed to exceed three hundred candle lights per horse-power of current.

2. The economy of all lamps of this kind is greater at high than at low incandescence.

3. The economy of light production is greater in high resistance lamps than in those of low resistance, thus agreeing with the economy of distribution.

4. The relative efficiency of the four lamps examined, expressed in carcel burners of 7·4 sper-

maceti candles each, produced by 1 horse-power of current, is as follows:—(*a*) At sixteen candles, Edison, 26·5; Swan, 24; Lane-Fox, 23·5; and Maxim, 20·4. (*b*) At thirty-two candles, Edison, 41·5; Lane-Fox, 37·4; Swan, 35·5; and Maxim, 32·4. To double the light given by these lamps the current energy was increased, for the Maxim and Lane-Fox lamps 26 per cent., for the Edison lamp, 28 per cent., and for the Swan lamp, 37 per cent.

The foregoing are the only incandescent lamps of which, up to the present time, exhaustive tests have been published. It will, however, perhaps complete the subject-matter better if a brief description be given of the general notions involved in some of the more recently invented lamps which have been sold to various public companies, but of which nothing further is at present known than is contained in the respective inventors' patent specifications.

Mr. William Crookes, F.R.S., who has sold his lamp to the Gülcher Electric Light Company, takes cellulose, which he purifies by soaking in hydrofluoric acid, etc. He also claims the use of certain substances which are capable of absorbing the residual gas; he mentions thorina and alumina as suitable for this purpose. It is stated in the specification, No. 1422, 1881, that alumina absorbs residual traces of aqueous vapour. The method of utilizing this property is thus given:—After exposing the substance to the action of aqueous vapour the containing bulb is to be exhausted in the usual way until the exhaustion reaches, say, the one ten-thousandth of an atmosphere. On applying heat to the part of the glass containing the alumina occluded aqueous vapour is given off from the alumina. On re-exhausting as completely as possible a mere trace of vapour is left in the bulb; as the heated alumina cools down this residual trace of vapour is absorbed, thus rendering the vacuum practically complete. Mr. Crookes says that by operating in this way it is easy to push the exhaustion to a degree that would be impracticable by the use of a pump only. The vacuum thus produced will prevent an induction spark passing that would strike through several inches of air. The methods by which the purified cellulose is formed into filaments constitutes another patent, No. 2612, 1881. In this specification several different ways are given of treating the purified cellulose with an ammoniacal solution of cupric hydrate called cuprammonia, a well-known solvent of cellulose. In the first method the cellulose is taken in a manufactured form as thread, paper, etc. The material is passed through or dipped into the solvent for a few moments until the cellulose is acted upon to such an extent as wholly or partially to destroy its intimate structure, but not sufficiently to produce disintegration or solution. When sufficiently acted upon the material is allowed to dry by simple exposure to the air. The copper that remains behind is extracted with dilute acid; after extraction the material is washed thoroughly with water and dried between sheets of blotting paper.

Another process is to allow a cuprammonia solution of cellulose to evaporate in a shallow dish, with an accurately levelled plane bottom. When the skin or film left has acquired a sufficient consistency it is treated with dilute acid to extract the copper, thoroughly washed with water and dried under pressure between sheets of blotting paper.

The filament is prepared from the above material by cutting or punching out an adequate portion. The ends of the filament are strengthened by electro-depositing nickel or copper on them, and the junction between the conducting wires and the filament are painted with a thick syrupy cuprammonia solution of cellulose; after drying and carbonizing a good junction will be obtained possessing good conductivity from the finely divided metallic copper present. The carbonization is to be effected slowly in a gas muffle furnace, the filaments being buried in powdered charcoal and placed under moderate pressure during the operation, coal-gas is passed through the iron box in which the filaments are carbonized during the whole operation. If the filament after carbonization does not possess the right resistance or is imperfect, it is improved by heating it in a vacuous vessel containing a quantity of a high boiling point hydrocarbon, of which the vapour tension at ordinary temperature is low, such as naphthaline, or xylol or chloroform. These hydrocarbons, although present in quantity, emit an attenuated vapour, which is slowly decomposed and deposits carbon on or in the pores of the filament in a good conducting graphitoidal form. The manner in which the filament is mounted in its glass globe forms the subject-matter of another patent, 3799, 1881. This patent specification contains an interesting description of the manner of forming the glass envelope, which, however, could not be intelligibly described without the accompanying diagrams. The most notable feature is the device of using a cored wire conductor for sealing into the lamp. It is difficult to make a good junction between the glass and the metal except in the case of platinum; and with thin conducting wires of platinum the low conductivity of the metal causes it to heat when large currents are used, and to crack the glass or cause a leak at the junction. Mr. Crookes gets over this difficulty by using a compound wire having a core of copper, silver, gold, or other good conductor, and a platinum sheathing, so that there is the advantage either of using a cheaper metallic conductor or a metallic conductor of better conductivity, without any increased difficulty in making it form a good junction with the glass.

The patent specification of Tom Ernest Gatehouse, 3240, 1881, appears to be an attempt to use platinum as an incandescing material, the metal being kept from fusing by an alternative circuit of carbon, the principle taken advantage of being the familiar one that metals increase in resistance with elevation of temperature, while carbon, on the contrary, diminishes in resistance under these conditions. Upon these facts Mr. Gatehouse constructs a current regulator. Chatterton's compound* is used in filling the neck of the containing globe. This lamp is said to have been acquired by one of the numerous electric lighting companies that have been formed during the last few months.

The remaining incandescent lamp it is proposed to notice is the one invented by Mr. Desmond Gerald Fitz-Gerald. Specification No. 3890, 1881. The filament of the Fitz-Gerald lamp is formed of Swedish filter paper gelatinized by the action upon it of concentrated solution of chloride of zinc of specific gravity 1·876 or thereabouts. When the material is sufficiently gelatinized it is thoroughly washed with water acidulated with hydrochloric

* A mixture very familiar to telegraph engineers, composed of Stockholm tar, resin and gutta percha.

acid, next with a dilute solution of ammonia, and finally with water, then it is left to thoroughly dry and when ready for use is said to be very tenacious. The prepared filaments are carbonized in the usual way.

The carbonized filaments are cemented into short lengths of copper tube, $\frac{1}{4}$ of an inch being a suitable length; the cement used is a mixture of lampblack and platinum black made into a paste with water, sugar solution or starch; after drying, the cement tubes carrying the filament are heated to a temperature of not more than 1900° F., being protected from the air in the meantime.

Platinum conducting wires are connected with these tubes and are fused into the glass in the usual manner. The hollow in the base of the lamp is first filled in with a minute quantity of melted gum copal, and then fully secured by means of an infusible cement composed of litharge and glycerine diluted with about two-thirds its bulk of water; this cement is said to become very hard and impervious. The details of the lamp connections can scarcely be understood without the proper diagrams.

Arrangements are made to ignite a short length of magnesium ribbon in the glass bulb in order to facilitate the removal of the residual oxygen. The Fitz-Gerald lamp is owned by the Phœnix Electric Light Company, and has been exhibited at Westminster during the few last weeks.

The future of the incandescent electric lamp looks very promising, though the whole subject is yet in its infancy. Still the progress that has been made is truly astonishing and augurs extremely well for the immediate future of this young creation of the nineteenth century. It was intended to discuss the theoretical bearings of the incandescent lamp more than has been done, but the necessary descriptive matter has taken up such an amount of space as to make this quite out of the question.

(*To be continued.*)

NOTE ON CONVALLARIA MAJALIS.*

BY A. LANGLEBERT.

Recent communications made to the Academy of Sciences and Academy of Medicine, by Professors Vulpian and Sée have attracted the attention of the medical profession to a new remedy derived from the lily of the valley (*Convallaria majalis*). Without dilating upon the botanical characters of this beautiful little annual, belonging to the sub-order Asparageæ, I will briefly recapitulate its chemical composition.

The action of this medicament appears to be due to a glucoside and an alkaloid. Valz, in 1830, isolated from it two glucosides, "convallamarin" and "convallarin." In 1865, Stanislas Martin obtained an alkaloid, "maïaline," an acid, "maïalic acid," an essential oil, a yellow colouring matter and wax. This plant, therefore, contains several principles that are themselves subject to modification. In fact, under the influence of dilute acids, convallamarin splits up into sugar and "convallamaretin," and convallarin into sugar and "convallaretin." The chemical composition being known, it was necessary to determine the seat of the active principles, it being easy to foresee that the effects would be different according to the parts of the plant employed. The experiments made hitherto have indicated that all the activity resides in convallamarin and maïaline, convallarin appearing to be nearly inert.

Already for a long time the *Convallaria majalis* has attracted the attention of the scientific world. Cazin tried the flowers under the form of an electuary and obtained abundant stools; the root produced emeto-cathartic effects. Schultze prepared an alcoholic extract of the flowers, which was bitter and purgative with a dose of two grains.

Wouters, Peyrille, Cartheusen and Klein made it out to be a purgative analogous to scammony and aloes. I wish to emphasize this point, because one of the difficulties met with is the elimination, at least partially, of the purgative principle. The extract actually prepared is exempt from it.

In idiopathic epilepsy, headaches and convulsions, Senckenberg, father and son, employed it in doses of from 1 to 4 grams. Hitherto, it would appear, the action on the heart was not even suspected.

In 1880, some Russian physicians experimented with an infusion of the plant, but without sensible results.

Recently the *Convallaria majalis* has been tried by Professor Sée in his clinical practice at the Hôtel Dieu, physiological researches being made simultaneously in the laboratory by Messrs. Bochefontaine and Hardy. Alcoholates and tinctures of the entire plant and of the various parts were prepared, but the results upon the heart were not conclusive. Infusions, even in large doses (6 or 7 grams of the plant), were not uniformly successful. It became necessary, therefore, to prepare extracts of the entire plant and each of its parts, taking into account the action of the menstruum upon the active principles contained in the plant.

The aqueous, alcoholic and hydroalcoholic extracts prepared from the roots did not give the results sought for. In my opinion, the emeto-cathartic action which was observed in a series of extracts prepared by me, was to be attributed to the presence of too large a proportion of the roots.

The aqueous, alcoholic and hydroalcoholic extracts of the leaves are three times less active than the extract actually prepared. Moreover, the aqueous and alcoholic extracts of the root and leaves, whilst fulfilling the therapeutic indications, possessed emetic and purgative properties if the dose given were too high.

The extracts prepared from the flowers and stalks, gave good results, especially with animals, in which the cardiac phenomena observed were very remarkable; they were unaccompanied by emetic or purgative effects, but with very slight diuresis.

From the foregoing facts it would appear that each part of the plant employed produces a slightly varied effect. After several trials made with the flowers, stalks, leaves and roots, the best results were obtained with an aqueous extract prepared from the flowers and stalks of the *Convallaria majalis*, with the addition of a third of their weight of roots and leaves.

This extract, deprived in great part of the resinous purgative principle, is solid in consistence, shining black, possesses a very bitter taste, is soluble in all proportions in water and alcohol, and has an agreeable persistent odour. It is used in the preparation of an aromatized syrup, having a free bitterness without after-taste, and containing 50 centigrams of extract to a tablespoonful. It is under this form

* *L'Union Pharmaceutique*, xxiii., 338.

and in doses of 2, 3, or 4 spoonfuls that the medicament is prescribed in the treatment of cardiac affections.

EXPERIMENTAL RESEARCHES UPON THE CONVALLARIA MAJALIS.*

BY G. SÉE.

The lily of the valley has been known from time immemorial among the Russian peasants as a certain remedy for dropsy. This popular belief became in 1880 the subject of experiment by Messrs. Troitzky and Bojojawlensky, but insufficient was published to attract attention to the subject. The statements, however, being supported by Professor Botkin, of St. Peterburg, impressed the author, who took the first opportunity for their verification, it being necessary to procure the plant in flower to determine the active part.

The Russian physicians had spoken of infusions, without saying whether they were prepared from the flowers, leaves, stalks, roots, or entire plants. The various parts of the plant were therefore tried under the form of infusions, aqueous or alcoholic macerations, and lastly of extracts. The infusion of the flowers was without effect, even in doses equal to five or six grams of the flowers, whilst the tinctures and even the alcoholatures were infinitely less active than the extracts, which M. Sée classes as follows, according to their order of merit:—(1) aqueous extracts of the leaves, which require a dose three times as large as the extracts from other parts of the plant; (2) extracts of the flowers, which exercise upon animals a very energetic action, and upon man a much less intense one; (3) extracts of the entire plant, including flowers, stalks, and roots.

Valz, in 1830, obtained from the aqueous extract of the dried flowers and roots the toxic principle called "convallamarin;" the alcoholic extract yields "convallarin," which is of little importance. The former principle is a glucoside, splitting up, under the influence of acids, into sugar and convallamaretin.

M. Hardy, demonstrator of chemistry in the laboratory of the Hôtel-Dieu, has obtained convallamarin in the amorphous state. It was obtained from extracts of the plant, by Dragendorff's process; treating the acidulated aqueous extract with alcohol and then with chloroform or amylic alcohol. This principle has an activity comparable to that of pure digitaline, with which experiment shows it to have points of analogy as well as of difference.

In order to arrive at the therapeutic dose of the extracts to be given to man, preliminary trials were carefully made first upon animals. By an approximative calculation, based upon corporeal weight, the dose useful in cardiac disease was determined. It may be thus formulated: 1 gram to 1½ or even 2 grams of extract of the flowers or of the entire plant; extract of the leaves is only active with double this dose.

EXTRACT OF MALT.†

BY THOMAS T. GOODALE, PH.G.

In preparing extract of malt, cleanliness is of primary importance. The vessels should be thoroughly washed in some alkaline solutions, such as solution of soda or potash, to prevent any substance from adhering to them, and, when not in use, should be filled with lime water. If these precautions are neglected, acetification is sure to follow, and the preparation is spoiled. Care must also be taken that the malt be fresh, as it sours and becomes unfit for use if it has been crushed more than three or four days. The grain must be reduced to a moderately fine state, and the best mode is that which crushes it and loosens the husk from the fleshy part without separating the two. Each shell then forms a filter through which the clear liquor percolates, leaving behind any matter which might be mechanically taken up. When ground in a mill, the grain is so disintegrated that it is apt to set during the process of extraction, and form a mucilaginous magma which retains much of the liquor. This cannot be removed except by repeated washings; a very dilute extract is then produced, which is liable to acetification in the succeeding treatment. In order to obtain a concentrated and bright liquor, the saccharine and amylaceous matters must be extracted with the smallest amount of water, and maintained at a proper degree of heat. The grain will be completely exhausted by one mashing, if successfully conducted. Failure may result from two causes: when a mucilaginous mass is formed in consequence of too elevated a temperature, or when the grain is too fine, the liquor cannot be drawn off freely, and the grain is, therefore, not thoroughly exhausted. If, on the other hand, the temperature is too low, the starch is not converted into dextrin and glucose, but is carried off in suspension. The washing apparatus which was found most convenient consists of a tub similar to that used by brewers, smaller at the bottom than at the top, with a finely perforated bottom fitted to it. In the side, between the true and false bottoms, is placed a faucet. Fitting into the perforated bottom, and passing through the cover, is a mixer, which is an upright shaft having cross-bars attached, running at right angles to it. A cog-wheel fitted to the top of the shaft, together with a crank, communicates power to it. A cover made of heavy felting was adjusted to the tub. Wood and felt being both non-conductors, any desired temperature can be constantly and perfectly maintained for many hours. Care must be taken to keep the heat of the mash at 160° F., the conversion of starch into dextrin and glucose being best effected at that degree. The freshness, hardness, and dryness of the grain exert an influence on the temperature. When very dry, heat is generated, and the conversion of the starch causes a still greater elevation of the temperature. Boiling water is poured into the tub, and when the heat has fallen to 165° F., the malt is gradually added and thoroughly stirred in. The temperature is now brought to 160° F., and the tub is closely covered to maintain the heat. After stirring a short time, the mash is allowed to remain at rest for two hours. At the end of this time, the faucet is carefully turned until it is half open. The liquid which flows out should be perfectly bright and clear, and great care should be used to prevent fine particles of grain or any solid matter from passing out. After drawing all the liquid from the tub, a fresh quantity of water heated at 160° F. is sprinkled on the grain, allowed to remain about an hour, and then drawn off as before. If the grain is not exhausted, this operation must be repeated, but nothing of value will remain after two macerations if they have been properly conducted. When three macerations are necessary, the resulting liquor is so dilute that acetification is apt to take place before it is evaporated. In practice, in order to obtain at once a very concentrated extract which should contain all the valuable properties of the grain, the liquid obtained from the first washing is returned to the tub and drawn off in a hour. It is then only necessary to sprinkle on sufficient hot water to force out the liquor held by the grain. If the process has been successful, the extract will be the exact colour of the grain used, will have a good head, be finely flavoured, and effervesce. When the temperature has been too high, the white head has a tinge of brown, and the colour of the extract deepens in exact proportion to any excess of heat. If, on the contrary, the temperature has not been high enough, the liquor is less bright and lively in flavour. When the heat has been very low, the characteristic head will not stand, but flies off immediately, and the liquor will be thick and mucilaginous, and quickly spoil when exposed to the air.

* Abstract of a paper read before the Academy of Medicine (*L'Union Pharmaceutique*, xxiii., 337).

† Abstract of a thesis presented to the Massachussets College of Pharmacy (Boston). From *New Remedies*, March, 1882.

This process differs greatly from Mr. Ebert's, by which the malt is digested for a short time at a temperature of 125° F., and then strained. The liquor obtained contains the diastase. The residue is boiled with fresh water, and strained, and the resulting liquor contains the starch. The two solutions are then mixed and kept at a temperature of 160° F. until the starch is completely changed into grape sugar, which can be readily ascertained by the iodine test. If a higher degree of heat is used, the diastase of the grain is coagulated, and becomes insoluble and inactive. After straining and filtering, the liquor must be carefully evaporated to the proper consistence. The importance of having the liquor perfectly clear and bright was shown by a series of eight experiments as follows.

Experiment No. 1.—The liquor was pale and not very bright. It was placed in a shallow vessel over a water-bath, and constantly stirred. The albuminous matter which made its appearance during the operation was removed, and the evaporation continued until an extract of the consistence of honey was obtained. It was light brown in colour, with a sweet taste, and had the odour of malt. At the end of two weeks it showed no change, but in four weeks, a thin crust had made its appearance. After eight weeks, the mass had separated into two distinct layers. The upper one, or crust, which formed about one-third of the whole, was a shade lighter in colour than the original extract, and quite tough and pliable. It had a starchy appearance and taste, and, when tested with iodine, gave the blue reaction characteristic of starch. The lower layer was a trifle lighter and more liquid than the original extract, and had an agreeable sweet taste and odour. With iodine, it gave negative results, showing the absence of starch. These layers were separated and again examined in four weeks. The crust had grown somewhat harder, but otherwise remained the same. The lower layer showed no change. The peculiar behaviour shown in this case was thought to be due to the separation of the solid and starchy matter of the grain, which had been held in suspension, but which separated when the liquor was evaporated.

Experiments Nos. 2, 3 *and* 4.—These three lots were made in the same manner as No. 1, except that particular care was taken to obtain the liquor perfectly clear and bright. The same process of concentration was strictly followed. When finished, all presented the same appearance, and exactly resembling the lower layer of No. 1, in colour, taste, and odour. At the end of eight weeks, all remained light-brown clear extracts. The liquor used in all the preceding experiments was made in a mash-tub.

Experiments Nos. 5 *and* 6.—The liquor used in these experiments was made by Ebert's process. When first strained, it had a pale starchy appearance. Being shaken with paper-pulp and again strained, a perfectly clear, bright colour was obtained. The method of evaporation was precisely the same as in previous experiments, and the product resembled in every particular those resulting from Nos. 2, 3 and 4. Examination at the end of eight weeks showed no change.

Experiment No. 7.—The liquor used in this experiment was made by Ebert's process, but was merely strained, not brightened. At the end of eight weeks, the peculiar formation noted in No. 1 had made its appearance. After separation, the lower layer remained unchanged, and presented every characteristic of a good extract.

Samples from Nos. 2, 3, 4, 5 and 6 when tested for starch gave negative results.

These experiments, then, proved the correct use of the theory that the peculiar formation noticed when turbid liquors were used, was due to the presence of the solid and starchy matters of the grain, which had passed out in suspension; and that no such formation will take place when the liquor is perfectly clear and bright. Filtering, which is necessary in Ebert's method, renders the process impracticable for large lots, as it is long and tedious.

When made in a mash-tub, the liquor is obtained at once perfectly bright and clear, and is ready to evaporate.

Having obtained a bright liquor, which is necessary, the next step was to find a process by which this liquor could be evaporated in considerable quantities at once, and, at the same time, be made to yield a preparation of a light and uniform colour. When evaporated in the ordinary manner in an open pan, good results can be obtained by constant stirring and careful regulation of the heat, provided the quantity of liquor is small. In making large lots, the long-continued heat necessary to reduce so much liquid produces an extract very dark in colour, and sometimes black. This process, is, therefore, impracticable. The vacuum-pan presented itself as a ready solution of the problem, since, by it, a very bright sweet extract can be made, which, in taste, odour, and particularly in colour, is all that can be desired. This method, however, was abandoned, as the aim was to find some process which would not require complicated or expensive apparatus. The plan of evaporating in very shallow pans at a low temperature was then tried. The clear liquid was poured into tin pans $\frac{3}{4}$ of an inch in depth. These were then placed in a drying closet having a heat 80° to 90° F. The result was but little inferior to what was sought, namely, a sweet extract entirely free from any burnt appearance or taste, with an odour resembling fresh bread. The amount of room necessary to carry out this plan led to its abandonment. The fact that the exposure of a very large surface to the air greatly facilitates evaporation, then led to the adoption of an apparatus by which this advantage was secured, and a very low degree of heat could be employed. There being no ceiling to the room in which the experiment was conducted, two wooden uprights, 12 inches wide, which reached nearly to the bottom of a jacketed kettle underneath, were fastened to adjacent floor-beams above. A wooden roller passed from one upright to the other near the bottom, while near the top two rollers were placed parallel to each other. Over these rollers, a band of cloth was passed, forming, as it were, a letter V closed at the top. Power was communicated by means of a crank attached to one of the upper rollers. The kettle being filled with the clear liquor, steam was turned on until the temperature reached 80° to 90° F., and the heat was kept at this point until the operation was finished. The belt was now set in motion, and passing through the liquor, brought the warmer portions to the surface, and carried a considerable part with it as it passed over the rollers. By this method, a large quantity of liquor can be quickly reduced to a small bulk by a low heat, and with little labour. The rapidity of the evaporation is increased by directing a current of air upon the band, and is also, of course, somewhat in proportion to the length of the band and the amount of surface thus exposed. This process yielded a very satisfactory product, very light in colour, and free from any burnt taste. When compared with lots made in the ordinary manner, its superiority was very marked. Here, then, was a method which gave good results, required only just sufficient heat to warm the liquor, and was easy in manipulation, while the apparatus was inexpensive and occupied but little room.

A freezing process next presented itself as possessing two great advantages, namely, the entire absence of heat during concentration, which would render the formation of caramel impossible, and the great preservative power of cold. The operation was conducted as follows:—The clear liquid, when cold, was frozen in an ordinary ice-cream freezer. The ice-cake was then broken, placed in a strong canvas bag, and firmly pressed in a tincture press. The ice-cake remaining in the press was of a pale straw colour. The liquid expressed was again frozen and pressed, and the process continued until a thick syrupy liquid was obtained. This was placed in shallow pans in a warm drying closet, and in about an hour was of the proper consistence. The finished extract was superior in appearance to any which I have yet seen, but the yield was less than in previous experiments, the ice-cake retaining some of the liquor. In subsequent experiments, the ice-cake was divided into several portions; these were put into separate bags, and iron plates placed between them. All were then pressed until the liquor ran white. The ice-cake remaining should be colourless. The liquor was again frozen and again pressed in the same way until the product could no longer be frozen; it was then finished in the drying closet as before. The yield was now satisfactory.

We have then two methods of concentration, each possessing its own special advantages. The first, in which a large evaporating surface is obtained by means of a belt of cloth, recommends itself by the simplicity of the apparatus and its economy in time and labour, while the finished product is of good appearance. The readiness with which this method may be employed in every store, will probably render it the most useful, The second, or freezing process, has the advantage of giving an exceptionally superior product free from all colour except that obtained from the grain.

To sum up, in order to prepare a good malt extract, the best malt must be used, a uniform and proper temperature must be maintained during the washing process, care must be used in drawing off the liquor, to prevent the solid matter of the grain from passing out, the exhaustion of the grain must be accomplished with as little water as possible, and the concentration must be effected rapidly at a low heat. By careful attention to these details, an extract will be obtained, which will be handsome in appearance, and contain all the valuable properties of the grain.

QUASSIIN.*

BY A. CHRISTENSEN.

The literature upon the chemical constituents of quassia wood is very inconsiderable. In 1806 Thomson† mentioned that by digesting quassia wood with water and evaporating he obtained a very bitter substance, which when warm was soft, and became brittle upon cooling, and which, in his opinion consisted principally of the pure bitter constituent; it gave a slight precipitate with tincture of galls. In 1811 it was stated by Pfaff‡ that the bitterness was completely extracted by cold water. In 1826 Buchner introduced 1 grain of the alcoholic extract into a wound in a rabbit, which was followed by the death of the animal. Another investigation of the extract by Keller§ contains nothing of importance.

Quassiin was first prepared by Winckler|| in 1835 as follows. Three ounces of quassia wood were extracted with 2 pounds of 80 per cent. alcohol. After evaporation in a water-bath the residue was dissolved in water, and the solution filtered and evaporated to the consistence of an extract. The extract was exhausted with absolute alcohol, evaporated almost to dryness, and then again exhausted with boiling water. The light-yellow solution, decolorized by animal charcoal, left after slowly evaporating crystals of quassiin. Winckler described this substance as crystalline, difficultly soluble in water and freely in alcohol, faintly alkaline, giving a precipitate with tannic acid, and as being obtained crystalline most easily from water.

Subsequently Wiggers¶ prepared quassiin by repeatedly boiling 8 pounds of quassia wood with water, evaporating the filtered decoction to 6 pounds, cooling, adding lime and allowing the mixture to stand a day with frequent shaking, filtering, evaporating nearly to dryness and then boiling with 90 per cent. alcohol. From the solution, which according to Wiggers contained, besides quassiin and colouring matter, some sodium chloride and potassium nitrate, the alcohol was distilled off and it was then evaporated to dryness. The residue was dissolved in the least possible quantity of alcohol and mixed with a considerable quantity of ether, which separated much colouring matter. The filtrate was now again evaporated, and dissolved in absolute alcohol and ether and this repeated until the residue was colourless and free from saline matter. Lastly the ethereal solution was poured into a small quantity of water and left to evaporate spontaneously.

Wiggers found for quassiin the formula $C_{20}H_{25}O_6$. According to him it loses 1·3 per cent. of water at 100° C., and 0·37 per cent. more upon fusing. The melting point, he says, lies a little above that of the resin. He found it dissolve in 220 parts of water at 12° C., and it did not neutralize acids. It crystallized by spontaneous evaporation from a solution in alcohol and ether which was mixed with water, and also when a warm saturated alcoholic solution was mixed with boiling water and allowed to cool. The quassiin of Wiggers was precipitated by tannic acid, but not by metallic salts.

In commencing the present investigation, Herr Christensen first directed his attention to find a new method of preparation, since the methods of Winckler and Wiggers yielded it in a very impure condition and the operations for its purification would involve considerable loss. The author tried two methods that are available in the extraction of several bitter substances: (1) treatment of a solution of the watery extract with bone black and exhaustion of this with alcohol; and (2) precipitation of the watery extract with tannic acid, decomposition of the washed precipitate, extraction with alcohol, etc. In both cases, by evaporating slowly, he obtained tabular crystals, having an intensely bitter taste, leaving on combustion no ash, difficultly soluble in water and fairly soluble in alcohol. The solutions gave with tannic acid a dense white precipitate.

Notwithstanding that the quassiin is tolerably completely removed by bone black, as is shown by the fact that the filtrate tastes only slightly bitter, the tannic acid method has the advantage that it yields the purer product. The following method was adopted by the author for the preparation of quassiin:—

Five kilos of quassia were boiled several hours with two successive quantities of water. The united filtrates were evaporated, at first over an open fire, subsequently on a water-bath, to 1½ litres. After cooling this was filtered and the filtrate precipitated with tannic acid, taking care to keep the reaction neutral or faintly acid by the addition of carbonate of soda, since the compound of quassiin with tannic acid, like many similar compounds of bitter substances with that acid, is very soluble in it. The precipitate, after the addition of well-washed pipe-clay is easily collected and removed by filtration. The precipitate after being repeatedly washed was mixed whilst moist with a considerable quantity of freshly precipitated lead carbonate, and evaporated to dryness in small portions, with frequent stirring, upon a water-bath. The mixture was extracted four times with alcohol, the alcohol distilled off and the residual liquid evaporated until the separation of crystals of quassiin, which were washed and dried between filter-paper. The filtrate yielded more crystals upon further evaporation, and some more quassiin was separated by shaking it with chloroform. Lastly, the quassiin was recrystallized from ether-alcohol and water.

In the place of lead carbonate, calcium hydrate also was used for the decomposition of the tannic acid compound, and an alcoholic solution obtained that was not so much coloured, but the yield was smaller.

* Abstract of a communication from the Strassburg Pharmaceutical Institute (*Archiv*, xx., 481).

† *System der Chemie*, iv., 47.

‡ *System der Materia Medica.*

§ Buchner's 'Repertorium,' ii.

|| Buchner's 'Repertorium,' liv. (1837), 85, and lxv. (1839), 74.

¶ *Annalen der Pharmacie*, xxi. (1837), 40.

Upon evaporating the watery extract of quassia wood, a considerable precipitate separated as a smeary mass. This was treated with freshly precipitated lead carbonate, evaporated almost to dryness and extracted with 84 per cent. alcohol. After the alcohol had been distilled off, and the liquid sufficiently evaporated, some quassiin separated, but in an impure condition.

Quassiin is very freely soluble in chloroform, and by shaking an aqueous solution of it with chloroform it can be nearly entirely removed. The author therefore tried to obtain the quassiin from the aqueous extract of quassia wood by simply shaking this with chloroform; but the practical difficulty was met with that the chloroform does not completely separate it, and a pasty, slimy mass was formed, the consistence of which was not altered even upon warming. After the chloroform had been distilled off a very impure residue was left, from which the quassiin was only obtained by repeated recrystallizations from ether-alcohol mixed with a little water. Neither can direct exhaustion of the quassia wood by chloroform be adopted in the preparation of the quassiin, since much resin is taken up with it, and this can only be separated by the ether-alcohol method, which involves considerable loss. The last two experiments show, however, that quassiin exists as such in the wood, and is not a product formed during the treatment.

The quassiin, obtained as above described with tannic acid, was purified by recrystallization from the smallest possible quantity of warm alcohol, in which it is so much more soluble than in cold that the solution solidifies into a paste upon cooling. After the crystals had been washed with dilute alcohol and dried between filter-paper and then over sulphuric acid they were white and gave a colourless solution. They were recrystallized once more by the addition of boiling water to a hot concentrated alcoholic solution; the crystals that separated on cooling showed the same melting point as those of the first crystallization and were used in the further experiments.

With respect to the proportion in which quassiin occurs in the wood, the author obtained from 18 kilos of Jamaica wood (*Picræna excelsa*) 12 grams of impure substance, equal to 0·6 per 1000. But in treating a subsequent consignment, both of Jamaica and Surinam wood, he found to his surprise that in repeated experiments upon considerable quantities of both kinds he could obtain scarcely any quassiin. A sample of *Quassia amara* wood, that yielded 2·8 per cent. of extract, and one of *Picræna excelsa* wood, that yielded 2·6 per cent., yielded no quassiin. The sample of *Picræna excelsa* wood that gave 0·6 per 1000 of quassiin yielded 3·2 per cent. of extract. The author is unable to explain the cause of this difference; but if the value of quassia wood is dependent upon the proportion of quassiin it contains, the results do not afford much justification for the exclusion of the Jamaica wood from some pharmacopœias.

Pure quassiin forms very thin rectangular double refracting crystalline scales. It has an intensely bitter taste, is without smell, permanent in air, and gives neutral solutions with alcohol, water, etc. It melts at 205° with slight puffing—possibly due to the giving off of water—to a yellow resin-like mass, which upon solution and recrystallization is recognized as unaltered quassiin.

Water, left in contact with finely powdered quassiin several days, with frequent shaking, at 15° C., dissolved 1 part in 1230. A warm saturated solution left forty-eight hours at 15° C., with frequent shaking, contained 1 part in 735. Boiling water dissolves quassiin with difficulty, but much more freely than cold. In alkalies it dissolves with a yellow colour very readily upon boiling and separates unaltered on the addition of acids, becoming again colourless. It is dissolved by alkalies in the cold somewhat more easily than by water, turbidity resulting upon neutralizing the liquid with acids. Boiling alcohol dissolves it very freely, but cold alcohol much less so, 1 part of quassiin requiring 30 parts of 84 per cent. alcohol at 15° C. In ether and petroleum spirit it dissolves with difficulty, but very freely in chloroform, of which 2·1 parts dissolve 1 part of quassiin. A solution in chloroform is dextrogyre, the specific rotation being $\alpha_D + 37{\cdot}8$.

Quassiin contains no nitrogen. After being dried to a constant weight over sulphuric acid, it did not alter in weight when exposed for an hour to a current of dry air at 100° C., and gave upon analysis results corresponding with the formula $C_{31}H_{42}O_9$.

	Calculated.	Found.
C	66·66	66·90
H	7·52	7·44
O	25·82	25·65

An aqueous solution of quassia is not rendered turbid by metallic salts. A saturated alcoholic solution gives no precipitate with a similar solution of neutral lead acetate, and upon evaporation the quassiin separates unaltered. Other saturated alcoholic solutions of metallic salts behaved similarly. Tannic acid produces in aqueous and alcoholic solutions of quassiin a white precipitate which is soluble in acids and in caustic and carbonated alkalies.

Dilute hydrochloric and sulphuric acids dissolve quassiin in the cold somewhat more freely than water, but 5 to 10 per cent. solutions, even after being heated in sealed tubes to 125° for an hour, did not reduce alkaline cupric tartrate, showing that quassiin is not a glucoside.

By treatment of quassiin with a 3 per cent. solution of sulphuric acid a new compound was obtained, crystallizing in fine needles, and having only a slightly bitter taste. It melted at 237° C., did not lose all its water of crystallization (four molecules) till 110° C., and when anhydrous gave upon analysis results corresponding with the formula $C_{31}H_{38}O_9$. It was very sparingly soluble in water, required 180 parts of alcohol at 15°, dissolved very freely in caustic potash and caustic soda, and gave no precipitate with tannic acid. There was also a formation of resinous matter that could not be crystallized and possessed an intensely bitter taste.

A strong solution of quassiin in chloroform decolorizes bromine, with formation of hydrobromic acid. The author obtained a bromine compound as a white amorphous mass, with a taste even more bitter than that of quassiin; this compound dissolved in alkalies with an intense yellow colour, distinctly produced by the smallest traces, and at the same time lost its bitter taste almost completely.

An experiment made to test statements as to the occurrence of an essential oil in quassia wood gave negative results, a small quantity of solid white substance that collected on the surface of the aqueous distillate proving to consist of free fatty acid.

"MANICURE."*

A number of persons at New York and at frequented summer resorts have for some time past been doing a profitable business in the treatment of the hands and finger-nails of those who consider themselves to be in need of such service. In a recent number of the *Art Interchange*, published in that city, the editor gives the following reply (in substance) to a correspondent who wishes information concerning the methods and materials employed. It is not unlikely that some of our readers may find it profitable to prepare the materials requisite, and give the necessary directions for their use.

For cosmetic gloves, take chamois or castor—the best quality is not necessary—three sizes larger than the person ordinarily wears; rip them open and spread them with the pastes below described. If you call at the lady's house and examine her hands, and learn what they need

* From *New Remedies*, June, 1882.

and the number of her gloves, you can prepare accordingly, and order gloves to be worn at night. The following is a useful prescription for whitening the hands, to be preceded by baths and washes, to be described further on.

Cosmetic Paste, No. 1.—Myrrh, 1 ounce; honey, 4 ounces; yellow wax, 2 ounces; rose water, 6 ounces; glycerin added according to thickness of paste, just enough to make it spread easily. Melt the wax in a dish over boiling water, add the myrrh while hot; beat up together, then add honey and rose water; beat again, and lastly add glycerin from a teaspoonful up; spread over the inside of the gloves; then sew them up; they are ready for use.

Cosmetic Paste, No. 2.—Two teaspoons of oil of sweet almonds; one ounce of rose water, thirty-six drops tincture benzoin; one teaspoonful glycerin; yolks of two fresh eggs; one teaspoonful of rice flour. Beat to a paste, and line gloves, or rub on hands, and wear close-fitting gloves over it at night.

Cosmetic Paste, No. 3.—One teaspoonful of the best pine tar; 1 pint pure olive oil. Melt in tin cup over boiling water. This can be kept on hand, and, if preferred, may be perfumed with rose water. To be spread on hands and worn with gloves. One application will not be sufficient; the beautifying of the skin is a work of more or less time, according to its condition.

Ground barley, the white of an egg, 1 ounce of honey, and a teaspoonful of glycerin spread thickly inside gloves, and worn at night, is a useful recipe for the hands.

Another recipe for whitening the hands, and an inexpensive one to prepare, is composed of home-made soft soap, half a pound; salad oil, 1 gill; mutton tallow, 1 ounce; boil together, then add, when away from fire, spirits of wine, 1 gill; ambergris or some other perfume, according to fancy; benzoin would answer. Spread on gloves and wear at night.

For ordinary use to keep the hands white where they are used in house work, bran mittens are excellent. Make good-sized mits of cloth, fill with wet bran or oatmeal first, washing the hands with vinegar and glycerin, or lemon-juice and glycerin rubbed in afterward; then put the bran mittens on; tie closely at wrist and wear them every night, or at regular intervals as needed.

Alum added to white of egg and rose water is good for making the flesh firm; a trifle of glycerin added is an improvement.

Colour for Finger-tips.—A pinkish tint is thought to be desirable for the tips of the fingers; it can be attained by the use of the following: ½ ounce of alkanet root chippings soaked for a week in alcohol diluted with water will give a lovely stain for the finger-tips; apply by dipping a bit of raw cotton in the mixture, and touching the finger-tips with it.

Polish and Colour for the Nails.—Rub the nails, which must first be carefully trimmed with sharp scissors, with equal parts of cinnabar and fine emery powder, and afterwards with scented oil of almonds.

To Remove Spots.—Pitch and myrrh melted together and laid over the nails over night will soon cause white specks to disappear. Butter or cream will remove the pitch in the morning.

For Removing Discolorations.—Two ounces of fine almond soap (white soap is always best) dissolved in 2 ounces of lemon-juice, to which must be added 1 ounce of oil of almonds and a trifle of carbonate of potash and one teaspoonful of glycerin, stirred up until like soap, is excellent to wash the hands with occasionally, but it must not be used where the skin is chapped or abraded.

A fine toilet salve, and useful for chapped surfaces, is made with 2 ounces of oil of almonds, 1 drachm each of wax, spermaceti, and glycerin, melted together and perfumed by 2 ounces of rose-water and ½ ounce of orange-flower water.

Fine pumice stone smoothed and rounded is exceedingly useful for smoothing the palms of the hands, and the fingers. As a first step in beautifying the nails, lather well with warm soap suds from a pure white soap; dry, and while the nails are softened, trim carefully, push down the skin all around to show the shape of the nails and the little half moon at the base of the nails; remove hangnails, and then polish and cover with powder described for the purpose. It would be well to treat the hands at the first, and then remove specks from nails and finally polish. The polishing may afterwards be done by the lady at home, if desired. Use different prescriptions, according to state of hands. Bran in warm water and vinegar is useful for a wash; make into lather with fine white soap, and rub the hands well with the bran. Indian meal and oatmeal are also goods for a preparatory bath before trimming and polishing nails and using cosmetic preparations. The various cosmetics can be sold at prices according to their first cost. The washing cosmetic with potash need only be used once or twice, and is useful after the bran bath or before; the cosmetic gloves may follow for night use. Always use pure white soaps; almond soap, glycerin and lettuce-oil soap, are to be recommended; also the oatmeal and pumice soaps where the skin will bear the latter.

THE FORENSIC-CHEMICAL DETERMINATION OF GELSEMINE IN ANIMAL LIQUIDS AND TISSUES.*

BY EDWARD SCHWARZ, M.D.

The author briefly reviews the investigations of H. Kollock (*Amer. Jour. Phar.*, 1855, p. 263), C. L. Eberle (*Ibid.*, 1869, p. 35), Professor Wormley (*Ibid.*, 1870, p. 1), and Dr. C. A. Robbins (*Ibid.*, 1876, p. 191). Professor Wormley's more recent investigation (*Ibid.*, 1877, p. 150), appears to have escaped his attention. The method recommended by Dragendorff (*Jahresbericht für Pharmacie*, 1878, p. 640), was used for the preparation of the two important principles; gelsemic acid was obtained from the acidulated solution by agitation with chloroform, and gelsemine by agitating the liquid rendered alkaline by ammonia with benzol.

The chloroform solution, on evaporation, left a crystalline residue, which dissolved partly in water, with a yellow colour, and showed a strong blue fluorescence. The small insoluble portion was dissolved in alcohol. Both solutions, placed over sulphuric acid, yielded crystals; those from the watery liquid were light yellow-brown fine needles, being comb-like, attached to a larger prismatic crystal. These crystals showed all the reactions of æsculin except that they acquired a greenish colour with ferric chloride, due probably to the presence of æsculetin. The crystals from the alcoholic solution emanated from a central point, and were branching in a tree-like manner; in the deeper part of the vessel several thornapple-like aggregations of crystals were observed. The amount obtained from 50 grams of the root was so small that accurate investigations could not be made; moreover, the presence of æsculin seemed to interfere with the reactions of this substance.

The benzol solution yielded, on evaporation, a dark brown, resinous mass, which was dissolved in dilute sulphuric acid and precipitated with concentrated soda solution; the precipitate collected, washed and dried formed a white powder, which caked together in boiling water to a brown mass, and showed the behaviour of gelsemine. The filtrate agitated with chloroform, yielded a pale, rose-coloured substance, having the same behaviour. The total yield weighed between 0·2 and 0·3 gram.

Another experiment made with the powdered root proved that the acidulated liquid yields to amylic alcohol

* Abstract from an Inaugural Essay presented to the University of Dorpat, and communicated by the author. From *The American Journal of Pharmacy*, August, 1882.

considerable æsculetin, recognizable by the dark green colour with ferric salts, and by the blue-green fluorescence in aqueous solution, which is destroyed by potassa. The residue also gave distinct alkaloidal reactions with bismuth-potassium iodide, picric acid, and iodine.

The following tests were made with æsculin and æsculetin, not with the similar principle obtained from gelsemium.

To the well-known reaction of æsculin and æsculetin must be added their behaviour to *Langley-Koehler's test*, which is very similar to that of picrotoxin,* except that the colour with æsculin is deeper brown, and with æsculetin, red-brown. Æsculin and brucine have also a similar reaction, namely, to *chlorine water* (red colour). *Gold chloride* is reduced by æsculin, the colour depending on the concentration and temperature of the liquid; it yields, with aqueous solutions of æsculetin, a raspberry-red colour. *Potassium ferridcyanide* does not affect æsculin, but, on boiling, colours æsculetin solutions red-brown. The same reagent, *with ferric chloride*, gives with both an intense green-blue colour, and gradually causes a blue precipitate. Solution of *copper sulphate* remains blue with æsculin, but turns green with æsculetin.

A solution of 0·5 gm. æsculin in 50 c.c. of water was given to a cat without producing abnormal symptoms; the acid urine let after two hours had a strong fluorescence. Another cat took 0·1 gm. æsculin. The aqueous solution of the fæces of the first and second day was strongly fluorescent; from the third day, æsculin could not be detected. The urine was likewise fluorescent on three days, but not on the fourth day until after it was rendered alkaline; chloroform extracted from it æsculin.

Subcutaneous injections of æsculin, ·0066 and ·0003 gm., were made to two frogs, and these were afterwards placed in distilled water, which for nine days became fluorescent.

The author concludes, from these experiments, that

1. Æsculin is without decided action upon the animal organism.
2. It rapidly enters the second ways from the stomach and intestines.
3. It is not decomposed within the body, and
4. Is rapidly excreted through the kidneys.
5. A prolonged time is required for its complete excretion.
6. Powdered æsculin is partly eliminated with the fæces, probably owing to its sparing solubility.

The "animal quinine" obtained by Bence Jones from the kidneys of higher animals, which, however, has not been observed by Dragendorff, is not fluorescent in alkaline solutions.

The experiments with the alkaloid were made with such prepared by the author, and with pure gelsemine made by Merck. If merely moistened with sulphuric acid and then brought in contact with a minute drop of solution of potassium bichromate, the colour produced and the changes closely resemble those observed with strychnine; but if, as suggested by Robbins, the alkaloids are dissolved in strong sulphuric acid, and the bichromate added to the solution, gelsemine yields a cherry-red colour, changing to dingy grey-brown, and green spots or streaks are not unfrequently observed, due to absorption of moisture. Strychnine becomes violet-blue, then cherry-red, finally brick-red, the latter colour lasting more than a day. Quebrachine becomes slowly violet-blue, and, after a long time, acquires a red tint; but, if dissolved in trihydrated sulphuric acid, no reaction is observed with potassium bichromate, as is also the case with curarine; but under the same condition the cherry-red colour of gelsemine changes to an intense green or bluish-green.

On substituting manganese binoxide for the bichromate, almost identical results are obtained; but using concentrated sulphuric acid, the colorations of gelsemine, and particularly of quebrachine, are much darker and handsomer. With the bihydrated acid, quebrachine gives only a slight violet colour; in the presence of trihydrate the dark green colour of gelsemine appears slowly, and, with a greater dilution of the acid, the blue-violet colour of strychnine in the beginning is more and more replaced by cherry-red.

The same reactions, made by ceric oxide, yield lighter and less intense colorations, the green from gelsemine having a bluish tint.

The weakest colorations are produced by lead peroxide only in presence of a trace of nitric acid; the tint from gelsemine is grass-green.

The reaction best adapted for gelsemine is sulphuric trihydrate and one of the four reagents, when the final colour by gelsemine is green, and by strychnine, brick-red.

Concentrated sulphuric acid dissolves gelsemine with a yellow-brown colour; quebrachine, similar; strychnine, colourless.

Sulphuric acid containing iron shows no reaction with gelsemine and strychnine; a blue-violet colour with quebrachnine.

Froehde's reagent: With gelsemine, roe-brown to red-brown, gradually yellowish-green (a very similar reaction was observed by Graebner with ptomaines); strychnine, no change; geissospermine and quebrachine, blue.

Selen-sulphuric acid, with gelsemine, no reaction.

Sugar and sulphuric acid: Gelsemine, cherry-red; but fats, biliary acids, aconitine, codeine, and delphinidine give the same colour; strychnine, no red colour; quebrachine, intense cherry-red.

Brouardel-Boutmy's reagent (potassium ferridcyanide and ferric chloride): Gelsemine and quebrachine, intensely green; strychnine and aspidospermine, no reaction. Ptomaines obtained from the stomach and intestines, no reaction; but if isolated from the liver, kidneys, etc., by agitation of the alkaline liquid with benzol or chloroform, a slight green colour is produced, and the older the corpse the more frequently are such ptomaines obtained.

Chlorine water to acid solution: Gelsemine yields yellowish turbidity and slight fluorescence; after a while a yellowish-white precipitate, which is produced yet in solutions of 1 in 1000 and is dark coloured from impure alkaloid; the supernatant liquid is not fluorescent. Strychnine has a very similar behaviour; likewise, though less delicate, quebrachine.

Boiling with perchloric acid: Gelsemine, slightly yellow; strychnine, red.

Sulphuric bihydrate, with fragment of potassium chlorate and boiling: Gelsemine and aspidospermine, clear; strychnine, red-brown to black-brown solution.

Selmi's reagent (iodic acid suspended in sulphuric acid): Gelsemine and strychnine, rose-coloured; brucine and aspidospermine, brick-red; quebrachine, dark violet. On warming, the colour becomes darker, and finally disappears.

Potassium-bismuth iodide gives a red-brown precipitate with ·000025 gram gelsemine; phosphomolybdic acid, a precipitate with the same amount. Precipitates with ·00005 gram gelsemine are caused by iodine, potassio-mercuric iodide, bromine (yellow), phosphotungstic acid (white), and tannin; with ·0001 gram gelsemine, by potassio-cadmic iodide (white) and picric acid (yellow), and a turbidity merely by the chlorides of gold and mercury.

The author then refers to the physiological experiments made with gelsemium by Professor Ott (1875) and Dr. Moritz (1878), with whose results his own observations agree. He details his experiments for th detection of

* Mix powdered picrotoxin with 3 or 5 parts of pure saltpetre; add 1 or 2 drops of strong sulphuric acid; mix, and add rapidly soda solution to strong alkaline reaction, when the mixture becomes transiently brick-red.—EDITOR *A. J. P.*

æsculin (gelsemic acid) and gelsemine, made with food, blood, and urine, both fresh and putrid, and with poisoned cats, and closes with the following deductions:

After poisoning with gelsemium in lethal doses, æsculin and gelsemine may be isolated by Dragendorff's method (removal of fat by petroleum benzin, extraction of æsculin from the acid solution by chloroform, and extraction of gelsemine from the alkaline liquid by benzol), and both may be recognized as such.

Æsculin may be found in all organs, and gelsemine in the stomach, intestines, blood, and liver.

After the subcutaneous application of rapidly fatal doses of gelsemine, the alkaloid can be detected in the corpse only in mere traces, and not with certainty; it is best to search for it in the liver.

Putrefaction, accompanied by alkaline reaction, does not alter gelsemine, but decomposes æsculin; both principles are not altered if the reaction remains acid.

The poisonous action of gelsemium does not depend on æsculin.

Gelsemine and æsculin rapidly pass from the stomach and intestines into the blood, and are excreted through the urine. The resorption is also rapid on subcutaneous application.

For the complete excretion of æsculin through the urine a longer time is required, so that after a single dose it may be recognized in the urine for several days.

If, in forensic analysis, gelsemine is supposed to have been found, the presence of æsculin should be determined for deciding the question whether gelsemine alone or gelsemium root had been administered.

Under certain conditions gelsemine shows the same reaction with sulphuric acid and potassium bichromate as strychnine. For distinguishing it from the latter, the following properties are useful:—

I. The reactions. 1. To concentrated sulphuric acid; 2. To sulphuric trihydrate and potassium bichromate (or ceric oxide or peroxide of manganese, or of lead); 3. To Brouardel-Boutmy's reagent; 4. To sugar and concentrated sulphuric acid.

II. The action upon the animal body; and

III. Its association in the root with æsculin.

It is distinguished from quebrachine, 1. By not being extracted by chloroform from acid solutions by the reactions; 2. With sulphuric acid and potassium trihydrate; 3. With Froehde's reagent; 4. With sulphuric acid containing iron; 5. By the absence of æsculin from quebracho bark.

The mode of isolation, the reaction with Froehde's reagent, and the association with æsculin in the drug serve to distinguish gelsemine from geissospermine.

For distinguishing it from aniline and curarine consult Dragendorff, 'Ermittelung der Gifte.' Relations analogous to those existing between strychnine on the one side and curarine and aniline on the other are likewise observed between gelsemine and the last two alkaloids.

PREPARATION OF ESSENCE OF RENNET FROM FRESH STOMACHS.*

BY DR. J. NESSLER.

In this paper the author communicates the results of some experiments made with the object of comparing the activity of essence of rennet made according to Soxhlet's method from dried stomachs† and that of essence made from fresh stomachs.

The experiment showed that, using corresponding quantities of dried and fresh stomach, the latter yielded the more active preparation. It was found, moreover, that the activity of the preparation from a fresh stomach could be increased by the removal of mucus, which not only made it more bulky, but prevented it from diffusing the milk so readily, and that this removal could be effected without injury by means of blotting paper. Preparations made from the top layer of the inside of the stomach, scraped off with a knife, proved much more active than others for which the residuum was used, but the residuum contained too much ferment to permit it to be left unused.

The author gives the following instructions for the preparation of an essence of rennet from fresh stomachs. Chop up a fresh calf's stomach as finely as possible, pour upon it two litres of water in which 100 grams of common salt has been dissolved, and shake well. After twelve hours add 200 c.c. of 90° alcohol, and allow the whole to stand, with frequent stirring, in a closed flask for three weeks, then decant, and add sufficient blotting paper to cover it. After several weeks, during which the vessel must be kept well closed, the essence of rennet is drawn off into bottles and preserved. A liquor prepared in this way was, when fresh, capable of curdling 6000 times its volume of milk, and, being kept in a well-corked bottle, it was found, after two years, to have diminished in activity only from 1 in 6000 to 1 in 5451.

The author adds that distilled or rain water gives a more active essence than spring water, and that it is advantageous to mince the stomach as finely as possible.

* *Pharmaceutische Zeitung*, July 15, Supplement.

† *Pharmaceutical Journal*, [3], ix., 307.

SOLAR APPARATUS.

It will be remembered that M. Mouchot, a short time ago,* devised an apparatus for utilization of solar heat, and that M. Pifre made some important improvements on it. Very different views have been taken as to the practical utility of such an apparatus. Some help towards a right judgment now comes from Montpellier, where a French Government Commission has been experimenting with the apparatus for a year (1881). Another commission has experimented at Constantine, in Algeria, but the results are not yet published. The apparatus was of the known form—a concave mirror, with blackened boiler in the axis, surrounded by a glass envelope. The steam from the boiling water was condensed in a coiled tube cooled by water. The weight of water distilled in an hour indicated the amount of heat utilized; and observations with an actinometer from hour to hour showed the amount of incident heat. The rates of these two quantities was a measure of the economic efficiency of the apparatus. The temperature and moisture of the air, etc., were also carefully noted. The number of days of observation was one hundred and seventy-seven, and of observations nine hundred and thirty, and water was distilled to the amount of 2725 litres. Without entering much into numerical detail, we may state that while the heat utilized in the most favourable circumstances per square metre per hour would be about equal to that utilized from 240 grams of coal (supposing about a half to be utilized)—even the half of this is not attainable in our climate. The sun does not shine continuously enough for practical utilization of the apparatus. In very dry and hot climates the possibility of utilization would depend on various circumstances, such as the degree of difficulty of procuring fuel, the price and facility of transport of solar apparatus, etc. We note in the report (by M. Crova) that the efficiency of the apparatus is not proportional to the heat intensity of the solar radiations, and hardly ever varies in the same sense. The absolute quantity of heat utilized, on the other hand, depends essentially on the temperature of the air; the higher this is, and the less consequently the cooling, the greater the amount of heat utilized.—*Times.*

* See *Pharm. Journ.*, [3], vol. x., p. 1037.

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REPORT OF THE SCIENCE AND ART DEPARTMENT ON SCIENCE TEACHING.

THE twenty-ninth Report of the Science and Art Department shows that during the year 1881 the expenditure under that head amounted to £340,025 14*s.* 10*d.*, and that although the number of schools examined was rather less than in the year 1880 the number of persons under instruction at them was larger than in the previous year. The term "science school" is employed in a somewhat wide sense in the Report, as indicating each separate institution in which science is taught in connection with the Science and Art Department. The school may consist of but one class in a particular branch of science, meeting in the evening in an elementary school or some other building used for a different purpose during the day, or it may occupy a building or part of one belonging to the school with day and evening classes, and a more or less complete curriculum of studies in several branches of sciences. No very precise classification of the different kinds of schools established under the system of aid granted by the Department can be made, but the following statement furnishes a fair general idea. There are about 300 science schools which are held in buildings which are either entirely the property of the schools or in part definitely appropriated to them and these schools have every element of permanency. About 320 science schools are parts of or adjuncts to educational institutions of a character more extended and general in its scope. They may also be looked upon as of a permanent character and depending more on local organizations than on the teacher. In addition, there are some 580 schools or classes which depend more on the teachers through whose energy these schools have come into operation than upon any permanent local organization. They are usually superintended by committees, but are generally held in rooms hired for the purpose, and though they may have been in operation for many years, and would probably be continued, there is a possibility that by the death or removal of the teachers from any of them they might be in many cases closed. Lastly, there are about 260 classes of a more ephemeral character, a certain number of which come to an end every year, while others are commenced. It is found that they often lead to the establishment of permanent institutions for science teaching, but even where this has not been the case these schools have been productive of good while they lasted.

The number of separate classes examined in 1881 was 4839, and the number of students who came up for examination from them was 38,837. In addition there were 5804 self-taught students and pupils in classes not entitled to claim payment on results. The number of papers which passed was rather larger than in the previous year, and the number of candidates in the honours division of the examination was 1342, of which 91 passed in the first class, and 395 in the second class.

It is considered that the general reports of the examiners give a favourable impression of the progress of the schools, but on referring to the published extracts from the examiners' reports it is not difficult to perceive that bad teaching is still too prevalent and that there is much reason for suspecting the existence of a cramming system, designed only to secure the benefit arising from success in the examinations. This is especially pointed to in the reports of Professors HUXLEY and GUTHRIE, Dr. MICHAEL FOSTER, Dr. RUSSELL and Mr. THISELTON DYER, and the circumstance appears to have been regarded as so obviously suggestive of a want of proper qualification on the part of the certificated science teachers that Colonel DONNELLY devotes considerable space to a kind of apology for the defects of the teachers. He seeks to answer the constantly repeated criticism of the action of the Department that it does not demand a higher qualification from the teacher before he is allowed to teach by pointing out that the Department does not give any certificate of qualification to teach, but merely states that a certain person, having passed a certain examination, is qualified according to the rules to earn payments on the results of his instruction as measured by examinations. This is scarcely a satisfactory answer, especially when it is remembered that Colonel DONNELLY does not dispute the existence of much bad teaching. It is discouraging to find this virtual admission that a vicious system is being propagated throughout the country, instead of that thorough study of subjects which can alone justify support by the State and the large expenditure that is incurred.

There can indeed be little doubt in the mind of anyone conversant with the past action of the Department, that certificates of qualification to teach various subjects are granted too readily and upon insufficient grounds and that much harm is being done in this way. Colonel DONNELLY, indeed, mentions a circumstance which appears to illustrate this point and to show that, in spite of the admirable body of distinguished men of science acting as examiners, there is a tendency, even among highly trained and good teachers, to make the passing of the examinations the chief object of their work rather than the sound instruction of their pupils. No doubt the power to teach is to a great extent a special faculty, distinct from the power to learn and to pass an examination, but that is not a sufficient reason for granting certificates of qualification to teach without applying some test by which the possession of the teaching faculty can be ascertained, and it is a fact that points in the opposite direction. We are inclined to believe that, under existing conditions, it does pay to prepare students for defeating examiners, and that the efforts made in this direction are only too successful. It may be a satisfaction to know that those who fail to do so do not obtain any State money, but it is not the less certain that infinite mischief is done by those who succeed.

The number of centres at which examinations were held last year was in the provinces 987 and in the metropolis 111. The total amount paid to teachers on results was £43,519 2*s.* 9*d.*, or at the rate of 14*s.* 2*d.* for each student under instruction. These payments were made to 1762 teachers, and the average payment per teacher was £24 13*s.* 11*d.* But there was a very great inequality in the amounts of payment to schools, as will be evident from one or two instances taken at random from the returns. Thus, an orphan school at Stockport presented one hundred students for examination in seven subjects, with the result that payment was made amounting to £301, or rather over £3 per head of the children. Another school at Warrington, presenting the same number for examination, only obtained £27. Another school in Bristol presenting one hundred and eighteen for examination in fourteen subjects gained £413. Hence it is evident that this system may be worked in such a way as to form a very considerable addition to the income of a school, and it becomes very important to guard against the possibility of this being effected by such means as we know examiners are very generally coming to acknowledge that they cannot adequately deal with.

During the past year the grants towards purchases of apparatus, diagrams and examples amounted to £497 13*s.* 2*d.*, being a decrease of more than £210 on the previous year. At the Normal School of Science and Royal School of Mines there were last year 46 regular and 139 occasional students. At the Royal College of Science for Ireland there were 16 regular and 20 occasional students. The lectures at South Kensington Museum were attended by 3788 persons. The evening lectures to working men at the Royal School of Mines were attended by 1472 persons, or 328 less than last year, and 211 science teachers attended the special courses of lectures provided for their instruction in the new science schools at South Kensington. The lectures in connection with the Department in Dublin were attended by about 850 persons. Therefore, the total number of persons who received instruction as students, or by means of lectures, in connection with the Science and Art Department in 1881 was 984,820, showing an increase as compared with the previous year of nearly 9 per cent.

THE CONFERENCE MEETING.

On Tuesday next, as most of our readers are aware, the Nineteenth Annual Meeting of the British Pharmaceutical Conference will commence in Southampton, and it may be convenient for some intending visitors to have a brief recapitulation of the programme of the proceedings, so far as it has been made known. The sittings are to be held in the Watts Memorial Hall, on Tuesday the 22nd and Wednesday the 23rd inst., commencing at 10.30 a.m. each day. At 1 p.m. on each day there will be an adjournment until 2.30 p.m., for the purpose of luncheon, and the business proceedings will terminate about 5 p.m. on Wednesday. On Thursday the visitors are invited by the members of the Local Committee to accompany them upon an excursion to the Isle of Wight, visiting Ryde, Ventnor, Brading and the Landslip.

Last week we were enabled, by the courtesy of the Honorary Secretaries, to print a list of papers that have been received or promised for reading, subject to the approval of the Executive Committee. To these are now added—

22. Note on a Reaction of Glycerine and other Polyhydric Alcohols. By W. R. Dunstan, F.C.S.

23. On Tumefaction as an Aid to the Identification of the Varieties of Maranta Starch. By W. H. Symons, F.R.M.S., F.C.S.

Although rather late, it may be useful to repeat that information respecting hotel accommodation and similar matters will be willingly given to intending visitors by the Honorary Local Secretary, Mr. O. R. Dawson, Belle Vue Road, Southampton.

The meeting, in the same town, of the British Association, under the Presidency of Dr. C. W. Siemens, promises this year to be a very interesting one, and as is usually the case will induce many of the visitors to the Pharmaceutical Conference to prolong their stay for some days more.

A NEW PHARMACOPŒIA FOR GREECE.

We learn from an esteemed correspondent, Professor Xavier Landerer, of Athens, that a Commission has just been entrusted by the Government with the task of elaborating a new Greek Pharmacopœia. The first official Greek Pharmacopœia made its appearance in the year 1837, and was compiled by John Bouros, Xavier Landerer and Josef Sartorios. In 1868, this work was reprinted, with an Appendix, by Professor Landerer, describing the more recent remedies and containing an etymological dictionary of names of botanical, zoological and mineral substances, and a list of antidotes. This work is still in common use throughout Greece, as well as in Asia Minor, and also to some extent in Constantinople; but in Turkey Dorvault's *L'Officine* is the work usually consulted.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council was held on Wednesday, August 2, in the College of Physicians, Kildare Street, at three o'clock.

The President, Professor Charles Tichborne, in the chair.

The other members present were:—The Vice-President, Dr. Aquilla Smith, and Messrs. Allen, Bennett, Brunker, Dr. Collins, Messrs. Doran, Draper, Grindley, Hodgson, Sir George Owens, Messrs. Payne, Pring, Simpson, Dr. Whittaker, Messrs. Lester and Wells.

Mr. Hugh Fennell, Registrar, read the minutes of the last meetings, which were confirmed.

The President congratulated the meeting on the presence, for the first time amongst them, of two newly elected members of the Council, Mr. Lester and Mr. Wells.

The first business on the paper was the election of an Examiner in Practical Pharmacy. There were two candidates.

Dr. Collins moved that—

"Mr. Charles Evans, M.P.S.I., be elected."

Mr. Draper seconded the motion.

Mr. Allen moved that—

"Dr. William Whitla, L.A.H.I., M.P.S.I., be elected."

Mr. Pring seconded the motion.

Dr. Whittaker hoped that by this election the Council would show that they were desirous of making the Society a national and not a metropolitan society. They had already three examiners belonging to Dublin. Dr. Whitla, besides being thoroughly conversant with practical pharmacy, had published a book. He had been in his (Dr. Whittaker's) establishment for years. He did not know Mr. Evans personally, but he wished he had some higher qualification than being a member of the Pharmaceutical Society of Ireland. Excuse him, he would say that it was not a very high qualification, although he hoped it would yet become such. [Certain members of the Council protested against Dr. Whittaker's remarks.] The Belfast members had tried to do all they could for the Society. There was no doubt as to Dr. Whitla's qualifications, and his being a medical man was rather in his favour than otherwise.

Dr. Collins said it was to carry out the principle mentioned of making the Society as much a national one as possible, that Sir George Owens and himself had wished to elect Mr. Harrington, of Cork, at the previous meeting.

The President said he had received a letter in reference to the election, in favour of Mr. Evans, from a member of the Council, who was unable to attend, and he thought he should read it.

Mr. Draper did not think such a letter ought to be read.

The Vice-President said if a member could not make it his convenience to attend the election he had no right to have his letter read.

Mr. Draper said he made the objection not knowing who the writer was.

The President: It is Mr. Hayes.

The Vice-President observed, that as both candidates were members of the Pharmaceutical Society, he did not think any disrespect was involved in the observation made by Dr. Whittaker. He was aware that Dr. Whitla had produced a work on pharmacy, which possessed a great deal of merit. He was not personally acquainted with Mr. Evans, but he knew that he represented the oldest compounding establishment in the city, which was at present more than a century old; and if there had been no other candidate he would vote for him, as he was sure he would make a very suitable examiner. He quite concurred in the observation that the examiners should not be exclusively Dublin men.

Mr. Payne, in supporting the candidature of Dr. Whitla, said that gentleman was a thoroughly practical man, and in addition to being a pharmaceutical chemist was an apothecary. He thought all the members of the Council would admit that in past times the apothecaries had conducted pharmacy in a satisfactory manner. One of the strongest points in his favour was that he in no way prepared pupils for examination in the city. He was sure no examiner would wish to examine his own pupils. No member of the Council who prepared pupils should be an examiner.

Sir George Owens said Mr. Evans was fully equal to the post he sought, and he could vouch for him that after he should be elected he would never take or teach a pupil in the city.

Mr. Draper said he never had the faintest idea that Mr. Evans took pupils. If he thought he did he should withdraw his support from him.

Mr. Payne said he thought the Registrar had a certificate from Mr. Evans.

Mr. Fennell said it was a certificate from Dr. John Evans, of having been engaged in compounding in his establishment for two years.

The President said he could contradict the imputation that Mr. Evans took private pupils. The certificate referred to was that of a Mr. Hardy, who went to Mr. Evans's brother to put in two years' pharmacy.

Dr. Montgomery said the taking of apprentices was not the same thing as grinding, and it rather added to Mr. Evans's ability to be a good examiner.

The President said it was not necessary to carry the discussion further. He merely wished to say that he knew both of the candidates, and they were both excellently qualified. He should be very glad to have Dr. Whitla as an examiner in materia medica, which was the subject on which he had written, but in the present instance he thought Mr. Evans would be the right man in the right place. He was a properly educated pharmaceutical chemist, and practically engaged in compounding; Dr. Whitla was a practising physician.

The Council then divided on the motion for the election of Mr. Evans with the following result:—

For the motion—Sir George Owens, Dr. Montgomery, Messrs. Hodgson, Brunker, Draper, Lester, Doran, Bennett, Dr. Collins and the President,—10.

Against it—Dr. Whittaker, Messrs. Allen, Pring, Simpson, Grindley, Wells, Payne, and the Vice-President,—8.

The President declared Mr. Evans duly elected.

The Registrar read a letter from Mr. George A. Webb, of 141, York Street, Belfast, stating that he was surprised at seeing it reported in the proceedings of the Council that a member had said that he (Mr. Webb) stated that while Mr. Carse was in his establishment he attended "pretty regularly." He had no recollection of having used such words. On the contrary, while Mr. Carse was with him his attendance was regular, and he exceeded his time by six weeks.

Mr. Payne said it was possible that he had made a mistake in using the words "pretty regularly."

The Registrar read a letter from a member of the Society in Waterford, protesting against Mr. Savage, of Dublin, being allowed to keep an open establishment for compounding in that city, even by means of a qualified assistant.

Mr. Brunker said this matter was considered at a former meeting of the Council, and the explanation then given by the representative of the late Mr. Savage was deemed satisfactory. The deceased Mr. Savage was an apothecary, and his executor was carrying on his business with the aid of a qualified assistant. The Council could not interfere in the case, and if the writer of the letter had anything to complain of he should apply to the Apothecaries' Hall.

The President said the proper reply would be to say that the case has been already considered, and that there was no information before the Council at present that would warrant interference.

Mr. Brunker said he would go further to say that the Council had no power to interfere under clause 32.

The Vice-President: There might be a hundred shops kept open in the same way. There should be some limit to it. Clause 32 did not put any limit to the time during which an establishment might be kept open by a hired assistant, and was therefore defective.

Mr. Brunker said clause 32 did not apply to a licensed apothecary.

Dr. Whittaker asked whether a lady had not been carrying on one of the first businesses in Dublin for years?

The President:—But she engaged a qualified man. She is the widow of an apothecary.

The Vice-President asked whether the deceased in the present case was a registered pharmaceutical chemist.

Mr. Brunker: No; an apothecary.

Dr. Collins said the Council had always allowed executors to carry on the business of deceased members of the Society by a suitable person and for a moderate time while they could dispose of the interests, but he did not think they had been allowed to go on as this man was doing. Still, if either this Society or the Apothecaries' Hall brought him into a court of justice the probability was that clause 32 would be relied on, even for an apothecary's executor.

The Vice-President said a legal opinion on the case ought to be taken.

On the motion of Mr. Payne the letter was referred to the Law Committee with instruction to take a legal opinion on it; and the Registrar was directed to inform the writer of the course which had been taken.

A letter was received from Dr. Stannus Hughes, Registrar of the College of Surgeons, intimating that as soon as the Council of the College had before them the amendments which the Council of the Pharmaceutical Society proposed to have made in the Sale of Poisons Act, they would take them into consideration.

On the motion of Mr. Bennett, seconded by Mr. Doran, a report of the Law Committee was adopted.

Mr. Allen moved the following resolution:—

"That for the use of the Examiner in Pharmacy a collection of prescriptions shall be formed, which shall be pasted in a book, or books, and placed, when not in use, under the care of the Registrar, and treated as confidential."

He would be glad to see the examination of the Society made very much better. It was rather under the standard of the Minor examination in England, and he should be glad to see it brought up to it. The English Pharmaceutical Society had a collection of 3000 prescriptions, got together by Mr. Joseph Ince, which included every variety of writing and different styles of Latin.

Mr. Pring seconded the motion.

Dr. Whittaker said he would not oppose the motion, but he thought it unfortunate that it should be called for. The motion of Mr. Allen was almost absurd on the face of it. He (Dr. Whittaker) would know what practical information a man possessed almost as soon as he saw him take a pestle in his hand. Botany and chemistry and materia medica were all very well, and yet there were practical pharmacists who knew mighty little about these things and yet could read prescriptions well and do their work well.

Dr. Collins was of opinion that it would be desirable to have such a collection of prescriptions as was proposed by Mr. Allen. It would be an advantage for the examiner to have other prescriptions besides his own.

The President said he agreed with Dr. Collins. It would be easy for the candidates to get prescriptions which had been written by the Examiner. A large variety would afford a much more effectual test. Besides, Mr. Allen did not want to dictate to the examiners. They could write prescriptions themselves also.

Dr. Montgomery said he believed Mr. Allen did not intend to interfere with the examiners. He (Dr. Montgomery) had had a large experience as an examiner and when conducting an examination he always selected from a collection of from 300 to 400 prescriptions.

Mr. Payne was in favour of the collection of prescriptions. It should embrace prescriptions written in every part of Ireland.

The motion was then put and carried unanimously.

Mr. Allen said that in order to carry out the resolution just passed it was necessary for him to move:—

"That the members of the Society be invited to send prescriptions and that the committee appointed to visit the examinations shall receive, examine, and arrange the collection."

Mr. Pring seconded the motion, which was unanimously agreed to.

The Registrar stated that he had received a letter from Mr. A. Chapman, pharmaceutical chemist, of Belfast, forwarding one which he (Mr. Chapman) had received from Dr. Meredith and Dr. Dunne, the secretaries of the Royal University, informing him that a certificate signed by a licentiate apothecary attached to a recognized hospital would be accepted by that university. Mr. Chapman asked the Registrar (Mr. Fennell) was it only a licensed apothecary that could give a certificate which would be accepted by the Royal University.

Dr. Whittaker said the Council should ask the Royal University to recognize their licentiates as competent to give certificates in pharmacy. He moved that the attention of the authorities of the Royal University be called to the fact that as far as regards the compounding of medicines the privileges of the Apothecaries' Hall had been united with those of the Society, and that pharmaceutical chemists were qualified by law to compound medicines, and that the Council should ask the authorities of the Royal University to accept the certificates of qualified members of the Society as on a par with those of members of the Apothecaries' Hall.

The President said that as the subject was not on the paper of business it was better to give a notice of motion respecting it.

The Registrar laid on the table the report of the examiners.

Mr. Brunker, as one of the visitors who had attended the examination, said that the candidates were of a good stamp, but he thought the arrangements made for the holding of the examination most unsatisfactory. The time given to the examiners was also insufficient. They would like to have two days, one for papers and one for *vivâ voce.*

The President said he had directed Mr. Fennell to supply the examiners with everything that they required.

On the motion of Dr. Whittaker, seconded by Mr. Hodgson, the consideration of the recommendations of the Pharmacy Act Amendment Committee was postponed.

Mr. Payne said he had to hand in his resignation. He could not remain on the Council when it was the opinion of some members that three weeks was a sufficient time to learn compounding in, and when the Council had endorsed that view by the course which it had that day taken with respect to the election of the examiner.

Mr. Brunker trusted that the Council would not receive Mr. Payne's resignation. He was sure that when Mr. Payne thought over the subject he would see that it was scarcely wise to retire merely because everything was not done according to his own ideas. If everyone did that they would have no Council.

Dr. Whittaker also handed in his resignation. He said he did so with regret, but he did not believe that he could do any good by remaining. He was afraid he was not met in the spirit in which he should be met, having regard to the services which he had rendered to pharmacy. He believed they wished to make the Society a Dublin Society.

The President said he thought Dr. Whittaker was hardly justified in in saying that, when four members of the Society from Belfast had been put on the Council, which numbered, in all, only twenty-one members, and having regard to his (President's) anxiety to get the North of Ireland represented on that Council. Dr. Whitla, it was true, had resigned, but he was sure that they would all be glad of the first opportunity of seeing him back again.

Dr. Whittaker said he merely believed that what he had stated was the case.

Mr. Pring said that he had been disappointed at the result of the election, as well as Mr. Payne and Dr. Whittaker. But they had been fairly beaten, and, therefore, they should not resign. But there were one or two notices of motion to come on with respect to the bye-laws and if these should not be carried, he (Mr. Pring) would resign.

Mr. Brunker said that five Dublin members of the Council had voted for Dr. Whitla; while two country members had voted for Mr. Evans.

The President said he would not accept the resignations. If the gentlemen desired to resign, they could, after good consideration, forward their resignations to him.

The Council then adjourned.

Provincial Transactions.

CHEMISTS' AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

A meeting of the Executive Committee of this Association was held at the office of the Association, 23, Burlington Chambers, New Street, Birmingham, on August 9, 1882, at 1 p.m.

Mr. Robert Hampson (London), President, in the chair.

Mr. John Harrison (Sunderland), Vice-President.

Present—Messrs. Arblaster (Birmingham), Barclay (Birmingham), Bell (Hull), Churchill (Birmingham), Cross (Shrewsbury), Davis (Leamington), Ellinor (Sheffield), Holdsworth (Birmingham), Jones (Llanrwst), Laird (Edinburgh), Maltby (Lincoln), Mason (Liverpool), Parker (Nottingham), Paterson (Aberdeen), and the Solicitor of the Association.

Communications were read from Messrs. Mackenzie, Stead, Walker, and Williams, regretting their inability to attend.

The minutes of the previous meeting of the Executive were read and confirmed.

It was moved by Mr. Laird, seconded by Mr. Ellinor, and unanimously resolved:—"That the officers of the Association, together with Messrs. Andrews, Arblaster, Barclay, Bell, Cross, Davis, Jervis, Holdsworth, Maltby, Mason, Stead, Symes and Walker form a Law and Parliamentary Committee for the ensuing year."

It was moved by Mr. Cross, seconded by Mr. Mason, and unanimously resolved:—"That the officers of the Association, together with Messrs. Arblaster, Barclay and Holdsworth, form a Finance Committee for the ensuing year."

It was moved by Mr. Bell, seconded by Mr. Paterson, and unanimously resolved:—"That the officers of the Association, together with Messrs. Andrews, Arblaster, Bell, Cross, Davis, Jervis, Ellinor, Holdsworth, Jones, Maltby, Mason, Parker, Stead, Symes, Walker and Williams form a General Purposes Committee for the ensuing year."

It was moved by Mr. Cross, seconded by Mr. Davis, and unanimously resolved:—"That Mr. Henry Glaisyer be re-appointed Solicitor to the Association for the ensuing year."

It was moved by Mr. Bell, seconded by Mr. Harrison, and unanimously resolved:—"That Mr. W. F. Haydon be re-appointed Secretary to the Association on the same terms as before."

It was moved by Mr. Bell, seconded by Mr. Ellinor, and unanimously resolved:—"That Professor Attfield be re-appointed Analytical Referee to the Association for the ensuing year."

It was moved by Mr. Mason, seconded by Mr. Arblaster, and unanimously resolved:—"That Messrs. Lloyd's Banking Company be re-appointed Bankers to the Association for the ensuing year."

It was moved by Mr. Cross, seconded by Mr. Davis, and unanimously resolved:—"That Messrs. Laundy and Co., Public Accountants, be re-appointed Auditors to the Association for the ensuing year."

Mr. Paterson said that he thought the Assistant Secretary might make a journey to Scotland with a view of taking proceedings against unregistered traders under the Pharmacy Act.

The Secretary said that in May last, he had written to the Honorary Secretary of the Scottish Branch of the Association, asking to be supplied with the names of a few unregistered traders, residing in Scotland, who were openly selling arsenical sheep dip, but that he had not yet received such a list.

On the suggestion of Mr. Barclay, the Secretary was instructed to again write to the Secretary of the Scottish Branch respecting his (the Secretary's) former application.

The Secretary said that some months since, it had come to the knowledge of the Committee of the Scottish Branch of the Association that an application was about to be made by the Edinburgh University Court to Her Majesty in Council, for powers to make attendance in practical classes in physiology, pathology, and materia medica imperative, and that the instruction accepted as equivalent to a course of practical materia medica be apprenticeship for not less than two years in compounding and dispensing drugs under a registered medical practitioner or a member of the Pharmaceutical Society of Great Britain. This ordinance would have precluded chemists and druggists who were not members of the Pharmaceutical Society from educating students in materia medica. A memorial was consequently transmitted to the Secretary of the University Court on the subject, to which memorial the faculty of medicine had replied as follows:—"The memorial of the Scottish Branch of the Chemists and Druggists' Trade Association urges that a certificate of two years' apprenticeship with a registered chemist and druggist should be received by the University as equivalent to a certificate of apprenticeship for a similar period with a member of the Pharmaceutical Society of Great Britain. The faculty of medicine, only after some hesitation, included the latter among the means of instruction alternative to a recognized class of practical materia medica, on the ground that a certain number, which can only be a small one, of candidates for degrees in medicine may, in the laboratory of a pharmacist, have acquired practical instruction in many of the subjects taught in this class, at a time when they did not contemplate qualifying themselves for the profession of medicine. It appeared unnecessary to require such students to attend a class of practical materia medica, even although the instruction in this class would be of a more systematic, wide, and academic character than in the establishment of a pharmacist. It was recommended that apprenticeship should be restricted to a member of the Pharmaceutical Society of Great Britain, because the fact of such membership affords a guarantee that an education had been undergone which renders the members of this Society in many respects qualified to give such instruction to their apprentices as a university might be justified in recognizing. The education of registered chemists and druggists is, however, of the most varying description, and the title fails to afford a guarantee of equal value to the title of member of the Pharmaceutical Society of Great Britain. At the same time, taking into consideration the fact that the alternative qualification of apprenticeship to a pharmacist would affect only a limited number of students, and that the class of students so affected would generally be one whose pecuniary resources are limited, the faculty of medicine would be willing to coincide in the suggestion of the Chemists and Druggists' Trade Association. The University Court consider it desirable to adopt it."

The Executive considered in committee the advisability of defending a member of the Association against whom an action was threatened for the alleged infringement of a trade mark for liver mixture, and decided to defend on the grounds that the words liver mixture had been for many years of common use in the trade, and that it was not advisable in the interest of the trade that any person or firm should claim a monopoly over such common terms.

The President said that the next subject on the agenda paper was:—"To consider the advisability of giving effect to the following resolution, passed by the Executive at their last meeting:—'That it be a recommendation to the incoming Executive to communicate with the Government on the question of the sale of patent medicines containing scheduled poisons.'" The discussion on this matter was also taken in committee.

It was moved by Mr. Barclay, seconded by Mr. Holdsworth:—"That a deputation be appointed by the Executive to wait upon the Government to ask that the sale of patent medicines containing scheduled poisons may be put under the same regulations as the sale of other scheduled poisons," to which Mr. Paterson moved, as an amendment, and Mr Bell seconded, "The previous question."

On being put to the vote, 10 voted for the amendment and 4 against it; it was consequently carried.

On the motion of Mr. Barclay, seconded by Mr. Jones, it was resolved:—"That the Finance Committtee be authorized to appoint local secretaries in all towns in England and Wales containing six or more chemists and druggists, and that the same Committee be empowered in conjunction with the Scotch Committee of the Association to appoint local secretaries in Scotland."

Several communications were read from members of the Association, and the Secretary was instructed as to the manner in which he should deal with the same.

DOVER CHEMISTS' ASSOCIATION.

At a meeting of the above Association the following note was read:—

A Dispensing Solution of Acetate of Potash.

BY J. F. BROWN.

From its proneness to deliquescence, this salt often gives trouble to the dispenser; and I thought it might be worth while to suggest the following formula for a dispensing solution, which is easily made, permanent, and of convenient strength.

Weigh into an evaporating dish half a pound (av.) and 68 grains of acetic acid, B.P.; then add in successive portions 3¾ ounces, or quant. suff., potassium carbonate, until the solution, having been gently heated to expel carbonic acid, is neutral to test paper; evaporate further if needful, to make the measure exactly 8 fluid ounces, and filter. Two minims contain 1 grain. A fluid drachm contains 30 grains and a fluid ounce 240 grains.

Proceedings of Scientific Societies.

KENTUCKY PHARMACEUTICAL ASSOCIATION.

Some New Preparations of the Hypophosphites containing Iron.*

BY C. LEWIS DIEHL.

Several years ago I was requested by a physician to prepare for one of his patients a pleasant combination of the hypophosphites of iron and quinia, if possible, in the form of an elixir, and in as nearly a neutral condition as practicable. After some experiments I succeeded in making a very acceptable preparation—in fact, an elegant elixir, containing in each fluid drachm one grain of each of the salts named, in perfectly neutral combination. The successful production of this preparation led me to apply the chemical facts involved to the production of other combinations of hypophosphites containing iron, some of which have been received with decided favour by the physicians whose attention I have been able to invite to them. Thinking that possibly these preparations may merit more extended use, and that at all events they are interesting combinations, I have concluded to make known their formulas and the methods of their preparation in the following.

In the preparations prepared by me the ferric salt is used, as in Professor Procter's formula,* but instead of effecting its solution by means of hypophosphorous acid, citrate of potassium is employed, a handsome greenish and perfectly neutral solution being formed. The quantity of the citrate necessary for this purpose is about equal to that of the dry ferric salt, but the latter is preferably prepared freshly and dissolved while still moist. The citrates of ammonia or sodium would answer the purpose of solvent as well as the potassium salt, which was selected only because it is always at hand, and because the ammonium and sodium salts are not known to possess any advantage. For the preparation of the ferric hypophosphite any of the soluble salts of the hypophosphorous acid will answer, but I have selected the hypophosphite of calcium, with ferric chloride as precipitant, for the reason that it is the salt most commonly kept in quantities, and because it is the cheapest. Certain precautions must, however, be observed to secure the perfect precipitation of ferric hypophosphite, for if too much or an insufficient quantity of ferric chloride be added, a portion of hypophosphite remains in solution and is lost during the washing of the precipitate, which must be done with the smallest possible quantity of water. It may be well, therefore, to give particular consideration to the

Preparation of the Ferric Hypophosphite.—Dissolve 150 grains of the hypophosphite of calcium in four fluid ounces of distilled water, if necessary, by the aid of gentle heat, and filter the solution. To the cold solution carefully add solution of ferric chloride so long as a precipitate is produced. Collect the precipitate upon a close muslin cloth, drain well, and express firmly; then pour upon the magma one fluid ounce of distilled water, and express again. The magma may then at once be dissolved by the aid of citrate of potassium.

When precipitating this compound it is best to add the ferric chloride in small portions at a time and to stir the liquid constantly. Then allow the precipitate to subside, so that the supernatant liquid may become clear before adding the next portion of ferric chloride. Toward the last a small portion of the clear supernatant liquid is removed after each addition and tested with diluted ferric chloride solution, allowing it to stand for several minutes if no immediate turbidity occurs. If the liquid remains clear after several minutes' standing, the precipitation may be regarded as complete, and the straining and washing may go on as above directed. The product is equal to 128 grains of dry ferric hypophosphite.

Having thus explicitly given the method of obtaining the magma of ferric hypophosphite, these directions do not need repetition in the formulas for the different preparations given below. As regards its solution by the aid of citrate of potassium, it is only necessary to triturate the magma with the specified quantity of the latter, when partial solution will occur, and complete solution follows upon the addition of water, or of the solution of the other hypophosphites.

I. *Improved Syrup of the Hypophosphites with Iron.*—Take of hypophosphite of calcium 256 grains; hypophos-

* Read at a meeting of the Kentucky Pharmaceutical Association.

* Parrish's 'Pharmacy,' third edition, 1864, pp. 429, 430.

phite of sodium 192 grains; hypophosphite of potassium, 128 grains; ferric hypophosphite (represented in the magma obtained from 128 grains of hypophosphite of calcium), 96 grains; citrate of potassium, 96 grains; white sugar 13 troy ounces; orange flower water, 1 fluid ounce; distilled water, a sufficiency. Dissolve the calcium, sodium, and potassium hypophosphites in 7 fluid ounces of the water, if necessary, by the aid of a gentle heat, and filter the solution. Triturate the magma of the ferric hypophosphite with the citrate of potassium, add the solution of the other hypophosphites, and when complete solution is effected, the orange flower water and sufficient distilled water to make the whole measure 9 fluid ounces. In this dissolve the white sugar, without heat, and filter the resulting syrup through paper. A fluid drachm of this syrup contains 2 grains of the calcium, a grain and a half of the sodium, one grain of the potassium, and three-fourths of a grain of the ferric hypophosphite.

II. *Syrup of Hypophosphite of Iron.*—Dissolve 128 grains of ferric hypophosphite (represented in the magma) from 150 grains of hypophosphite of calcium, by the aid of 128 grains of citrate of potassium, in 1 fluid ounce of orange flower water, and sufficient distilled water to make the solution measure nine fluid ounces. In this dissolve 13 troy ounces of white sugar, and filter the resulting syrup. One fluid drachm of this syrup contains one grain of the ferric hypophosphite.

III. *Elixir of Hypophosphite of Iron.*—In the 9 fluid ounces of solution of ferric hypophosphite, obtained as above (II.), dissolve 4 troy ounces of white sugar, and add 5 fluid ounces of alcohol, in which 8 drops of fresh oil of orange have been previously dissolved; then filter. The strength of this is the same as that of the syrup, over which it probably possesses no advantage.

IV. *Elixir of Hypophosphite of Iron and Quinine.*—Make a solution of ferric hypophosphite, as under II., but bring it only to the measure of 7 fluid ounces, and dissolve 4 troy ounces of white sugar in it. Triturate 128 grains of sulphate of quinine with 5 fluid ounces of strong alcohol, add a solution of 30 grains of hypophosphite of calcium in ½ fluid ounce of distilled water, and shake the mixture occasionally for an hour. Then filter, and wash the filter with sufficient strong alcohol to make the filtrate measure 7 fluid ounces. In this dissolve 8 drops of fresh oil of orange, add it to the solution of ferric hypophosphite, mix well and filter. A fluid drachm of this elixir contains 1 grain of the hypophosphite of quinine and 1 grain of ferric hypophosphite.

V. *Elixir of Hypophosphite of Iron, Quinine and Strychnia.*—This is the above elixir (IV.) containing $\frac{1}{128}$ grain of hypophosphite of strychnia in the fluid drachm, and is made by triturating 1 grain of sulphate of strychnia with the sulphate of quinine and alcohol, and increasing the quantity of hypophosphite of calcium by 1 grain.

VI. *Elixir of Calisaya with Hypophosphites.*—This is the "elixir of calisaya" proposed by me in 1866, containing hypophosphites in such proportion that two teaspoonfuls represent one teaspoonful of "improved syrup of the hypophosphites with iron" (I). It is therefore necessary to reproduce the formula for the elixir of calisaya, as modified for this purpose.

Take of calisaya bark, 24 troy ounces; curaçoa orange peel, 16 troy ounces; coriander, 4 troy ounces; cinnamon, 3 troy ounces; cardamom, 1½ troy ounces; anise seed, 1 troy ounce; cocoa (Baker's), 8 troy ounces. Having reduced these ingredients to a moderately fine powder, displace them with a mixture of one volume of strong alcohol and three volumes of distilled water, until 2 gallons of percolate are obtained.

Meanwhile prepare from 6 pints of solution of tersulphate of iron, hydrated sesquioxide of iron by the formula of the Pharmacopœia, measure the magma, and add to every 4 volumes 1 volume of strong alcohol; then add of this mixture sufficient to the percolate, obtained as above, to deprive it of its cinchotannic acid. The absence of the latter is readily ascertained by the addition of a drop of muriated tincture of iron to a filtered portion of the liquid, which should not be coloured by such addition. Should coloration result, the intensity or faintness will serve as a guide to the further addition of the ferric oxide. As soon as de-tannation is effected, filter the whole through a *double* muslin cloth, express the residue under a press, filter this portion, add to that first obtained, and measure the united filtrate. Add to the residual magma on the cloth sufficient of the above described mixture of alcohol and water to make, when again expressed and filtered, the united filtrates measure 3 gallons. Now triturate 2 fluid drachms of fresh oil of orange with 4 troy ounces of prepared chalk, incorporate this with the 3 gallons of de-tannated "cinchona liquor," and agitate occasionally for twenty-four hours, and then filter.

The "cinchona liquor" so obtained is just twice the strength of the "elixir of calisaya," above referred to, and when mixed with an equal volume of "improved syrup of the hypophosphites with iron" forms the "elixir of calisaya with hypophosphites."

VII. *Elixir of Calisaya and Hypophosphites with Strychnia* may be made by dissolving 1 grain of strychnia by the aid of a few drops (or just sufficient) of hypophosphorous acid in one fluid drachm of distilled water, and adding sufficient of the above elixir (VI.) to make 1 pint A dessertspoonful contains 1·64 grain of strychnia.

Parliamentary and Law Proceedings.

Poisoning by Opium.

On Wednesday, August 9, an inquest was held at Millfield, Sunderland, upon the body of Dr. Joseph Parker Crossby, aged 44 years, medical officer of the Sunderland Workhouse, who was found dead in bed on Monday morning.

Mrs. Crossby testified that the deceased, who slept alone, was in the habit of taking morphia pills at night. He had complained of heart disease for years. He appeared all right on Sunday.

Dr. Drinkwater said he met Dr. Crossby (who had given evidence in a manslaughter case at Durham Assizes on Saturday) coming from the Workhouse on Saturday night. He was very much excited, nervous and shaky. When he was hastily called in on Monday morning, he judged deceased had been dead two hours. In his opinion death arose from an overdose of opium, but there was no indication of an intentional poisoning.

The jury returned a verdict in accordance with this testimony.

Important Excise Prosecution.

At the Lambeth Police Court on Tuesday, Mr. W. Bush, wholesale chemist, Artillery Lane, City, and Ash Grove, Hackney, appeared to summonses issued against him by the Inland Revenue for having, as alleged, used a still without a licence for compounding spirits, and for retailing spirits without a licence, and for separating gum resin from methylated spirits mixed with gum resin.

Mr. N. J. Highmore, barrister, prosecuted on behalf of the Inland Revenue; and Mr. Edward Pollock appeared for the defendant.

Mr. Highmore said he would take first the offence of "using a still" and "for separating gum resin from methylated spirits mixed with gum resin."

He called Mr. R. W. Parry, supervisor of Excise, who said he visited the premises of the defendant in Hackney. The ordinary still licence was produced. The defendant had no licence to distil spirits. Witness found six stills, varying from 30 to 1000 gallons. There were likewise three or four smaller stills. He found methylated spirit running from the worm end of some of the stills. He asked a man what they were distilling, and he replied "A varnish or finish." A Mr. Wooton told him the same, and that the operation was performed in order to rectify the spirit from the gum. He took samples and handed them to the analyst at Somerset House. Witness made a search, and close to the stills found ten drums containing 110 gallons of methylated spirit, from which the gum resin had been extracted by the stills at work. On July 28, he again called in conjunction with Mr. Harper, who had been with him on the first day. Mr. Holmes, one of the analysts of Somerset House, was with them. There was no distilling going on then. Witness explained to Mr. Bush, jun., the nature of the offence and the law. He requested witness not to remove the spirit until Mr. Bush, sen., came, and he said he would not. When the defendant came and was told of the affair, he said it was the practice of the trade to separate gum from the "finish," and that he was ignorant of the law on the subject.

In cross-examination, the witness said he had not heard of such a practice as that of the defendant's being carried on before by the trade. There was no desire by the defendant to conceal anything.

Mr. John Harper, supervisor of Excise, corroborated; and Mr. John Holmes, analyst, spoke as to having examined the samples, and found them to be methylated spirits, and the solid matter in the stills he found to be gum resin.

Mr. Pollock said with regard to the separation having been carried on he would not dispute, but pointed out that everything had been done by the defendant in an open manner. The defendant likewise had acted in ignorance of the law.

Mr. Chance asked if the facts were admitted, and Mr. Pollock replied in the affirmative, but contended that within the meaning of the Act it was not a distillation of spirits going on, but it was methylated spirits. A long discussion arose over points raised by Mr. Pollock, especially upon the one as to what was meant by "spirits," the learned counsel pointing out that in many articles "spirits" were used.

Mr. Chance said he should well consider the points raised before giving his decision.

The other summonses against the defendant were then proceeded with—the first being for his having carried on the trade of a compounder of spirits, and for compounding spirits without a licence.

Mr. Highmore said the defendant would be bound to have taken out a licence as a compounder quite distinct from that of a distiller. The defendant was the maker of compounds for spirits and liqueurs, and he would show such essences contained "spirit." Under such a business it was likewise required there should be an "entry" of the premises, and a very strict survey. None of these had been complied with.

Mr. Parry, the supervisor, gave evidence in support of the learned counsel's statement, and the evidence of the analysts was given stating that in their opinion the "essences" were "spirits."

Mr. Pollock said that the defendant had carried on the business for many years, and he had in his possession the circulars of many others who for a long period had carried on a similar business. At the Exhibitions from 1851 downwards, medals had been awarded for these "essences" and no proceedings had been taken.

Mr. Highmore said such a trade might not have been known to the authorities, or perhaps the article had been manufactured by a "licensed" compounder. If it had been known the authorities would have interfered.

Mr. Chance said there were certainly many important points to be considered, and he should take time to give his decision upon them. He could hardly understand how these matters had gone on without being known to the authorities.

Mr. Pollock observed that even the Prime Minister must have known it.

The cases were then adjourned.

Alleged Poisoning by Belladonna.

Mr. Carttar, Coroner for West Kent, held an inquest on Monday, at Plumstead, on the body of Henry John Cetewayo Kitchingham, aged two years and seven months. On Thursday the child was playing in the garden of 3, Wellesley Terrace, Anglesea Road, Plumstead, where its parents lodged, and was seized with vomiting, and getting worse he was taken to Dr. Ingledew's surgery, where it was found he was suffering from inflammation of the stomach and intestines, due to some irritant poison.

Mrs. Reeves, landlady of the house, said she noticed some of the children who were playing with the deceased come in with some flowers and a weed like that produced, which she remarked at the time was very poisonous, and threw it on the fire. A wooden fence separated her back garden from that of No. 2, and the flowers and weed, she believed, had been plucked through the fence, as she had no such flowers or weed in her garden.

When the jury viewed the body they also inspected the next garden, and amongst some scarlet runners the Coroner drew their attention to some deadly nightshade or belladonna, the berries of which were green.

Dr. Ingledew said the weed produced was nightshade, and from a *post-mortem* examination he attributed death to the deceased having eaten some of the berries.

Mrs. Henderson, the neighbour, produced some of the weed and said she had since cleared her garden of it.

The jury returned a verdict of death from accidentally eating berries of deadly nightshade.—*Standard.*

Reviews.

The Manual of Colours and Dye Wares. Second Edition. By J. W. Slater. London: Crosby, Lockwood and Co.

In this little manual of two hundred and thirty-four pages, the dyer, calico printer and drysalter will find a fair amount of really valuable information, given in a brief and thoroughly practical form, under an alphabetical arrangement favourable for easy reference.

The particulars given embrace the results of recent researches on colouring matters, the modes of testing dye wares, the strength of acids, etc., together with some useful tables of French weights and measures reduced to their English equivalents, and hydrometer tables of Baumé and Twaddell, compared with the actual gravities to which they correspond. Soaps and mordants are well described, and the chemical properties of dye wares correctly stated. The latter descriptions might in some cases have been elaborated with advantage, but what is stated appears to be singularly correct. The only errors are a few misprints, such as the proper names of inventors or manufacturers:—"Perkins," "Lewinstein," "Fel" and "Bayer," standing for Perkin, Levinstein, Fol and Baeyer; and "Bismark brown" is not a true rendering of the colour named after the great German Chancellor. "Mythylic alcohol" is another mistake, and on page 162, for "permanganate" read "ferrocyanide." Excepting these clerical errors, and another (on page 131), where it is said that "Tin (or iron) dissolved in nitric acid is more readily deposited upon cotton than if hydrochloric acid were the solvent," the book throughout seems thoroughly trustworthy, and we feel pleasure in recommending it to the notice of dyers and others interested in the technical branches treated of in this useful little manual.

Remarks on Certain Medical Principles and Publications. By Dr. Joseph Hamernik, Prague. Translated from the German by F. Marks. London: E. W. Allen. 1882.

This pamphlet belongs to a class of literature that is sufficiently represented by indigenous productions to have enabled the English community to have dispensed with imports of it from foreign lands. Its principal characteristic is a maximum of assertion and a minimum of proof. When doctors disagree ordinary mortals do not usually volunteer to decide, still, if they are appealed to they might require something more than three dozen pages of dogmatism before giving a verdict against all that is "orthodox" in medicine. The author is evidently not troubled with doubt. Vaccination is denounced by him as worse than useless, without the reader being favoured with the evidence leading to that conclusion. He is told cow pox has no connection whatever with small pox, and that "in the event of an attack of small pox it is of no manner of importance whether the patient is vaccinated or not." Though he may find this difficult to reconcile with a statement on the opposite page that "persons are most liable to be attacked by small pox in the years immediately succeding vaccination." Vaccinators with original cow-pox lymph are described as "for the most part charlatans, who produce the pustulation in the udder of the calf or cow by solutions or ointment of tartar emetic, and drive a fraudulent trade in it." All aperients are said to be superfluous and mischievous, and Hunyadi-Janos water is specially singled out for condemnation, apparently because of its dissimilarity to ordinary drinking water. "Disinfection does nothing in the way of preventing disease or rendering it milder." And so on, *usque ad nauseam.*

Notes and Queries.

[737]. Extractum Cinchonæ Liquidum.—On several occasions whendispensing the above preparation, contentions have arisen, sometimes with the patient, sometimes with the prescriber, as to the proper appearance of mixtures in which it has been ordered. The patient is continually complaining that the medicine is not like the last, made up elsewhere; and the doctor himself sometimes will hardly be satisfied with the explanation one has to offer, even though one goes deeply into the subject and harangues him for half an hour on the great difference observable in it as obtained from different establishments, and as prepared from different species of cinchona.

One exhausts one's knowledge of materia medica and wastes one's breath to very little purpose: the mixture has been made before at a first rate West End house; mine is not like it, as it ought to be, and there's an end of the argument.

This strikes me as being so very unsatisfactory, that I am now led to seek the consolatory comments of some kind brother pharmacist.

Three samples of ext. cinch. liq., obtained from well known sources, gave the following divergent results. The experiments being carried out in 1-ounce phials, and 20 minims of the extract added to each, then allowed to stand twelve hours.

No. I.

With distilled water only.

Colour of mixture golden-brown. The precipitate occupied about one seventh of thephial, of a dirty yellowish brown. It shook up easily. Supernatant liquid clear, amber-colour.

With 5 grs. amm. carb.

Colour of mixture dirty yellow-brown. The precipitate occupied about one fifth of the phial. A pale mud-colour; fine, and easily shaken up; supernatant liquid opaque, light brown.

No. II.

With distilled water only.

Colour of mixture purplish liver-colour. The precipitate occupied a. fourth of the phial. Dingy purple; softly flocculent; shook up well, but soon began to come down again. Supernatant liquid clear and rather darker than No. 1.

With 5 grs. amm. carb.

Colour of mixture pale brick-red. The precipitate occupied a third of the phial. Sand-red colour. In large flakes and slightly granular. Not mixing thoroughly when shaken, and beginning to fall at once. Supernatant liquid clear, bright orange.

No. III.

With distilled water only.

Colour of mixture bright brown. The precipitate scarcely more than covered the bottom of phial. Dense, and not shaking up so easily; dark brown. Supernatant liquid opaque, dark brown.

With 5 grs. amm. carb.

Colour of mixture nearly black by reflected light. The precipitate very dark brown; small; dense, with some inclination to stick to the glass. Supernatant liquid opaque, dark brown.

[738]. "Lin. Scorpii."—Can any reader of the Journal favour me with the formula of the above, as I am unable to find any mention of it in any book of formulæ? F. Herington.

Obituary.

T. B. STEAD.

It is with regret that we have to record the death of Mr. T. B. Stead, chemist and druggist, of 20, Upperhead Row, Leeds, which took place on the 14th inst. at his residence, Roundhay. Mr. Stead had been ailing for some time, but his illness did not assume a serious form until last week. On Tuesday last he consulted Dr. Horsfall as to his condition, and that gentleman advised him to take a few days' rest. Mr. Stead gradually became worse, congestion of the brain set in, and he died on Monday. Mr. Stead held the position of President of the Leeds Chemists' Association at the time of his death, having been one of its founders just twenty years ago. His sound sense, genial manner and willingness to work for public objects had secured for him the esteem of his brethren in the ranks of pharmacy. He represented the Leeds district on the Executive Committee of the Chemists and Druggists' Trade Association, and was a regular attender of its meetings in Birmingham. The deceased gentleman represented the West Ward in the Town Council from 1872 until November last, when he did not seek re-election. During his connection with the Corporation he rendered much useful service as a member of several important committees. He was the means of bringing to light many of the anomalies which existed in the collection of the rates in the townships, and on the formation of the committee for levying the rates over the borough he was appointed its chairman, an office which he held until his retirement from the Council. For many years he was a member of the board of overseers of the township of Leeds. As a thorough-going politician he actively engaged in many parliamentary and municipal contests, always displaying a generous spirit, which gained for him the admiration of his opponents, as well as the esteem of those who worked with him. He leaves a widow, a son, and daughter.

Notice has also been received of the death of the following:—

On the 21st of July, Mr. Robert Lambert, Chemist and Druggist, Haworth. Aged 78 years.

On the 22nd of July, Mr. Sydney Herbert Witherington, Chemist and Druggist, Wandsworth Road, S.W. Aged 44 years.

On the 28th of January, Mr. Thomas Howie Hopper, Chemist and Druggist, High Street, Hawick. Aged 64 years.

On the 29th of July, Mr. Alexander Holroyd, Chemist and Druggist, Widnes. Aged 39 years.

On the 29th of July, Mr. Thomas Andrews, Chemist and Druggist, Shrewsbury. Aged 50 years.

On the 31st of July, Mr. William Symes Pryer, Pharmaceutical Chemist, Axminster. Aged 75 years. Mr. Pryer had been a Member of the Pharmaceutical Society since 1853.

On the 6th of August, Mr. Richard Bird Mitchell, Chemist and Druggist, Chulmleigh. Aged 49 years.

On the 11th of August, Mr. William Ruston, Chemist and Druggist, Grey Street, Newcastle-on-Tyne. Aged 39 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Future of Pharmacy.

Sir,—If your correspondent "Wulfruna" will make a simple calculation he will find that the prices he quotes in your last issue are not, after all, anything "special," but the usual wholesale price, with a fair profit for bottling, etc., and if there were a demand among retail chemists for packed drugs of that description I have no doubt they would be supplied on quite as reasonable terms. There is a firm of grocers in the immediate vicinity of my shop who retail many of the articles at the same and in some cases less than the price "Wulfruna" quotes.

Why we should "Boycott" those firms who supply stores I cannot understand, for if a wholesale chemist publishes a list of prices at which he is prepared to supply drugs to all *bonâ fide* wholesale buyers it should not concern him who those buyers are, so long as they have the money to pay for their goods. I doubt if your correspondent could point to any wholesale firm in London which would refuse a good ready money order from any of the London stores.

It is not by any such pettish actions as those advocated by "Wulfruna" that the questions of co-operation are to settled or pharmacy advanced to that professional dignity "Wulfruna" would see it occupy. It is within the power of Parliament only to give us the necessary legislation that will raise pharmacy above the level of other competitive trades, and until that legislation is granted we must be content either to hand over a large portion of our business to the grocers and the stores, or to try and compete with them. For myself, I prefer the latter course.

H. S.

Sir,—I beg to make a few remarks in the Journal on the above subject. It is a burning question amongst us, and any practicable suggestion likely to be beneficial would undoubtedly be welcomed by the whole profession.

We have just had before us Professor Attfield's excellent scheme, which was pretty generally approved. Being myself an outsider,—a country druggist,—I could not take the liberty of intruding on your space with my opinion. I was, however, glad to see that a very great majority endorsed that scheme. But in the meantime the "stores" are our *bête noire*, and we have suggestions without end as to our attitude towards them. It is the letter of your correspondent "Wulfruna" on the stores and their treatment, in last week's issue, under the heading "The Future of Pharmacy," which induces me to write you.

His ideas appear to me to be impracticable and inconsistent. He advocates "Boycotting" firms supplying stores, though he is of opinion that "we cannot blame stores." We cannot. So long as they avoid infringing the law they are perfectly legitimate concerns. It cannot be maintained that there is any difference in, *e.g.*, the glycerine, B.P., which the chemist sells at, say 3*d.* per oz. (the Liverpool chemists' price list), and the glycerine, B.P., 4-oz. bottle at 6*d.*, Lewis's price. The truth is the profits of the chemist and druggist have been too high. The prices "Wulfruna" quotes from the list of a wholesale house supplying stores,—the lowness of these prices is apparently the principal occasion of his letter,—are quite as high as he himself would buy at from any wholesale house. In most instances they are, I think, higher. But whatever these prices might be, they would be probably the same to everybody for the same quantity and terms. It is a matter of competition. The stores employing a larger capital require less percentage of profit. I have a general dealer next door to me selling at store prices. Amongst other drysalteries he sells 3-oz. bottles castor oil, at 3*d.* each; 4-oz. bottles at 4*d.*; cream of tartar, 1*s.* 4*d.* per lb.; tartaric acid, 2*s.* per lb.; seidlitz powders, 10*d.* per box; extract of meat (Company's), 1*s.* 3*d.* for 2-oz. pot; toilet soaps, about 33 per cent. off usual retail prices. I must then either sell at these prices or not sell these articles at all, for even at these prices he makes as much per cent. on his turnover as he finds necessary to the profitable carrying on of his business. How could we "Boycott" firms supplying him? We could not "Boycott" castor oil nor extract of meat. We cannot blame the stores so long as they deal honestly, nor the public for laying out their money economically. The chemist and druggist himself is, I think, to blame. He has, in the business of distributing "patent medicines and perfumery," "homœopathic medicines," "toilet requisites," etc., put a fictitious value on his services. But he can now bring his professional education to bear. "Knowledge is power." This is true, whether the knowledge be business or scientific. If "Wulfruna" (I speak generally) be placed in a situation where nothing more is required than a distributing capacity, he must either accommodate himself to his environment, or shut up. If his scientific ability merit it he will find scope and obtain customers in spite of "cutting" stores. It is not by "Boycotting" wholesale houses that we may improve our position. That could only be done by a demand for more skilled labour on the part of the medical faculty and the public, and the supply of that labour.

The law relating to the practice of pharmacy may require amendment, but reform is much required within the ranks of chemists and druggists. Instead of the charlatanry, chicanery and huckstering, which so widely prevail, let us cultivate a purer pharmacy.

It will eventually come, throughout the country, to what it has already come to in many places. Those most fitted for pharmacists have survived, and their businesses have become more truly pharmaceutical than ever. Those most fitted by education and position to become traders have, by speculation, untiring energy and economy, developed stores into a financial success. The weak have gone to the wall.

W. B.

Leeches.

Sir,—In the matter of leech keeping I am sorry to have to say that my experience differs very greatly from that of Mr. Lamble, my conviction being that in order to ensure the keeping of leeches in perfect health you will have to change their water very often indeed. So far as mine are concerned I have found that they have flourished the most vigorously when the water was changed every day, and that they soon began to stagnate when neglected for a few days, not to speak of weeks or months. I should like to hear from Mr. Lamble how he gets over the difficulty of vegetation on the surface of the water and sides of the aquarium.

Aquam.

W. Miller.—Nos. 1, 3 and 5 are named correctly. 2. *Hypericum perforatum.* 4. *Anthemis Cotula.* 6. *Teucrium Scorodoma.*

J. J.—We know of no reason why the two substances mentioned should form a dirty brown mass.

R. F.—Numerous forms for coating pills have been already published, and may be found by reference to the Index.

Vin. Aurant.—We think that there can be no doubt that the wine has undergone acetification.

A. B. C. is thanked for his communication.

Communications, Letters, etc., have been received from Messrs. Morley, Macdermot, Benest, Garrett, Dobson, Thompson, Aquam.

The Pharmaceutical Journal.

SATURDAY, AUGUST 26, 1882.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

BRITISH PHARMACEUTICAL CONFERENCE.

SOUTHAMPTON has during the past week been the rendezvous of such pharmacists as have been able and had the inclination to avail themselves of the opportunity afforded by the annual meeting of the British Pharmaceutical Conference to vary the monotony of the ordinary routine of their lives by friendly intercourse with their *confrères.* The Conference commenced on Tuesday, at half-past ten o'clock, in the WATTS Memorial Hall, under the presidency of Professor ATTFIELD, F.R.S., the visitors being welcomed, in a few well-chosen words, by Mr. RANDALL, speaking in the name of the local pharmacists. The audience was not so large as on some similar occasions in previous years, and did not nearly fill the area of the handsome hall in which the Conference met; whilst the general attendance appeared to be below the average, and this is confirmed by the number of signatures in the book placed at the entrance.

After a formal reception of the delegates present from various societies, the business of the meeting was commenced by the reading of the Report of the Executive Committee. The Report referred to the alterations that were introduced into the last 'Year-Book' and to the subject of grants in aid of original scientific research. It also mentioned the resignation of one of the General Secretaries, Mr. M. CARTEIGHE, in consequence of his accession to the Presidency of the Pharmaceutical Society of Great Britain, and stated that the consequent vacancy had been temporarily filled, at the request of the Committee, by Mr. SIDNEY PLOWMAN. From the Financial Statement it appeared that during the past year the expenditure had exceeded the income by about £65, which was partly due to a falling off in the number of members from whom subscriptions had been received. In alluding to this deficiency the President remarked that the introduction of the Parcels Post System would lessen the expense of distributing the 'Year-Book' in future, and he expressed an opinion that an appeal to the registered chemists and druggists who are not already members of the Conference should be followed by an increase of members sufficient to prevent a deficit in future years; further, that although the Committee had felt compelled to defer for the present, for financial reasons, the compilation of the General Index which had been suggested, the postponement would only be of short duration.

The Address of the President was undoubtedly the most important feature of the meeting. The Conference has been privileged in previous years to hear admirable addresses from different presidents, but in no previous year has a more marked impression been produced. As the Address is printed *in extenso* in another part of this Journal, it is not necessary to summarize it here, neither will this be the best opportunity for its criticism. As remarked by one of the speakers, it will doubtless be read with pleasure by all English speaking pharmacists, and the decided opinions expressed, couched in language that admits of little misunderstanding, will probably evoke a considerable amount of discussion. Indeed, that it has already attracted attention outside the pharmaceutical circle is evidenced by the fact that the *Times* has already devoted a leading article to the discussion of some of its topics. It will be sufficient to say here that the Address was admirably delivered and was listened to with that silent attention which is sometimes better evidence of interest than the most boisterous applause.

The first papers read consisted, as usual, of reports of work undertaken at the request, and with the aid, of the Conference. The first was a "Report on the Differences between the Essential Oils of Cinnamon and Cassia," by Mr. A. H. JACKSON. The reporter stated that, tested from a physical standpoint, the oils possess distinctive and characteristic odours and that the cinnamon oil has a more fiery taste than the cassia, but that neither the relative densities nor the refractive energies are sufficient guides in distinguishing mixtures of these oils, though the density of the oil of cassia was found to be somewhat greater than that of the oil of cinnamon. The chemical examination seemed to show that the constituent or constituents in which the oils differ from each other are present only in extremely small proportion. The next report was by Mr. A. W. GERRARD, "On the Alkaloidal Value of Belladona Plants," which was a continuation of a report on the same subject presented last year. The experiments referred to in the present report were made upon uncultivated plants in their first year's growth, from a chalk soil in Yorkshire and from a leaf mould in Sussex, and also upon cultivated plants in their second year's growth, gathered in May, June and July, or before flowering, whilst in flower, and whilst in fruit. The results obtained with the wild plants indicated that belladonna in the first year of its growth contains a very small proportion of alkaloid, but to that extent they were confirmatory of previous deductions by the author that the formation of alkaloid in the plant is favoured by a chalky soil. Experiments with the cultivated plant showed that the plant becomes most rich in active principles at the period of flowering and that the proportion is maintained in the fruiting season; further, that there is a simultaneous development of alkaloidal matter in the root and in the leaf, the former not being exhausted to strengthen the latter. A slight discussion followed, in the course of which Mr. HOLMES remarked that he had observed that belladonna grows more luxuriantly in calcareous soils, which might perhaps account for its being richer in alkaloid. At the close of this discussion the Conference adjourned to luncheon, which was provided in an adjoining room.

On resuming, the first paper read was entitled "A New Styptic of Indigenous Growth," and contained some observations of Professor QUINLAN upon the hæmostatic properties of the leaves of the *Plantago lanceolata*, or ribgrass. Notwithstanding the form of its title, the paper contained some interesting quotations from SHAKSPERE and CULPEPPER, proving that the ribgrass long ago had a great reputation as a styptic. Professor QUINLAN exhibited some pharmaceutical preparations of the plant, but it would appear that for external application the dried leaves are effective or the fresh leaves in a paste such as would be produced by mastication. It is not quite clear in what manner the leaf acts, but some experiments appeared to show that it is devoid of any kind of tannin, and it was suggested by Professor TICHBORNE that if there were an astringent principle present it might be allied to the catechuic acid compounds. Mr. BORLAND said that *Plantago lanceolata* had long been used in the district in which he lived to stanch the bleeding of wounds, but he had hitherto thought that it was merely because they formed a convenient covering of a wound.

A *résumé* was then given by Mr. W. A. SHENSTONE of "Some Experiments on English Oil of Lavender," which had been undertaken to test statements made by foreign chemists to the effect that oil of lavender sometimes deposits in cold weather a camphor, identical with common camphor, and that the oil contains a hydrocarbon boiling at a very high temperature (200°–210° C.). Mr. SHENSTONE was unable to confirm either of these statements, the oil used by him evidently not containing any notable quantity of crystalline constituents, whilst the distillate collected about the temperature mentioned contained a large amount of oxygen. It would also appear from the independent experiments of the author and M. BRUYLANT that the English and foreign oils of lavender differ very considerably in the amount of terpene which they contain. It may be remarked, in passing, that Mr. SHENSTONE'S *résumé* was evidently appreciated by the audience, and it is worth consideration whether it would not be better, as a rule, to summarize papers containing a large number of details that cannot be followed in the reading and to present the general results in such a form that they can be readily grasped, and, if necessary, discussed. No person in the habit of attending scientific meetings like the Conference can have failed to observe the weariness that becomes evident in the audience during the reading of even valuable papers, the drift of which is obscured by the multitude of details.

Next Mr. PARKER read a meritorious paper upon "Terpin Hydrate: its Preparation and Crystallography," which had been suggested by the occurrence of some crystals in a jar of furniture oil, supposed to have been compounded chiefly of linseed oil, turpentine, butter of antimony and methylated spirit. The author does not seem to be aware that the formation of such crystals in furniture polish is by no means a new experience; but it may be mentioned that in the early days of the School of Pharmacy, Bloomsbury Square, the conditions under which the formation of such crystals took place was the subject of many experiments in the laboratory, though without any satisfactory result being arrived at. Besides an elaborate description of the crystallography of terpin hydrate, the paper contained details as to its preparation and physical properties, and it mentioned the interesting fact that it is probable that terpin hydrate may be made to yield several aromatic oils by the action upon it of dehydrating substances under suitable conditions.

The next paper was on "A New Method of Making the Volumetric Solution for Estimating Hardness of Water," by Professor TICHBORNE. The novelty consists in the use of an oleate of soda, the preparation of which he describes, in the making of the soap solution. Dr. SYMES then read "Some Notes on Brazilian Drugs," in which he described a gum derived from the *Acacia Angico*, known in Brazil under the name of "resin de angico," and said to be useful for chest complaints. Another drug referred to was a species of elemi, named "almesca," differing in some respects from the elemi of commerce. The last drug described was a bark named "casca de guassatunga," from which in Brazil an alcoholic tincture is prepared said to be useful in the treatment of snake-bites.

The chair was now taken by Mr. GROVES, whilst a paper was read by the President, entitled "Half-an-hour with a Few Sheets of the New Pharmacopœia of the United States." The sheets upon which the remarks were based had been placed at the disposal of Professor ATTFIELD by the courtesy of Professor P. W. BEDFORD, President of the American Pharmaceutical Association, who is also a member of the United States Pharmacopœia Committee. The work is printed in large octavo, and the division into the two classes of "Materia Medica" and "Preparations," which obtains in the last edition, is abandoned in favour of one simple alphabetical arrangement like that of the British Pharmacopœia. The system of chemical nomenclature advocated by Professor ATTFIELD is again followed, and the author of the paper justly claimed that this proved that it was practicable and serviceable in the medicine and pharmacy of an English-speaking people. The old system of weights and measures is abandoned and the formulæ are, as a rule, expressed in parts by weight, but in cases where particulars of volume as well as of weight are required the metric decimal system is employed. The Pharmacopœia opens with a new class of preparations, termed "Abstracts," which are alcoholic extracts mixed with sufficient sugar of milk to make one part of the preparation represent two parts of the original drugs. The class includes abstracts of aconite, belladonna, conium, digitalis, hyoscyamus, ignatia, jalap, nux vomica, podophyllum, senega and valerian. A list of the additions and omissions was given, which cannot be referred to here further than to notice that "aconitia" is omitted, notwithstanding the assistance afforded to the Pharmacopœia Committee by Dr. Wright in respect to a definition of that substance. Further, the doses of drugs are now given, temperatures are stated in Centigrade degrees with Fahrenheit equivalents in brackets, chemical formulæ are inserted as in the British Pharmacopœia, and the molecular weight is appended to each formula. The interest excited by this paper was increased by the fact that Professor Redwood took the opportunity of stating that the preparation of a new edition of the British Pharmacopœia is now in contemplation. He said that he had little doubt that in it the same system of nomenclature would be adopted as in that of the United States, but he spoke with less certainty as to the adoption of the plan of indicating quantities in parts by weight, although he approved of the system and had himself worked it out years ago. He remarked that with respect to the Pharmacopœia of this country a greater conservatism was exercised by the Medical Council than by the body that controlled the United States Pharmacopœia, since it did not introduce any unproved remedies. The reading of this paper brought the first day's business to a close.

In the evening a visit was made to the picturesque ruins of Netley Abbey by upwards of sixty members and visitors, carriages having been provided by the Local Committee. The pleasure of the excursion was slightly marred by atmospheric influences, the splendid view of Southampton Water and the opposite coast being nearly destroyed by the driving rain and mist; but notwithstanding this untoward circumstance the trip proved a very enjoyable one, and much interest was excited by the ruins.

On Wednesday morning the proceedings were resumed by the reading of a paper on "Some Reactions of Arsenic," by Messrs. Naylor and Braithwaite. The first portion of the paper was devoted to the results of some experiments made to test a statement of M. Patrouillard, and introduced into some text-books, to the effect that arsenic acid is easily reduced to arsenious acid by the action of oxalic acid. The authors failed to obtain any confirmation of this statement and expressed an opinion that oxalic acid exerts no reducing action under the conditions described by M. Patrouillard. The remainder of the paper was devoted to an account of the method followed in employing the copper-test, which is based upon the fact of the solubility of cupric arsenate in the double tartrate of potassium and sodium, and to a description of the decomposition which takes place between arsenious acid and mercuric salts.

The next paper read was entitled "Some Results of the Action of the Digestive Ferments on Drugs," and was by Mr. G. Brownen. It described the effect produced by solutions of the gastric ferment and pancreatic solutions upon a number of drugs and their preparations. The results obtained suggest that this field of investigation will prove not only interesting but important to the physiologist, though evidently the value of such experiments will be increased in proportion as the conditions under which they are performed resemble those which occur in the human economy. It was pointed out in the discussion which followed that those conditions are very difficult to imitate, especially such of them as obtain in cases of disease, and it was objected by Mr. Plowman that the temperature at which the experiments were conducted (50° C.) exceeded that of the human body. Some little amusement was caused by the prohibition by the President of any reference to such a subject as "vital force" and by the difficulty some of the speakers experienced in their attempts to avoid the veto.

Mr. E. M. Holmes commenced his "Remarks on the Root of *Aconitum Napellus* and Allied Species" by pointing out that although aconite has long been in use in medicine, and is recognized as one of the most powerful of medicinal agents, its internal administration in this country is not so great as might have been expected. This he considers to be possibly due to variation in the strength of official preparations, and without attributing this variability altogether to the non-recognition in the Pharmacopœia of well-known facts, he says that it appears certain that the requirements of the Pharmacopœia might be complied with and yet preparations of very variable strength be the result. He points out that the figure of the root referred to in the Pharmacopœia is totally inadequate to distinguish the root of *Aconitum Napellus* from that of other less poisonous species, and that the roots imported from Germany are collected by peasants not possessed of any botanical knowledge and sold without any guarantee as to the time of their collection. The difficulty is increased by the fact that the numerous aconites are closely allied, the varieties running one into another, whilst a complete series of the members of the genus is hardly to be found for reference in any botanical garden or museum. He, therefore, considered it worthy of inquiry whether the aconites available for pharmaceutical preparations might not be characterized for practical purposes by the effect produced by them when chewed. He found that the roots of several species did not cause a tingling sensation upon the tongue, including some plants which presented the specific characters of *Aconitum Napellus*, though easily distinguishable from it by habit. But all the aconites in which this variation occurred were observed to flower later than the typical *Aconitum Napellus.* He expresses the opinion, therefore, that the only way to secure aconite of good and uniform quality is to limit the official drug to home-grown aconite, flowering in May and June and gathered while the plant is in flower. He remarks, in conclusion, that aconite is very easy to cultivate and that, considering the small quantity used, there is no reason why any chemist who has a small piece of garden should not grow his own aconite root. Contrary to what might have been expected after the reading of so practical a paper, no discussion followed, and it may be remarked that the comments made upon the papers read at this meeting, as a whole, were far fewer than in previous years.

"Ammoniated Extract of Ergot and a Process for its Preparation" was the title of the next paper read, which was contributed by Mr. A. W. GERRARD. The process consists in macerating 10 parts of crushed ergot for eight or ten hours with frequent stirring in 50 parts of cold water containing ½ per cent. of strong solution of ammonia, straining through flannel, washing the ergot from time to time with more ammoniacal water till exhausted, evaporating the strained liquor to five parts (any scum or fat arising to the surface being removed), treating the cooled extract with an equal volume of aromatic spirit of ammonia, decanting the clear portion after subsidence, filtering the remainder through felt or flannel and washing the residue with sufficient spirit to bring the volume of the extract to ten parts. One part of the extract, which thus prepared is darker in colour than the ordinary form, contains the soluble matter of one part of solid ergot; the average specific gravity is 1000, and the dose is the same as that of the ordinary liquid extract. The advantages claimed for the preparation are that the ammonia not only by its solvent power insures a complete exhaustion of the active principles of the drug, but by its presence in the medicine induces a rapid action by acting as a nervous stimulant. In the discussion which followed it was suggested that the ammonia by forming a soap took up a portion of the oil present in ergot, and thus facilitated the permeation and consequent exhaustion of the drug. The official formula found several defenders, Mr. GREENISH being of opinion that water extracts all the active principle from ergot if the oil be previously removed. On the other hand, Dr. QUINLAN said that in practice he had found ammonia in a preparation of ergot to be useful as a corrective.

Mr. SYMONS then read a paper on "Tumefaction as an Aid to the Identification of the Varieties of Maranta Starch." It contained the results of experiments made by treating different starches with solutions varying from 0·5 to 1·5 per cent. of caustic soda and also by submitting them to various degrees of heat until tumefaction took place. He found that when potato, oat, Natal, tous-les-mois, wheat, Bermuda, sago, maize, cassava, St. Vincent, and rice starches were treated with caustic soda for ten minutes, they required for their complete tumefaction solutions increasing in strength in the order mentioned, from potato with a 0·8 solution to rice which required a 1·3 solution. When tumefied by heat and arranged according to the degree of temperature required, the order of the starches was nearly the same, with the exception of oat and cassava. It is worthy of remark that when using the alkaline method of tumefaction the order of the starches bears out a conjecture recently put forward in this Journal by the author, that the higher the temperature at which a starch grows the higher is its point of tumefaction.

The next paper read was on "The Purity of Commercial Salts of Gold," by Mr. F. W. BRANSON. It gave the result of the examination of some fifteen-grain tubes of commercial salt of gold, eight of which were found to be correct within reasonable limits, whilst four showed a deficiency of 8 per cent. in weight or 5 per cent. in metal. The latter, although obtained from a reputable house, bore neither trade mark, seller's name nor guarantee label.

In the paper next read, on "The Iodides of Bismuth," by Messrs. F. W. FLETCHER and H. P. COOPER, the authors described a new compound of bismuth, a very basic yellow iodide, represented by the formula $BiI_3.5Bi_2O_3$ or $3BiOI.4Bi_2O_3$, met with whilst testing metallic bismuth for lead.

The last paper read before the adjournment for luncheon was a note on "Microscopic Organisms in certain Inorganic Solutions," and contained the details of some experiments made as to the formation of a green vegetable growth in bottles containing solutions of sodium phosphate, magnesium phosphate, and calcium sulphate, kept in the laboratory of the Yorkshire College of Science.

The Conference reassembled at 2.30 p.m. when a paper by Mr. D. B. DOTT on "The Solubility of Morphia Salts" was read. It consisted principally of an adverse criticism of two papers on a similar subject by Professor POWER and Mr. J. U. LLOYD, and incidentally the author mentioned that he is engaged upon the compilation of a table of the solubility of morphia salts, the determinations being made at 60° F. In discussing this paper Mr. R. H. PARKER suggested that it would be advantageous to establish standard conditions under which solubilities should be taken, since the solubility of many substances is much affected by varying circumstances. Mr. J. WILLIAMS said that he looked upon solubility as being closely associated with the power of crystallization, illustrating his remark by a reference to the compounds of caffeine recently described by M. Tanret, which he does not consider to be definite chemical compounds, but mixtures. Mr. P. W. Squire also pointed to the necessity of distinguishing between the point of solubility and the crystallizing point.

In some "Notes on the Pharmacy of Cinchona," Mr. R. W. Giles called attention to the unsatisfactory results that have followed the "fearful deterioration of Calisaya bark," both pharmacy and medical practice having been prejudiced through the consequent substitution of quinine for pharmaceutical preparations of the bark. He recommends that all pharmacists should keep in stock Indian or other non-official bark of sufficient alkaloidal value and that when opportunity offers they should educate the medical profession to the use of it. He considers that the standard adopted for the cinchona of pharmacy should be an alkaloidal and not a quinine standard, that it should be a mean and not an extreme one, and that it should admit barks from all sources. Further, he described a process for the determination of the alkaloidal value of cinchona bark which, he said, though simple and easy of manipulation, gives results near enough for pharmaceutical purposes. He expressed a preference for a fluid extract as a pharmaceutical preparation, but said that a fluid extract of cinchona worthy of its name was still a desideratum. In the discussion of this paper, Mr. Welcome recommended that the standard of a pharmaceutical bark should be fixed at 2 per cent. of quinine with a proper proportion of the other cinchona alkaloids. Mr. Southall spoke favourably of the decoction, which he said was largely used in the Birmingham district, and Dr. Symes said it was also a favourite preparation in Liverpool. On the other hand, Mr. Ekin reminded the Conference that he had found the decoction to be the preparation weakest in alkaloid. The discussion afforded Mr. Hampson the opportunity of saying that changes in the Pharmacopœia would be best effected, when necessary, under the advice of practical pharmacists, and that the Pharmaceutical Society of Great Britain or the British Pharmaceutical Conference ought to be represented in the Pharmacopœia Committee in virtue of legal enactment.

"A Note on the Action of Glycerine upon some Salts of Iron," by Mr. G. F. Schacht, described the results of some experiments arising out of an alteration observed in a mixture made from the following prescription:—"Tinct. ferri perchloridi, ʒiss; glycerini, ʒvj; aquæ, ad ℥vj." The mixture, when first prepared, was of a pale sherry colour and possessed an astringent metallic taste; but the colour afterwards nearly disappeared and the taste became sweet and metallic, but not astringent. The change was due to the reduction of the iron from the ferric to the ferrous condition and experiments showed that this reduction takes place in the presence of ethyl alcohol, glycerine, and probably some other alcohols. Conversely, glycerine appears to retard though not absolutely to prevent the oxidation of the proto-salts. The President said that this action of alcohol upon a per-salt of iron had been long known, an ethereal spirit of chloride of iron prepared in this way having been formerly official in a continental Pharmacopœia.

In a "Note on a Reaction of Glycerine and Polyhydric Alcohols," Mr. W. R. Dunstan recorded the observation that the acid solution obtained by the addition of glycerine to an aqueous solution of sodium biborate becomes alkaline when heated. The reaction is also given by many other polyhydric alcohols and by certain sugars.

The interest excited by the introduction of Professor Barff's "Boro-glyceride" has induced Mr. D. Hooper to make some experiments upon the "Solubility of Boric Acid in Glycerine." He finds that at zero 100 parts of glycerine dissolve 20 parts of boric acid, that at 100° C. the quantity dissolved is increased to 72 parts, and that between these two temperatures the solubility is represented by an almost straight line.

Mr. B. S. Proctor, having been somewhat sceptical as to the cause of the non-appearance of the results of oxidation in a commercial sample of liquor of iodide of iron, was induced to examine it, and the results furnished the subject of the next paper read. He proved the presence of phosphoric acid by its separation as ferric phosphate and that of oxalic acid by its separation as ferrous oxalate. The liquor also did not contain the quantity of iodide of iron required to make a syrup of full strength, when used according to the directions accompanying it. At the conclusion of his paper Mr. Proctor somewhat cynically suggested that if any pharmacist feels impelled to any other expedient than that of keeping his solution in contact with an iron wire he had better at least know what he is doing, and add the adulterations himself rather than buy the liquor ready adulterated, not knowing what it contains. Mr. Fletcher expressed a doubt whether any manufacturer who had a reputation to lose would add such a substance as oxalic acid, and, referring to the acidity of the liquor which had been mentioned by Mr. Proctor, said that it might be due to free hydriodic acid which is always formed. The usual *pro* and *con.* statements with respect to the permanence of syrup of iodide of iron and the effect produced by iron wire or light were made by different speakers, and Professor Tichborne expressed an opinion that a frequent cause of failure was that the heat was not continued long enough in making the solution of iodide of iron to sufficiently remove the hydriodic acid formed.

A "Report on the Strength of Commercial Samples of Tincture and Liquid Extract of Opium," by Mr. J. Woodland, was then read. Fourteen samples of tincture had been examined, and taking the percentage of morphia present as a criterion, eight of them appeared to have been prepared from opium exceeding in morphia strength the Pharmacopœia standard; the other six were more or less deficient. Of ten samples of liquid extract of opium none reached the standard, and in one or two cases the percentage of morphia was very low.

The last paper read was a "Report on the Purity of Commercial Samples of Silver Salts," also by Mr. Woodland. It stated that caustic points had been found to contain from 25 to 36 per cent. of potassium or sodium nitrate, crystals of silver nitrate from none to 19 per cent. of the same diluents, and oxide of silver from 13 to 26 per cent. of impurities. It was remarked by the President that potassium nitrate is avowedly added in the preparation of caustic points in order to give them greater toughness, and Mr. J. Williams said that nitrate of lead is used for the same purpose. Both Mr. Williams and Mr. Naylor expressed surprise at the statements with respect to silver oxide and said that it did not usually contain more than 1 or 1½ per cent.

The next business of the Conference would have been to decide as to the place of meeting in 1883; but the President having stated that it was not yet settled what town should be visited by the British Association,—the arrangement with respect to Oxford having fallen through,—it was agreed to leave the decision in the hands of the Executive Committee.

The election by ballot of officers for 1882–83 then took place with the following result:—

President.—Prof. Attfield, Ph.D., F.R.S., F.I.C., F.C.S.

Vice-Presidents.—M. Carteighe, F.I.C., F.C.S., London; J. R. Young, Edinburgh; C. Umney, F.I.C., F.C.S.

Treasurer.—C. Ekin, F.C.S., Hounslow.

General Secretaries.—F. Baden Benger, F.C.S., Manchester; S. Plowman, F.I.C., London.

Other Members of Executive Committee.—Alexander Kinninmont, F.C.S., Glasgow; J. C. C. Payne, Belfast; W. A. H. Naylor, F.C.S., London; R. Chipperfield, Southampton; P. W. Squire, F.L.S., F.C.S., London; G. S. Taylor, F.C.S., London; J. C. Thresh, D.Sc., F.C.S., Buxton; F. W. Fletcher, F.C.S., London.

Auditor.—James Spearing, Southampton.

Nothing now remained for the Conference to do but to record its sense of indebtedness to those friends who had contributed in various ways to make the meeting a success. First, the cordial and well-deserved thanks of the non-resident members were accorded to the Local Committee, and especially to Messrs. Randall, Chipperfield and Dawson, for the successful way in which they had carried out the arrangements. Then a vote of thanks was passed to General Cooke, Director-General of the Ordnance Survey Department, for his kindness in affording facilities to the members to visit the Ordnance Survey Offices and inspect the operations going on there. Last of all came an enthusiastic vote of thanks to the President, for his conduct in the Chair, and the members of the Conference then separated, not without some misgivings as to the weather for the evening Excursion.

Any fears, however, which might have been entertained during the storm which raged on Wednesday night, as to the condition of the weather on the following day, were fortunately dispelled. The morning was faultless; the sun brilliant and the air delightful. Before half-past eight, the hour fixed for starting, members of the Conference were making a forced march to the pier-head, many, judging from an indescribable expression of "goneness" in their features, having evidently sacrificed breakfast to a heroic determination to be punctual. The steamer engaged for the trip was one of the finest boats in the Isle of Wight Company's service, and about one hundred and twenty excursionists, including a fair proportion of ladies, were on board when, a little before nine o'clock, the signal for departure was given. The run to Ryde was most enjoyable, affording as it did, glimpses of many objects of interest; Netley Hospital, with its magnificent façade, and the ruins of the fine old Abbey close by, well contrasted the spirit of the Past and the Present, and Osborne, so delightfully situated amidst the peaceful beauty of its surrounding, evidenced the gentle spirit of its Royal occupant.

Ryde was reached at 10·30, where a train was waiting to convey the party to Brading. Alighting here, a pleasant stroll through lanes and fields, rich in spoils for the botanists, brought the visitors to the remains of the Roman Villa. An inspection of the mosaic floors, some of which are in very perfect condition, and the many archæological treasures which have been turned up during the excavations, detained the company here until 12·30, when train was taken to Ventnor.

A short distance from the town, on the Bonchurch Road, a substantial luncheon was served on the lawn in front of the residence of Captain Roache, who had kindly thrown open his grounds for the reception of members of the Conference. The majority of the party then made their way through Bonchurch to the Landslip. The magnificent scenery of this spot is too well known to need description; suffice it to say that the expanse of sun-illumined sea on the right hand and the solemn grandeur of the grey crags to the left, intermingled with the varied tints of the luxurious foliage, made up a scene which by those who witnessed it for the first time will never be forgotten, and which by those who had already seen it many times before will ever be remembered with increased delight.

On the road along the cliffs to Shanklin stands the private residence of Mr. Gibbs, of Ryde, and at this point a pleasant surprise awaited the excursionists. Mr. Gibbs, gracefully assisted by his wife, welcomed into his house successive detachments of the party as they arrived; and beneath his hospitable roof every kind of comfort and refreshment was set before them. In the dining room were choice wines and fruits, and in the drawing room, tea, coffee, and other light refreshments. Coming as it did so unexpectedly, and dispensed so courteously and generously, Mr. Gibbs's hospitality constituted one of the most delightful incidents of the trip.

After passing through the village of Shanklin and visiting its celebrated Chine, the party returned by rail to Ryde, and thence by steamer to Southampton, where, at 7.30, high tea was served at the Royal George Hotel. Numerous speeches followed, and at a late hour the company dispersed, unanimous in the opinion that a pleasanter excursion had never been spent by the Conference.

Amongst the members of the Local Committee singled out for special thanks were Mr. Randall, the courteous Chairman, Mr. Dawson, the assiduous Honorary Secretary, and last, but not least, Mr. Chipperfield, the energetic "Acting Manager."

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

The Nineteenth Annual Conference commenced its sitting at the Watts Memorial Hall, Vincent's Walk, Southampton, on Tuesday morning, the 22nd inst, at 10.30 a.m., under the Presidency of Professor Attfield, Ph.D., F.R.S., F.I.C., F.C.S. During the Conference about one hundred and twenty persons signed the book.

Welcome to the Conference.

Mr. W. B. Randall (Southampton), Chairman of the Local Committee, said he was deputed by his brother pharmacists to say how pleased they were to see the British Pharmaceutical Conference meet in Southampton. The gentleman who conveyed the invitation to the Conference at York last year mentioned certain disabilities under which they laboured in undertaking this duty, but notwithstanding that, with the help of their brethren in the neighbourhood and of some friends at a distance, they trusted they had been able to make such arrangements as would make members of the Conference comfortable and minister to their enjoyment during their visit. They could not say at Southampton that they were favoured by nature with those mineral treasures which added so greatly to the population and wealth of the localities where they were found, but they might boast, perhaps more than some of those localities, of the beauties of nature, and he ventured to think that this was as good a part of the country to work in, and to enjoy life in, as those parts where there might be more mineral wealth. It was quite certain that the monks of old thought this locality a good one, and they were not bad judges, for they put up Netley Abbey, of which the stately ruins might still be seen. The Government of our own day had much the same feeling, for they erected Netley Hospital close to the ruins of the Abbey. The old Norman kings too must have thought something of the South of England, for they made their hunting grounds in the New Forest, and Her Gracious Majesty the Queen and her lamented Consort appeared to have thought the same when they chose Osborne as one of their royal residences. He might say something too, if time permitted, about the historic associations of Southampton. It was there, he believed, that Canute gave that celebrated rebuke to sycophancy which all would remember, and that lesson in reverence which was now-a-days, he believed, equally needed. In that neighbourhood too, in his early days, ran about a man who had taught some amongst them the close observation of nature, when he recommended them to imitate the industry of the busy bee, and who also taught many of them their first lessons in logic, for his handbook on that science had the honour for some time of being the text-book in one of the universities. He alluded to Dr. Watts, after whom the building in which the Conference was assembled had been called, and on whose father's garden it stood. He would detain them no longer from the address they were anxious to hear, but in the name of the pharmacists of the south-western district, including those residing in the garden of England across the Solent, he bid the British Pharmaceutical Conference welcome to Southampton.

The President, in the name of the Conference, thanked Mr. Randall for the kind words of welcome he had uttered. He begged also to express the hope that, in return, the meeting of the Conference might be the means of doing some good to the pharmacists of Southampton and the district.

Reception of Delegates.

Mr. F. B. Benger (General Secretary) then read the list of delegates from various societies, who were collectively welcomed by the President.

The following is a list of those present:—

From the *Pharmaceutical Society of Great Britain.*—Mr. S. R. Atkins (Vice-President); Messrs. F. Andrews, T. Greenish, F.C.S., F.R.M.S., R. Hampson, W. D. Savage, G. F. Schacht, F.C.S., P. W. Squire, C. Symes, Ph.D., F.C.S. and J. Williams, F.I.C., F.C.S.

From the *North British Branch of the Pharmaceutical Society.*—Messrs. Borland and J. B. Stephenson.

From the *Pharmaceutical Society of Ireland.*—Professor Tichborne, Ph.D., F.I.C., F.C.S. (President); Messrs. W. N. Allen, H. Bennett and Payne.

From *Birmingham.*—Mr. Southall.

From the *Brighton Association of Pharmacy.*—Messrs. Padwick and W. D. Savage, J.P.

From the *Bristol Pharmaceutical Association.*—Mr. G. F. Schacht (President).

From the *Liverpool Chemists' Association.*—Mr. Mason and Dr. Symes.

From the *Leicester Chemists' Assistants and Apprentices' Association.*—Mr. J. W. Clarke.

From the *London Chemists' Assistant's Association.*—Messrs. W. A. Wrenn (President), and C. E. Stuart, B.Sc.

From the *Manchester Chemists and Druggists' Association.*—Messrs. F. Baden Benger, F.C.S., and A. H. Jackson, B.Sc.

From the *Sheffield Pharmaceutical and Chemical Society.*—Mr. J. Preston (President).

From *York.*—Messrs. Clark and Dresser.

Mr. Benger then read the report of the Executive Committee, as follows:—

Report of the Executive Committee.

Since the last general meeting of the Conference at York, your Committee have met on several occasions in London, chiefly for the transaction of business connected with the publication and distribution of the 'Year Book,' the issue of the Blue Lists and other circulars, the collection of members' subscriptions, and the organization of the present meeting.

At a meeting held in December, Mr. Siebold was re-appointed editor of the 'Year Book' for 1882. The manuscript of the forthcoming volume, so far as it can be completed up to this date, has been placed on the table. There remain to be added to it the Introduction, the Bibliographical section, the Transactions of the Conference at this meeting, and the Index.

Members will have observed that in the 'Year Book' for 1881 the various alterations and improvements alluded to in the last Report of your Committee have been carried out. A new section, "Bibliography," comprising titles of books, pamphlets, etc., on chemistry, botany, materia medica, pharmacy, and allied subjects, published between July 1, 1880, and June 30, 1881, has been added. The abstracts are somewhat more condensed than in former years and are more numerous, one of the lists of members—that in which the names were classified under those of the cities and towns in which they reside—has been omitted, and better paper has been employed. The issue of a general index has been postponed for financial reasons.

It being very desirable to enlist the sympathies and secure the friendly co-operation, in Conference matters, of colonial pharmacists as far as possible, steps have been taken to place the Blue List of subjects suggested for investigation in the hands of the principal pharmacists residing in some of the British Colonies. In carrying out this arrangement, the assistance of local Pharmaceutical Associations has been kindly afforded. Your Committee have already been informed of the distribution of the papers sent to Victoria, and twenty-one applications for membership have already been made in consequence.

Letters have been received from Mr. Bosisto, the President, and Mr. Shillinglaw, the Secretary of the Victoria Pharmacy Board, expressive of the cordial interest taken by them in the proceedings of the British Pharmaceutical Conference, and offering to distribute, at any time, Conference circulars free of cost.

One application only for a grant in aid of research has been made, that of Mr. Alfred H. Jackson, B.Sc., of Manchester, The sum of £10 has been placed at this gentleman's disposal for the purchase of materials wherewith to conduct an examination of the essential oils of cinnamon and cassia, with a view to discover some chemical or physical distinctions. Mr. Umney was good enough to undertake the distillation of these oils from the respective barks, thereby guaranteeing their purity, and Mr. Jackson will present a first report to the present meeting. Mr. Gerrard, to whom a grant was voted last year, has continued his investigations on the relative values of wild and cultivated belladonna, and on the activity of the various parts of the plant, and will furnish a further report.

Mr. H. G. Greenish, who was also the recipient of a grant last year to aid his investigation of the principles of *Nerium Oleander*, writes, "The publication of the results that I have hitherto obtained would probably lead only to confusion, as they involve the modification, to a certain extent, of statements made in a 'Preliminary Note,' published in the *Pharmaceutical Journal* some time since and are in themselves but incomplete." The reception of Mr. Greenish's report is therefore postponed.

Your Committee take the opportunity of again reminding members that there are funds ready to be placed at their disposal, to defray the cost of materials used in the investigation of subjects suitable for Conference Reports, and they cannot refrain from an expression of disappointment that so few avail themselves of this assistance.

Your Committee regret the loss of the valuable services of one of the Honorary General Secretaries. Mr. Carteighe, having been elected President of the Pharmaceutical Society of Great Britain, felt it to be his duty to that Society to resign the position as Secretary he held with us.

Mr. Sidney Plowman, F.C.S., having been asked by his fellow members of the Committee to act provisionally as an Honorary Secretary until an appointment could be made, has assented to do so.

Fifty-seven gentlemen have been elected members since the last annual meeting.

Mr. Ekin (Treasurer) read the statement of accounts for the past year, which is printed on page 169.

The President, in moving the adoption of the report, said he trusted the Conference would be satisfied with the work of the Committee during the year. He would remark, in reference to the small deficit which marked the operations for the year, that the Committee did not seek to save money; it desired to spend every penny received. In past years, more by accident than anything else, the Conference had accumulated £300 or £400, which was quite sufficient to stand between it and bankruptcy, and he should be quite satisfied if that amount remained to its credit. As to whether in any year there might be a deficiency of a few pounds, or an increase of a similar amount, need not cause much trouble. If anyone had any misgivings on this point, however, he might reflect with satisfaction that very shortly a post-office parcels post would be in operation, which would save at least 2*d.* per volume in the delivery of the 'Year-Book.' But when the Conference came to ask the registered chemists and druggists of the country who were not already members of the Conference to become so, he thought there would be such an increase of membership as would remove any possible difficulty there might be in the way of finance. With regard to the general index to the 'Year-Books,' to workers at pharmacy it would be a great advantage to have a general index to the whole of the volumes, and two years ago it was suggested that such a general index should be published. The Committee had considered the matter carefully, and were somewhat surprised to find that the production of such a work would cost a considerable sum, and just now they did not happen to have funds in hand for that purpose. He had no doubt that in the course of a year or two such funds would be forthcoming, and one of the first objects to which they would be applied would be the production of the general index.

Mr. W. D. Savage (Brighton) seconded the motion, which was then put and carried unanimously.

The Bell and Hills Fund Gift of Books.

Mr. Ekin said he was happy to be able to state that the Local Committee saw its way to accept the gift of books from the Bell and Hills Fund, and to make arrangements by which they would be available to all the chemists of Southampton. He regretted that it had not been decided a little earlier, so that the books might have been presented on the spot; but the selection had been made, and they would shortly be sent to Southampton.

Mr. Randall said the pharmacists of Southampton accepted this gift with very much pleasure and thankfulness, and they hoped it might lead some day to their having their own place in which to keep and use these books, and even to something beyond that. If it did, it would have done them considerable good, and he must say, in his opinion, the donors of this gift had done great good by giving such practical lessons in the value of a good library.

Mr. Sidney Plowman (General Secretary) then read the following letter from Professor P. W. Bedford, President of the American Pharmaceutical Association:—

"Professor John Attfield, Ph.D.,
"President,
"British Pharmaceutical Conference.

"Dear Sir,—Allow me to congratulate yourself and the Conference on the assured success of the coming meeting at Southampton, and to express my regret that I have to do by letter what I would far rather do in person. I had hoped that ere this I should have had the pleasure of attending one of the gatherings of the British Pharmaceutical Conference, but it is still one of the prospects of the future.

"I trust that in numbers it will be the largest meeting yet held; in papers, most numerous; in discussions, most profitable; in social pleasure, the most enjoyable.

"I recently forwarded to you proof sheets from the corrected plates of the first ninety-six pages of the text of the forthcoming U.S. Pharmacopœia; and, with this, I have the pleasure of sending the succeeding forty-eight pages; all that are as yet in presentable condition.

"It will serve to show yourself and friends of the British Pharmaceutical Conference, that it will be a work worthy of the labour bestowed upon it.

"It is the only copy that has gone outside our Committee, and I take pleasure in sending it to one that has honoured his own land by his worthy work in the cause of pharmacy, and in our own land is as well known by his scientific labours in our profession. Another tie exists: it is the remembrance of the practical sympathy and interest which years ago was extended to those of our profession who saw their College of Pharmacy vanish in the flames.

"The annual meeting of the American Pharmaceutical Association follows close after that of the Conference. I trust that it may be possible for us at that meeting to extend a cordial welcome to some of our fraternity from England.

"May the British Pharmaceutical Conference ever prosper, ever be an active promoter of the true welfare of our profession, and stand as an able exponent of the best talent of pharmacy in England.

"Very sincerely yours,
"P. W. Bedford,
"*President,*
"*American Pharmaceutical Association.*"

Letters expressing regret at not being able to be present had also been received from Mr. Richard

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30, 1882.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

Dr.	£	s.	d.
To Balance in hand	282	9	10
„ Sale of Year-Book by Publishers	26	6	8
„ Sale of Year-Book by Secretary	5	12	6
„ Advertisements, 1879 vol.	0	12	0
„ „ 1880 vol.	8	10	0
„ „ 1881 vol.	103	6	6
„ Subscriptions from Members	661	7	3
July, 1881. To Dividend on £250 Consols	3	13	5
1882.			
Jan. „ „ „	3	13	5
Feb. 15. To interest on deposit	3	5	4
	£1098	16	11

Cr.				£	s.	d.
By Expenses connected with Year-Book:—						
Printing, binding, and distributing	£467	0	0			
Editor's Salary	150	0	0			
Advertising and Publishers' charges	30	7	8			
Foreign Journals	3	19	0			
				651	6	8
„ Grants in aid of Research				20	1	11
„ Secretary's Salary				100	0	0
„ Printing and Stationery				37	12	2
„ Sundry Expenses				3	13	3
„ Postage				44	7	3
„ Expenses of York Meeting				18	7	4
„ Secretary's Expenses, York Meeting				6	0	0
„ Balance at Bank	£212	9	9			
„ Cash in Secretary's hands	4	18	7			
				217	8	4
				£1098	16	11

Assets July 1st, 1882		£	s.	d.
	Cash in hand	217	8	4
	Consols (stock)	250	0	0

THE BELL AND HILLS FUND.

Dr.	£	s.	d.
1881. To Balance in hand	25	9	10
July. To Dividend on £350 Consols	5	2	10
1882.			
Jan. „ „ „	5	2	10
	£35	15	6

Cr.	£	s.	d.
By purchase of Books for York	10	10	6
„ Balance at Bank	25	5	0
	£35	15	6

Assets July 1st, 1832		£	s.	d.
	Cash in hand	25	5	0
	Consols (stock)	350	0	0

Audited and found correct, { RICHARD DRESSER / JAMES SPEARING } *Auditors.*

Reynolds, late President of the Conference, Professor Bentley, Messrs. Siebold, Umney, Stanford, Proctor, Young, Taylor, Thresh, Kinninmont, Frazer, and others.

The PRESIDENT then delivered his address as follows:—

THE PRESIDENT'S ADDRESS.

Pharmacy, in every country, has high duties to perform towards the State. The humble handmaid of medicine, she has to aid in maintaining that greatest of physical blessings, health; to aid in restoring those from whom that blessing is temporarily withdrawn; and to aid in soothing the life of those to whom that blessing will never come again. From earth and sea, and the living things they foster, pharmacy draws forth drugs new and old, gives them convenient shape, and distributes them to the community. Ever conservative, she searches the whole globe for supplies of medicaments, well known, well tried, and reliable; ever progressive, she searches the realms of nature and the regions of art for new materials wherewith to aid in combating disease and death. And when she has found her *materia medica*, she is unwearied in elaborating them, and unremitting in her endeavours to place them—by her possibly too competitive and too varied agencies—at the door of every dwelling in the land. Exhaustive research, careful manufacture, thorough distribution: these are the means by which her duties are fulfilled.

Is pharmacy performing those duties with the maximum of efficiency, either in the world generally or in any country particularly? Can she better search, better elaborate, better distribute? Can she in any way better meet the public demands made upon her? Can she better serve mankind, either herself directly, or through the profession of medicine? Is she performing any one of her duties better in some countries than in certain others; and, if so, can the international agencies for the exchange of pharmaceutical information be improved in character or wisely increased in number? Is a community best served, in the matter of pharmacy, by a large number of distributors of elaborated drugs, only a few persons being manufacturers of the preparations; or by a smaller number of distributors, each of whom makes his own preparations? Can the followers of pharmacy show the civilized States of the world, or show the governing body of any one State, how legislative enactments, new or extended, will better enable her to perform her high duties?

These are vital questions—vital to the health and therefore to the happiness of society, vital to pharmacy.

They are questions which may well form the subject of an address on the present occasion to a non-political society of pharmacists—the British Pharmaceutical Conference. For with one exception, the last, which will only receive such a passing notice as previous presidents have given to politics, the questions lie outside the area of legislation and administration. Lying also, as they do, outside the area of that original pharmaceutical research, the promotion of which is the chief object of the Conference, their consideration will form an agreeable relief to our deliberations on more technical matters.

They are questions which should strike home to pharmacists as individuals. For does any follower of pharmacy desire to promote even his own sole interest? Let him remember that the better he performs the duties the public require him to do, and have put him amongst his drugs to do, the greater will be his personal success. Let him reflect that he is only one member of the pharmaceutical body, and that in the degree in which he contributes to the welfare of the whole body does he promote his own welfare. Let him never forget, in short, that in pharmacy, as in every other walk of life, the highest self-interest is to be found in the forgetting of self. The requirements of the public have called him into existence; the requirements of the public maintain him in his position; only in proportion as he meets the requirements of the public will he promote his own interests or raise either himself or his calling.

Collection; Preparation; Distribution.—We must glance at the present condition of the machinery with which we perform our pharmaceutical duties before we can usefully consider possible improvement.

Collection.—In searching for supplies of the old and well tried natural drugs, pharmacy presses into her service natives of many climes and traders of many nationalities. In growing those drugs more or less artificially, she employs thousands of workers in all countries. In making her more strictly artificial saline remedies, she contributes to the support, is often the chief and sometimes the only support, of the chemical industries of Europe and America. And in the exercise of her demands for new remedial agents, she looks to the original researches and discoveries of the traveller, the botanist, the zoologist, the mineralogist, the scientific chemist. Her followers themselves largely conduct original research and discovery; they also largely foster research and discovery by banding themselves into Societies, Associations and Conferences, for the initiation of original pharmaceutical research, for the payment of expenses incurred in research, and for the free publication of the results of research.

Preparation.—To manipulate raw drugs and to manufacture compounded drugs is perhaps pharmacy's most special duty, the work which gives to pharmacy a distinctive stamp amongst man's many vocations. For it is her peculiar art to find the fittest form in which the animal product, the medicinal plant, or the crude mineral shall most directly, easily, and even pleasantly it may be, do the work it is intended to do. From the plant, animal, or mineral which observation or more minute research has shown to have medicinal value, pharmacy must carefully, step by step, and constantly testing progress, eliminate what is valueless, until she is able to say that a simple aqueous infusion or decoction contains all the activity of the raw material. Perhaps she finds that the active matter is only removable by more spirituous fluids, and hence produces a "tincture." May be she proves that the aqueous or spirituous fluid, without harm and with some advantage, may, by the boiling away of the solvent, be concentrated to a soft solid or "extract." Possibly, after much labour, she obtains from the crude drug one or more of the actual principles in which reside its activity; extracting such an alkaloid as quinine, such a substance as salicin, such a body as citric acid, such a salt as cream of tartar. Whether she always extracts the active principle or not, she must ascertain its properties in order that its presence may at any time be verified, or perhaps its purity be demonstrated, and in order that she may avoid mixing antagonistic or incompatible drugs when she distributes compounded drugs to the public.

To accomplish this manufacturing or manipulative work, either all or some of the followers of pharmacy must possess extensive knowledge. They must have sufficient preliminary education and mental training to enable them intelligently to study the scientific books they will have to master, and to comprehend the principles on which their work is based. They must as pupils give a few years to the acquirement of *materia pharmaceutica*, in order that they may be familiar with the standard physical characters, the general medical qualities, and the commercial importance of the many hundreds, if not thousands, of elaborated materials or mixtures of materials which they desire, sooner or later, to prepare for themselves. They must have some knowledge of botany, as well as of animal and mineral products, or they will not be able to judge of the raw materials with which they will have to deal. They must have a fair knowledge of the natural forces and of mechanics, or they will not be able to convert the raw drugs into preparations having the maximum of medicinal activity and convenience of form or shape, with the minimum of unpleasant flavour, odour and appearance. They must have a considerable knowledge of chemistry to enable them to judge of the qualitative character of many drugs, and the quantitative character of most, the purity of the chemical substances which they purchase, the state of activity of preparations that have been long in stock, the compatibility or incompatibility of the components of mixtures they are called upon to prepare. A very large amount of such professional and commercial knowledge must be forthcoming somehow and somewhere from the pharmaceutical body for pharmacists rightly to do their duty to the State, as elaborators, or manufacturers, or compounders of drugs. Whether all pharmacists or only some should possess this knowledge, is a question yet to be discussed. The point up to which division of labour is desirable and beyond which it is undesirable, will be considered subsequently.

Distribution.—In every civilized State somebody must bring drugs within reasonable reach of every household. Very different agents perform this duty. There is, first, the pharmacist proper, who is not only a distributor but a manufacturer or compounder of the pharmaceutical preparations he distributes; the man who can warrant the purity and efficiency of every drug he distributes, either because he has tested it, or because he has made it himself from materials which his professional knowledge tells him to be trustworthy; the only pharmacist, therefore, who can offer a personal guarantee that the medicine prescribed by a physician will, as medicine, have the effect intended. There is next the druggist, who makes few, if any, compounds, trusting for their purity and efficiency to wholesale manufacturers, and who is able to test few, if any, of the articles supplied to him; but who has such experience of pharmacy as well fits him to supply a widespread demand for drugs—especially in suburbs of cities, and in the small towns and the villages of a country. Third in importance as a distributor of drugs, is the general practitioner of medicine, who, if he even has less knowledge of drugs than the druggist just alluded to, supplies an important demand, not only where pharmacists could do the work, but in outlying country districts remote from a druggist's shop of any kind. Fourthly, the distribution of drugs is effected, to some extent in the aggregate, in certain countries, by shopkeepers other than druggists; that is to say, by grocers, drapers, and such vendors, who admittedly know nothing about drugs, and who, except that they buy in bulk from the wholesale dealer or manufacturer, and retail in small quantity, sell the drugs in the state in which they are received. Lastly, drug distribution is, in certain countries, extensively accomplished by the agency of portable proprietary preparations termed "patent," though only so-called, now-a-days, in a *lucus a non lucendo* sense, the composition of most of them being a secret. These compounds pass from the producer to the consumer, either by the agency of the retail dealer, often but not always a pharmacist, or through the post-office. The maker of the patent medicines may or may not be a person having knowledge of drugs, and may not even reside in the country in which his articles are sold, therefore may not be legally responsible for any harm caused by their use or misuse.

The relative numbers of these five classes of drug distributors doubtless vary considerably in different countries, and probably cannot be ascertained for any one country. In Great Britain, for instance, there are some thirteen thousand registered "Chemists and Druggists," but how many of these are in business on their own account, and how many are assistants who have passed the qualifying examination, we do not know; nor do we know how many of those in business on their own account are mere vendors of drugs, and how many can give, respecting all their drugs, the personal guarantee of purity and efficiency already alluded to. There are twenty-three thousand registered practitioners of medicine in Great Britain and Ireland, but how many of them are direct distributors of medicines we do not know. What amounts of drugs are annually sold by grocers, drapers, and other non-pharmaceutical vendors we do not know. Patent medicine stamp duty to the amount of nearly £140,000 was paid into our Inland Revenue in the year ending March 31, 1881, which is equivalent to at least one million of pounds as the present annual payment by the public for secret remedies. But many proprietary medicines are not liable to stamp duty; so that the extent to which drugs are distributed in this way we do not quite know, though it is obviously very considerable.

Thus far the position of pharmacy in relation to the State has been defined, and an outline given of the means or method or machinery—partly haphazard, partly almost naturally evolved—by which pharmacy performs her State functions of collecting, elaborating, and distributing drugs.

Does this existing condition of pharmacy admit of improvement? If so, in what directions?

These are questions of great importance to the community. They are also of the highest importance for the pharmacist, both from the point of view of bounden duty to the State, and from that of obvious self-interest.

That the pharmacy of the present day admits of improvement will probably be admitted by the pharmacists of every State. What human institution does not? But respecting the directions in which improvements may be effected, the period at which they may be introduced, and the rate at which they may be carried out, there will be differences of opinion, especially as regards different States. The pharmacists of each separate nation must therefore separately discuss this question, at all events, as a preliminary step to international discussion at any future time. Our own discussion of the relation of pharmacy to the State will at present be carried on solely from the British standpoint.

Collection; Elaboration; Distribution.—Let us again in this order consider the general direction of possible improvements in our important and honourable State relations: our relations on the one hand to remedial agents, and on the other to our fellow-countrymen, who all, at one time or other, need remedial agents.

Collection, including, as already indicated, commercial investigations and original research.—The therapeutical importance of quinine and morphia have secured attention to the cultivation of the cinchona tree and the opium poppy; but for the vast majority of vegetable drugs, we still have to rely, as regards quality, on the somewhat capricious kindness of unaided nature, and as regards quantity and quality, too often on the good and bad consciences, and perhaps commercial cupidities, of more or less ignorant and irresponsible collectors. Why should not drug farms be more generally established, even in Great Britain? Is land required? Many food farms are being thrown out of cultivation in this country. Would farming other than food farming be likely to be remunerative? Flower farming and fruit farming are among the most lucrative callings in these islands. Could not some pharmaceutical body emulate the Royal Agricultural Society with its Woburn experimental farm? May we not hope that a Lawes will arise in pharmacy, who, founding a Rothamstead, will pioneer us towards the successful scientific cultivation of most of the medicinal plants? The area of pharmaceutical research, in the largest sense of that term, including improved modes of collecting as well as of investigating drugs, could be extended by the State, by societies, and by individuals. But State aid to research of any kind is almost necessarily accompanied by State control, and some peoples are impatient of control, and do their duties to their calling and to the public with the maximum of efficiency in an atmosphere of freedom. State aid in carrying on research in pharmacy would probably be less effective than internal effort, hence improvement in pharmaceutical research by such aid is scarcely to be expected. Internal effort to improve and extend pharmaceutical research may come from societies and from individuals. And already in Great Britain the Pharmaceutical Society and the Pharmaceutical Conference have given good aid to research, especially in affording opportunities for individuals in pharmacy to bring their researches before their fellow pharmacists, to publish researches without expense, and in the case of the Conference to carry on researches at diminished expense. But any really comprehensive scheme of aid to research by societies, as societies, needs far more ample funds than those at the disposal of the bodies just named; and the source of such funds is not obvious so long as two-thirds of the pharmacists of the country stand aloof from the other third in all matters pertaining to the general pharmaceutical welfare, withholding even that small annual subscription which, contributed by the many, would allow of so much good in many directions being accomplished. In the matter of pharmaceutical research by individuals, English pharmacists, even with the limited aid of the Pharmaceutical Society or the Pharmaceutical Conference, are holding their own, let us hope, but not much more. Such men as a Deane, a Morson, or a Squire need no incentive. Force of character and love of truth for its own sake have always and will always bring a few such men to the front, but we can never hope to see many there. The educational endeavours at the headquarters of the Pharmaceutical Society during the past forty years have always included efforts in the direction of the encouragement of research, and associations of students and assistants for the prosecution of investigations, more or less original, have been the immediate outcome, a subsequent result being the enleavening spread of active workers at original research, and men having sympathy with original research, throughout the whole country. The introduction of compulsory examination into British pharmacy in 1868 was expected to result, *inter alia*, in such an impetus to education as would carry large numbers of young pharmacists into the region of original investigation. That such an impulse has not resulted, that the cause of the failure has been detected, and that a remedy has been found and is to be applied forthwith, are now matters of history. Soon again will every young pharmacist in this country have such opportunities for acquiring sound pharmaceutical education as will start him fairly on the road to research; and we may reasonably expect that a certain proportion will continue to travel along that grand highway. Sooner or later, therefore Great Britain, let us hope, will be not only abreast, but ahead, of other countries in the matter of pharmaceutical discovery; that is to say, in the matter of a more extended and trustworthy *materia medica.*

In the matter of the improved collection of drugs, therefore, including the development of the maximum activity of medicinal plants and general control over their growth, and including the prosecution of those branches of original research which shall extend the number and the definiteness of drugs, there is room for great improvement in English pharmacy.

Elaboration.—Is a State best served, as regards pharmacy, by a large number of distributors of elaborated drugs, only a few persons being manufacturers of the preparations, or by, probably, a smaller number of distributors, each however making his own preparations? "A smaller number," because, in any calling, the greater the skill, knowledge, and intelligence of its followers, the greater their reasonable expectations of remuneration, and therefore the fewer that can be supported by the community. Now, in Great Britain, unquestionably, the tendency—at all events during the past fifty years—has been for fewer and fewer of the distributors of drugs to manufacture their own medicinal preparations, the retailer relying for these more and more on wholesale manufacturers. Is this practice likely to promote the interests either of the public or of the pharmacist himself? In dealing with a druggist for drugs, simple or compound, the public expect to be served with what is trustworthy. The vendor is a "chemist" as well as a druggist; therefore, presumably, he can chemically verify the trustworthiness of those of his drugs which have chemically definite characters. But he is a "druggist" as well as a chemist; therefore, presumably, he can guarantee the trustworthiness of his non-chemical drugs and drug-compounds. How can he do this if he has not himself prepared those compounds? For they cannot be assayed chemically. Nay, if he has not himself made them from the raw drugs, and thus by long acquaintance with the latter become thoroughly familiar with them, and a thorough judge of their character, how can he guarantee the quality even of what few drugs he may sell in the raw state? Further, if a druggist has not made his own preparations, and has not tested those he purchases—either because he himself cannot test them, or because they are beyond the grasp of chemical analysis,—is he one whit the superior in pharmacy to his neighbour, the medical practitioner? Possibly both purchase their compounds of the same wholesale dealer. And if such a *soi-disant* druggist is not more of a druggist than the medical practitioner, where is the foundation for the hope that the medical practitioner will some day turn over all his medicine-making to the pharmacist?

Again, if the druggist is only a distributor and not a compounder or elaborator or manufacturer of drugs, has he much more claim to be even a distributor than a grocer or any other trader who buys or distributes drugs? Is the State much better served by one of these distributors than by the other? Let there be no misunderstanding here. The cry of "drugs for the druggist" is a good and wise cry, but only when founded on the druggist's knowledge of drugs, and on his personal guarantee of their efficiency,—a guarantee founded, as before stated, on his having either made or tested all, or practically all, of his preparations. If he merely buys and sells his preparations, without such personal knowledge, he cuts his own professional platform from beneath his feet. Having taken up the ground of a mere trader, can he wonder if other more astute traders beat him on that ground. Neglecting what ought to be his own cherished art of elaborating or compounding his preparations, can he wonder if he has to relinquish that remuneration, those profits, which were born of the times when the druggist was such a manufacturer,—profits which are still enjoyed by those who do so manufacture. Relinquish them he must if he deliberately labours on the lines of mere trade. In these days of over-population and, consequently, keen competition, no other result can ensue. It is a case of reaping what is sown. And the sooner such a man realizes his position and adds to his trade the trades of those who otherwise will supplant him, the sooner will he be saved from ruin. This differentiation between trading retail druggists and manufacturing retail druggists is already going on. Afterwards there will be another. Some day what remains of the trading retail druggist's trade in drugs will flow away from him to the counter of the manufacturing retail druggist, even though the latter be charging higher prices; for in proportion as purchasers find they cannot judge for themselves, they will go to those who can judge for them. Then if the trader has cultivated other trades, he will have them to fall back upon. Fortunately, in the long run the fittest must survive: the fittest tradesman who is only a tradesman, and the fittest pharmacist who is a tradesman and a professional man too. Does the pharmaceutical apprentice of to-day desire future pharmaceutical success? Let him master the principles of his art. Let him practically learn how, by the aid of chemistry and botany, to test the quality of most of the articles he works with, and how to manufacture what cannot be tested.

Broadly, as a matter of self-interest and sound policy, the preparation of medicinal compounds by a few druggists only, and their mere distribution by the many, is a practice to be deprecated. Clearly, too, it is to the interest of the public that every druggist should be really, as well as nominally, a druggist,—a man who either tests or manufactures every one of his own preparations. All efforts to secure future drug dealing and drug-working to druggists must be founded on personal professional knowledge possessed by every pharmacist. A medical practitioner purchasing drugs at all will surely prefer to obtain them from the neighbouring druggist rather than from a distant source, if he knows that the druggist can give the guarantee of genuineness that he himself cannot provide, and if they can be obtained at a reasonable price. May he not in many cases go further, and give up dispensing bodily, if in the matter of trustworthiness of materials the druggist can beat him, and if, of course, neither he nor his patient suffer too severely in pocket? For the practitioner will thus get that personal guarantee which should be the druggist's most treasured possession, a guarantee which must, in the nature of things, be stronger when afforded by a neighbour than when offered by the distant dealer, especially when in the latter case it is only afforded at second hand by a price list or a traveller. Contrast the value of the guarantee of a retailer who is also a maker, with that of a druggist who can only trust to the respectability of a maker separated from him by two or three different agents and by scores or hundreds, if not thousands, of miles. Some preparations will doubtless always be better made by one man than by another, or by few persons rather than by many. Let us do nothing to damp the ardour of discoverers, inventors, or originators, in great things or in small. And let us always welcome to our shores anything of excellence that may be offered to us by other countries. But if pharmacy has anything to do with the health and welfare of a State, and if that health and welfare are affected by the personal skill, knowledge, and ability of the pharmacist, let us avoid those false but specious principles, and those false and more specious practices, which would sink pharmacists to the level of mere traders, mere dealers, mere agents, worthy and honourable enough in their sphere though such men might be.

In the matter, then, of the elaboration of drugs by all druggists, as against elaboration by a few druggists and distribution by the many, there is room for great improvement in English pharmacy; for it would be idle to deny that the preparation of his own compounds is the exception rather than the rule with the British pharmacist. No doubt druggists who are manufacturers as well as retailers of the preparations on their shelves may readily enough be found; but it is a fact that many druggists scarcely make even their own pills, but purchase them of wholesale makers (or even only of dealers) who reside, it may be, in quite another county, possibly in another country or in another continent altogether. What can such a druggist know of the quality of such articles? He urges the respectability of their maker. But how much can he know of the characters of makers separated from him by an ocean? After a time prominent makers may be severely pressed by more obscure manufacturers, and he may be dealing with some of the latter, whose probity, with a sense of responsibility naturally diminished by distance, may have given way. In purchasing preparations cheaper, as such a druggist thinks, than he can make them himself, and, still sadder to say, perhaps better looking, is he not buying pottage with the coinage of birthrights? Is he not dealing disastrously with his own interests, and with those of the State, in which he is after all but a steward?

Into the question of improvements in the elaboration of particular drugs it is not desirable now to enter; first, because it is dealt with in the list of subjects for research annually issued by the British Pharmaceutical Conference; secondly, because the spirit of emulation will not permit it to pass out of sight; and, thirdly, because it would be unwise to dwarf the importance of the main question just considered.

Distribution.—Given a body of pharmacists, each member of which can, respecting his drugs and drug compounds, supply either the analytical or the synthetical guarantee of efficiency and trustworthiness, then a State is best served by drug distribution being limited, on the whole, to such a body. Limited as a rule. For just as some drug compounds will probably always best be prepared by the few and distributed by the many, so the distribution of drugs to dwellings remote from towns will probably always have to be accomplished by mere distributors. The main limitation of drug supply to the public should, however, be to qualified druggists—men who prepare as well as distribute. The public in a sparsely populated district might purchase drugs of a mere distributor rather than do without them, especially if the real manufacturer were not far off, and whose personal guarantee were available at the cost of a long walk or a drive, or a short railway journey—just as the services of a solicitor's confidential clerk, or of a medical practitioner's assistant, will be accepted in the absence of those of the principal. Bearing in mind, however, the importance in pharmacy of the influence of the personal guarantee, and that this influence becomes weaker and weaker the more it is stretched, the distribution of drugs should, obviously, in the interests of the public and of pharmacy itself be confined, as a rule, to those who can afford such a personal guarantee—to those who, let me reiterate, either compound or test every drug they distribute. In the matter of pharmacy a State will, year by year, be better and better served to the extent to which there obtains a pharmaceutical policy that provides for the growth, not of those already named as mere distributors of drugs, but of druggists who are manufacturers and distributors too.

The third-named agent of drug distribution, the medical practitioner, cannot be, and probably never desires to be, a competent pharmacist. He has never professed to be anything more than a distributor of drugs, and as year by year the demands upon his medical, surgical and sanitary skill become, as they do, greater and greater, he will probably find his pecuniary interests, his tastes, and his aspirations for social position, prompting him to relinquish drug distribution altogether. Let pharmacists take care previously to prepare themselves for the work that will then fall into their hands; for whatever be the period when such a state of things comes to pass, it will be the outcome of a public demand for more and better work all round, from the pharmaceutical as well as from the medical practitioner; nay, the period of the demand will be greatly accelerated by the promise and power of the potential supply. Doubtless the country doctor will always carry, or hold himself ready to carry, in his pocket, his saddle-bag, or his carriage, agents which heal as well as agents which hurt, agents to inject into the flesh as well as those with which it may be incised, agents in the form of the soothing pill or the stimulating spirit. But for the compounding of even these he will look to the pharmacist proper, who with due and dignified responsibility will be near at hand to supply fresh and trustworthy fluids, convenient combinations, and palatable preparations, and who will receive adequate but not extravagant remuneration.

Respecting the distribution of drugs by retail vendors other than competent and trustworthy druggists, it is open to very serious question whether a State does not get more harm than good by such a practice. Such vendors can offer no personal guarantee either of the purity or the efficiency of their drugs. The practice may perhaps be tolerated for a time in a country where the machinery for the supply of druggists who are compounders as well as distributors is incomplete. But in a State in which all the druggists are competent for their work, the supply of medicinal agents by vendors other than druggists should only be permitted in districts where population is below a given number per square mile, and then only in unbroken packets supplied by a not far distant registered and responsible pharmacist. With non-pharmaceutical vendors of drugs must be classed co-operative stores. For personal responsibility respecting either raw or compounded drugs is scarcely compatible with the co-operative system. The companies who own co-operative stores do not make their own drug compounds. They are mere distributors. They could not well do or be anything else. At first sight it would appear that such an undesirable condition of things for the welfare of the public might be remedied by the employment at such stores of a staff of properly qualified pharmacists; men who could not only discriminate between good and bad raw drugs, but who could and would test all supplied drugs admitting of assay, and who could guarantee the quality of all other preparations because they had made them. There is, however, a good reason why such a remedy could not work, for then the cost of, and hence the prices charged for, dispensing prescriptions would necessarily be pretty much those of ordinary retail shops, and the inducement for the public to deal at stores rather than at shops would cease. Besides, long before such a remedy can be applied, society will probably find that money saved at co-operative stores, having to be expended in those rates and taxes, and in those many services now paid for by shopkeepers, there will be a balance of State advantages in leaving trade to the trader, and certainly in leaving the half-trade, half-profession of pharmacy to the pharmacist.

Respecting the distribution of drugs in the form of proprietary preparations, especially those called patent medicines. The question here must be not so much what improvements can be effected in this mode of distributing drugs to the inhabitants of a country, as, can the inexorable demand for simple medicinal remedies by the public be supplied in any better form than that of patent medicines. For the demand for simple remedies by all persons, and the habit of prescribing simple remedies by all persons for themselves, or for one another, are matters which always have lain outside, and always will lie outside, medical practice by professional men, a demand and a habit the source of which lies deep down among the springs of human nature, and of the common sense of free people. They therefore scarcely admit of criticism, and do not admit of carping, cavilling objection. The demand and the habit exist naturally in this country, and must be dealt with wisely. They scarcely admit even of definition, or of the drawing of any line up to which they may go, and beyond which they may not go. This much would seem certain, however, that if a mother for a child or a friend for a friend may prescribe a remedy which has proved serviceable under similar circumstances, surely a druggist, who is daily dealing with remedies from year's end to year's end, may prescribe simple remedies too. If one druggist will not do so, we may be quite sure another will; and that to the extent to which druggists generally do not or cannot prescribe simple remedies, to that extent patent medicine owners will step in and supply the irrepressible demand. Some medical men decry the habit of prescribing by druggists; but is the demand for simple remedies by channels other than the medical man's prescription thereby curtailed? Probably not. On the other hand, do not such medical men, and those druggists who from various motives follow the medical lead, thereby play directly into the hands of the proprietors of patent medicines? In the United States the practice of medicine is largely separated, and most wisely separated, from the practice of pharmacy. But besides this, the open recommendation of simple remedies by druggists is discouraged. With what result? In no country is traffic in secret remedies more rife. It is of course wrong for the pharmacist to meddle with pathology, attempting to diagnose while knowing nothing about the human frame. I trust no one will construe what I have said into support of quackery. But whenever and wherever a druggist is free to sell a patent medicine, he surely should be free to sell and be able to sell a simple remedy prepared by himself, by the aid of that special pharmaceutical knowledge and skill which are the guarantee that he is something more than a mere drug distributor. The inability to recommend remedies characteristic of the mere seller of drugs, and the professional jealousy which would stop a qualified pharmacist from recommending them, have probably done more to foster the present enormous demand for secret remedies than all other causes put together. The reduction of what is sometimes termed the patent medicine evil will probably be effected, chiefly, by that gradual extension of pharmaceutical knowledge amongst our future pharmacists, which will enable them to supply from their own shelves simple remedies for those tiresome minor maladies for which the public are now driven to patent medicines. The druggist who in this country prescribes simple remedies is a man who has been called into existence by the wants of the community; a useful servant, whom the public are too mindful of their interests ever to discharge. Society distinguishes clearly enough for all practical purposes between this man and the medical practitioner, and well may be left to seek the aid of one or other as required.

For improvement in drug distribution, therefore, we may reasonably look in two directions. First, in the distribution of drugs being limited, in the main, sooner or later, and of course without injuring any one, to druggists, such druggists being compounders as well as distributors of the drugs with which they deal. This will be brought about internally by education, externally by legislation. Internally by the carrying out of that policy to which pharmacists may now be said to be committed, and which may be summed up in the words sound and thorough compulsory pharmaceutical education; externally by appropriate legislative enactments. Improvement will result, secondly, in our having in the place of secret remedies, which are prescribed by persons at a distance, who are irresponsible, the open recommendation of simple remedies by pharmacists who have made the components themselves, and who can guarantee their trustworthiness. This too will be brought about gradually by improved pharmaceutical education, and by that only. It would be unwise to provide for pharmacists any modified medical education. Let there be no pretence of professional medical treatment mixed up with pharmacy. Let the druggist's recommendation of simple remedies be founded on that knowledge and experience which comes of much pharmaceutical familiarity with remedies, and on that common sense and perception in all that pertains to drugs, with which a properly and specially educated pharmacist may be credited. Indeed, any trespassing on the purely medical domain would necessarily sooner or later involve commensurate punishment.

Pharmaceutical Legislation. The old partnership of *Chemists and Druggists. Pharmaceutical Organization.*—A few words must be added on each of these subjects.

Legislation.—As regards legislative enactments that will enable pharmacy better to perform her duties to the State, they must always be of two kinds—each complementary to the other. First, those designed for the well-being of the public; second those which provide for the well-being of the pharmacist. It is to the interest both of the public and the druggist that the sale of poisons should be restricted, it is to the interest of both that the sale of compounded drugs should be restricted. For a State to assert that druggists must be qualified is only, in other words, to proclaim that drugs should not be sold by unqualified persons: the one proposition is involved in the other. It is law that the British druggist must be qualified. The health and welfare of the community has called this law into existence. Why? Because the health and welfare of the community are endangered if this dealer in drugs is not qualified. To this end the law has labelled him alone "chemist and druggist." From this point of view a Pharmacy Act which provides for the qualification of drug vendors without rendering penal the vending of drugs by unqualified persons is simply incomplete. It is no answer to this argument to say that the State, by protecting the title "chemist and druggist," has only adopted means for the proper supply of drugs to those of the public who cannot judge for themselves, and who desire State guidance, and that to go farther than this would be to interfere with freedom. *Caveat emptor* does not apply here, however good the judgment for other things may be. For no ordinary purchaser is able to judge of drugs. It is too bad to expect him even to judge of the qualifications of the vendor solely by the presence or absence of the words "chemist and druggist" in connection with the shop, for the time-honoured coloured show-bottle and a display of senna, rhubarb, etc., forms the commoner test. To provide for the well-being of the public who cannot judge of drugs for themselves something more than the test of title should be allowed. But in truth no such indirect mode of providing the public with qualified druggists will suffice for the public welfare. The only way in which the welfare of the public, so far as it is affected by drugs, can be provided for, and harm to the public, as far as it may come from drugs, be provided against, is not only to enact that druggists must be qualified, but that drugs must not be sold by unqualified persons. This is already enacted for a certain small number of drugs named in a schedule to the Pharmacy Act of 1868, and deemed poisons. So far so good. But all drugs are, more or less, poisons. The sale of all drugs should be thus restricted. If there are any substances sometimes used as drugs, but so harmless, and so generally used for other purposes, that to restrict their sale would be inconvenient to the public, let such drugs alone be scheduled as those which may be sold by unqualified persons. A Pharmacy Act which provides for the qualification of vendors of drugs, but contains no clause preventing the sale of drugs by unqualified persons, is incomplete. And if our own Pharmacy Acts are thus incomplete, the sooner they are rendered complete by an extended Pharmacy Act, the better for the State, the pharmacist, and the public. To get our legislature to take an interest in this matter, and to view it in its proper bearings, should be the only difficulty in the way of obtaining legislative enactments which will better enable British pharmacy to perform her duties to the State. This is no mere matter of class legislation, but a subject of considerable national importance. Let us only take care that the thoroughness of our pharmaceutical education fully demands or warrants such legislation, which it will do when founded not alone on that very inefficient test termed "a pass examination," but also on a properly arranged public curriculum diligently followed for an appropriate period.

Chemists and Druggists.—An address on the relation of pharmacy to the State should include, at all events in Great Britain, some allusion to that part of the implied duty of a pharmacist to his country covered by his use of the designation or title of "chemist." The English pharmacist is a "chemist and druggist." From what has already been stated, it will be clear that the proper standard as regards such a "chemist," is that of a man who is not only a vendor of chemical substances, but who has sufficient professional knowledge of chemistry to enable him to guarantee analytically every one of his drugs and chemical substances that admits of chemical assay. And there are large numbers of pharmacists in this country who can do all this and more. But does the average chemist and druggist of to-day come up to this standard? Is he even a general trading *chemist?* Is he not rather a man who has left to the oilman and the grocer the vending of "soda" and other alkalies, vinegar and other acids, delicate mineral and vegetable dyes and colouring matters, and hosts of such "chemicals," as they are termed; a man who, while calling himself and legally appropriating to himself the title of "chemist," has through his ignorance of chemical substances, allowed chemists, who dare not call themselves chemists, to establish shops for the sale of photographic and other chemicals, and chemical and physical apparatus generally; a man who, through being unable to perform such simple chemical operations as the testing of a fluid excretion for albumen or sugar, has driven from his doors the physic-taking patient afflicted with diseases of the albumenoid or saccharoid type; and a man who has committed these sins of omission, not always because his time was wholly occupied with the pursuit of pure pharmacy. Can such "chemists and druggists" wonder that their calling is declining in this country, when even for chemical guarantees of the genuineness of their goods they must rely on the distant wholesale manufacturer, and for the pharmaceutical attractiveness of prettily coated pills, they find it necessary to go to the other side of the Atlantic? Will the rising generation of pharmacists allow this state of things to continue? No doubt a great deal of the work of the pharmacist of fifty or one hundred years ago has gone never to return, but a vast amount of new work has taken the place of the old. Chemistry is progressing with a rapidity unexampled in the annals of man's avocations. The trade in the materials and apparatus for the study and the practice of chemistry by amateurs, professional men, and manufacturers, is extending year by year. Will trading "chemists" allow this chemist's trade to slip through their hands? At no previous period in the history of this country has the subject of purity of food, drink, drugs, and all other things, occupied so much attention as at present. Never was there a greater demand on the part of the public, not for direct analysis at the request of ordinary purchasers by officials under the Acts relating to adulteration—that Parliamentary scheme (Act of 1875, section 12) has entirely failed—but for the personal guarantees of vendors that articles sold are what they are professed to be. Who so well able to give this guarantee as the "chemist and druggist" who is a chemist as well as a druggist. Such a chemist will extend his trade over the whole commercial area of chemistry, as well as draw to himself those pharmaceutical streams now flowing in channels uncontrolled by pharmacists. There is also minor professional work to be done by the "chemist" in such directions as those already indicated; work chiefly qualitative, and for which the chemist and druggist would perhaps only receive silver fees, but for which he would be remunerated over and over again in the confidence reposed in him by his customers, and by the medical practitioners of the neighbourhood, and in the prestige and status it would win for him.

Organization.—A word respecting organization amongst pharmacists. Organization, in the absence of which any consideration of improvements in the modes of collecting, elaborating, or distributing drugs would be little more than a dream. Organization, without which the duties of chemists and druggists to the State will only be performed in an incomplete and haphazard manner, and without which their own interests will be developed or maintained very imperfectly if at all. Such organization—the work of a generation of philo-pharmaceutic pioneers—exists already in this country as regards about one-third of the chemists and druggists. Had the other two-thirds responded to the general appeals made by their brethren more than once during the past forty odd years, it is safe to aver that not only would the State at this moment be better served by pharmacy, but every pharmacist would be richer in pocket, richer in social position, richer in self-respect. Even now, were the advantages of union and a pathway to union brought home to every pharmacist—which could be well done now that we have a complete Register—there can be little doubt that nearly every druggist having any really important stake in pharmacy would join in forming a Pharmaceutical Society of Great Britain co-extensive with British pharmacy. It would be astonishing, indeed, if after such a special appeal any very large proportion of the druggists in the country were found to care so little for the welfare either of themselves or of the community, or to perceive that welfare so imperfectly, as to hold aloof from such an organization. But our chief hope must rest with our pupils and young men. Cannot some plan be carried out by which all future pharmacists shall become members of one great national society?

Conclusion.—In the course of this address on an aspect of pharmacy complementary to the political, an attempt has been made to set forth the duties of pharmacy to the State in obtaining, elaborating, and distributing drugs; suggestions have been offered by which pharmacy may better perform these duties; hopes thrown out respecting the duty of the State to pharmacy, though this, being a political question, has only been glanced at; and for the thoroughly qualified chemists and druggists of Great Britain generally, a brighter future foreshadowed than might at first sight be anticipated. Amongst the body there are large numbers who can well hold their own with the pharmacists of any country in the world, whether as followers of pure pharmacy or as "chemists" as well as "druggists." All that these are now, the rising generation of pharmacists should strive to become. With a thoroughly united, thoroughly educated, body of pharmacists, in number properly proportionate to the population of the country, each pharmacist a unit in one great society of pharmacists, we may confidently predict for no very distant future a relationship between pharmacy and the State which shall be permanently beneficial to all concerned. We too

" . . . rest in faith
That man's perfection is the crowning flower,
Toward which the urgent sap in life's great tree
Is pressing,—seen in puny blossoms now,
But in the world's great morrows to expand
With broadest petal and with deepest glow."

Mr. Chipperfield said the gentlemen present had all listened with much attention and gratification to the eloquent address just given; an address eminently practical and full of interest both to pharmacists and the general public; and he would fain hope that at least some benefit to the general public might be the outcome of its publication. It had always seemed to him an anomaly and a glaring injustice that while the pharmacist of the present day was bound to acquire an excellent education and to submit himself to a stringent examination he had no legal safeguard and possessed no special privileges in carrying on his vocation. The mere scheduling of a certain number of poisons, and he alone having the right to vend them, was virtually no protection or benefit to him or to the public, and nothing more incontrovertible was ever uttered than the proposition that a Pharmacy Act which provided for the qualification of the legal vendors of drugs, but contained no clause preventing their sale by unqualified persons, was incomplete, it being lame and impotent in the extreme. The great difficulty to his mind hitherto had been to see how persons living in rural and sparsely populated places were to obtain the necessary medicines if only legally qualified pharmacists might vend them; but the suggestion make by the President that unqualified persons should be permitted to supply the consumer with such medicines only in sealed packets supplied by qualified pharmacists completely destroyed that difficulty. It was his pleasure and privilege to propose that a hearty vote of thanks be recorded to the President for his very admirable, eloquent and practical address.

Mr. O. R. Dawson had much pleasure in seconding the vote of thanks. He was quite sure the words uttered that morning would be read by all English-speaking pharmacists with a great deal of pleasure; he hoped that what the President had foreshadowed with regard to legislation would be embodied in the Pharmacy Bill which he hoped it would soon be the duty of the Council to introduce.

Dr. Quinlan wished to say a few words in support of the motion. The address presented a great number of subjects which gave rise to a great deal of reflection, both on the part of the medical profession and also of the pharmacist, for he considered that the interests of these two great callings were inseparable. He had been much struck with the remarks about the collection of drugs, for nothing could be more unsatisfactory in many ways than the manner in which this was now conducted. In fact, it resembled the vicious system of merely asking a candidate what he knew, without any reference to where he had been educated. At present they had to take drugs collected by anybody, and depend on the commercial conscience for their purity, and, with all due respect for that commercial conscience, he might say that anyone who had occasion, as he had, to go through large samples and quantities of drugs, would be convinced of its extreme elasticity. He thought the suggestion made as to the establishment of pharmaceutical gardens was a very good one; they would require a good deal of trouble and skill to be brought to bear, but they would certainly pay. With regard to the practicability there could be no doubt; in the botanic gardens a great number of plants were grown on a small scale, and if a small bed of plants could be grown for the instruction of students, why should not two or three acres be cultivated? The greater certainly included the less. The distribution of drugs was a great difficulty. He had been convinced by long experience that there must be a hard and fast line of separation between the prescribing and compounding of drugs; he believed the two duties must be performed by two entirely distinct classes of persons. There was only one exception to that, and that was in thinly populated districts which would not support a pharmaceutical chemist; there the travelling physician or surgeon, who went thirty, forty, or sixty miles a day, would have to carry about his own drugs, but there was nothing to prevent his getting them from a practical pharmaceutical chemist, who would be able to guarantee their purity either by manufacturing or testing them himself. With regard to the manufacture, there was no doubt that there were some substances which could not be made with economy, except on a large scale; but there was a day within the memory of living men, when the bulk of pharmacists made their own preparations. Those happy days when concentrated infusions and such like things were entirely unknown had gone, and he much wished they would return, and that pharmacists would make their own preparations with the exception of elaborate chemical compounds. He had listened with the deepest regret to the statement that nearly a million a year was spent on patent medicines. People were very fond of dosing themselves, and they would ask for these things, but, in his opinion, a great deal of the blame lay with doctors and chemists, who should endeavour to diffuse truer notions amongst the masses, for it could not be very difficult to persuade them that one article could not cure thirty or forty different complaints; and gradually he hoped they might be able to educate patent medicines off the face of the earth. In conclusion, he alluded to the fact that the Royal University in Ireland required from all candidates for a medical or surgical degree a course of practical compounding and of pharmacy, and it required that this should take place in some regular pharmacy, not in a hospital or dispensary. He thought it extremely important that members of the Irish Pharmaceutical Society should see that they were not left out in the cold with regard to granting these certificates, which he considered they were as much entitled to do as the Irish apothecary. He believed the privilege could be obtained by simply asking for it.

Mr. Hampson wished to thank the President for his very able address, but he feared the hope he had thrown out of getting so much State aid was rather illusory; at all events they might hope, however, to have at some future day the dispensing of medicine protected by the State, and that would be a great step in advance. He must say he had more faith in the good results of educating the people themselves that in anything which was done by the State. When the public became more enlightened on these matters it would go to the best men it could find in the trade or profession, and until that came about he feared there would not be any great change. In London he feared that instead of making any advance in the way of getting the dispensing of prescriptions, they were rather going backwards; the medical man seemed to look for his profit to the retailing of medicine and giving it in the cheapest possible form.

Mr. ATKINS wished to add his testimony to the value of the address. Professor Attfield had paid a high compliment to the Pharmaceutical Conference in preparing so thoughtful and admirable an address, and the highest compliment those present could pay it in return would be not to attempt to criticize it in detail, but rather to peruse it carefully, and form their conclusions upon it. It had been his privilege to listen to many presidential addresses, but he did not know that he had listened to one which appeared so suggestive and likely to evoke a very large amount of controversy. The very highest tribute which could be paid to it was that it would bring out the points of difference in the pharmaceutical world. The division of the subject was admirable—collection, preparation and distribution were three points which could be at once fixed in the mind. He thought the suggestion of drug farms in this country a very happy one; it might be merely visionary, but he hoped it would prove to be practical, and that it would become practicable to produce on a large scale anything which the climate would admit. He hardly agreed with Professor Attfield as to the necessity or desirability of every chemist making all his own preparations. He quite agreed with him that the knowledge requisite to do it ought to be there, but it seemed to him the tendency of the age was rather to produce the best article under the most perfect conditions, such as could only be attained in large manufactories where there were the best appliances and the most complete division of labour. Still he thoroughly agreed that the knowledge requisite to produce all these preparations ought to be possessed by pharmacists, and if they did not all possess it now, it should be their earnest aim that their sons and successors should possess it.

Professor TICHBORNE also desired to express the pleasure with which he had listened to the address, and remarked that the subject referred to by Dr. Quinlan had engaged the attention of the Council of the Irish Pharmaceutical Society at its last meeting, and measures were being taken to secure if possible that the education of the pharmacist in Ireland should be available for conferring the qualification in the compounding of drugs required of medical men.

The vote of thanks was then put by Mr. GROVES, and carried unanimously.

The PRESIDENT, in response, thanked the meeting for the resolution. He said he had endeavoured, in the words of his predecessor, to give a good, straight look at things as they were, and he had also endeavoured to give a common-sense view of things as they should be. What he had said he simply put forward as his own opinions, and he had been abundantly compensated for any trouble he had taken in preparing the address by the manner in which it had been received.

(To be continued.)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The meeting of the above Association commenced on Wednesday, August 23, at Southampton, under the Presidency of C. William Siemens, D.C.L. (Oxon.), LL.D. (Glasc. and Dubl.), Ph.D., F.R.S., F.C.S., Member Inst. C.E., who delivered the following opening address:—

THE PRESIDENT'S ADDRESS.

In venturing to address the British Association from this chair, I feel that I have taken upon myself a task involving very serious responsibility. The Association has for half a century fulfilled the important mission of drawing together, once every year, scientists from all parts of the country for the purpose of discussing questions of mutual interest, and of cultivating those personal relations which aid so powerfully in harmonizing views, and in stimulating concerted action for the advancement of science.

A sad event casts a shadow over our gathering. While still mourning the irreparable loss science has sustained in the person of Charles Darwin, whose bold conceptions, patient labour, and genial mind made him almost a type of unsurpassed excellence, telegraphic news reached Cambridge, just a month ago, to the effect that our Honorary Secretary, Professor F. M. Balfour, had lost his life during an attempted ascent of the Aiguille Blanche de Penteret. Although only thirty years of age, few men have won distinction so rapidly and so deservedly. After attending the lectures of Michael Foster, he completed his studies of biology under Dr. Anton Dohrn at the Zoological Station of Naples in 1875. In 1878 he was elected a Fellow, and in November last a member of Council of the Royal Society, when he was also awarded one of the Royal Medals for his embryological researches. Within a short interval of time Glasgow University conferred on him their honorary degree of LL.D., he was elected President of the Cambridge Philosophical Society, and after having declined very tempting offers from the Universities of Oxford and Edinburgh, he accepted a professorship of Animal Morphology created for him by his own University. Few men could have borne without hurt such a stream of honourable distinctions, but in young Balfour genius and independence of thought were happily blended with industry and personal modesty; these won for him the friendship, esteem, and admiration of all who knew him.

Since the days of the first meeting of this Association in York in 1831, great changes have taken place in the means at our disposal for exchanging views, either personally or through the medium of type. The creation of the railway system has enabled congenial minds to attend frequent meetings of those special societies which have sprung into existence since the foundation of the British Association, amongst which I need only name here the Physical, Geographical, Meteorological, Anthropological, and Linnean, cultivating abstract science, and the Institution of Mechanical Engineers, the Institution of Naval Architects, the Iron and Steel Institute, the Society of Telegraph Engineers and Electricians, the Gas Institute, the Sanitary Institute, and the Society of Chemical Industry, representing applied science. These meet at frequent intervals in London, whilst others, having similar objects in view, hold their meetings at the University towns, and at other centres of intelligence and industry throughout the country, giving evidence of great mental activity, and producing some of those very results which the founders of the British Association wished to see realized. If we consider further the extraordinary development of scientific journalism which has taken place, it cannot surprise us when we meet with expressions of opinion to the effect that the British Association has fulfilled its mission, and should now yield its place to those special societies it has served to call into existence. On the other hand, it may be urged that the brilliant success of last year's Anniversary Meeting, enhanced by the comprehensive address delivered on that occasion by my distinguished predecessor in office, Sir John Lubbock, has proved, at least, that the British Association is not dead in the affections of its members, and it behoves us at this, the first ordinary gathering in the second half century, to consider what are the strong points to rely upon for the continuance of a career of success and usefulness.

If the facilities brought home to our doors of acquiring scientific information have increased, the necessities for scientific inquiry have increased in a greater ratio. The time was when science was cultivated only by the few, who looked upon its application to the arts and manufactures as almost beneath their consideration; this they were content to leave in the hands of others, who, with only commercial aims in view, did not aspire to further the objects of science for its own sake, but thought only of benefiting by its teachings. Progress could not be rapid under this condition of things, because the man of pure science rarely pursued his inquiry beyond the mere enunciation of a physical or chemical principle, whilst the simple practitioner was at a loss how to harmonize the new knowledge with the stock of information which formed his mental capital in trade.

The advancement of the last fifty years has, I venture to submit, rendered theory and practice so interdependent, that an intimate union between them is a matter of absolute necessity for our future progress. Take, for instance, the art of dyeing, and we find that the discovery of new colouring matters derived from waste products, such as coal-tar, completely changes its practice, and renders an intimate knowledge of the science of chemistry a matter of absolute necessity to the practitioner. In telegraphy and in the new arts of applying electricity to lighting, to the transmission of power, and to metallurgical operations, problems arise at every turn, requiring for their solution not only an intimate acquaintance with, but a positive advance upon, electrical science, as established by purely theoretical research in the laboratory. In general engineering the mere practical art of constructing a machine so designed and proportioned as to produce mechanically the desired effect, would suffice no longer. Our increased knowledge of the nature of the mutual relations between the different forms of energy makes us see clearly what are the theoretical limits of effect; these, although beyond our absolute reach, may be looked upon as the asymptotes to be approached indefinitely by the hyperbolic course of practical progress, of which we should never lose sight. Cases arise, moreover, where the introduction of new materials of construction, or the call for new effects, renders former rules wholly insufficient. In all these cases practical knowledge has to go hand in hand with advanced science in order to accomplish the desired end.

Far be it from me to think lightly of the ardent students of nature, who, in their devotion to research, do not allow their minds to travel into the regions of utilitarianism and of self-interest. These, the high priests of science, command our utmost admiration; but it is not to them that we can look for our current progress in practical science, much less can we look for it to the "rule of thumb" practitioner, who is guided by what comes nearer to instinct than to reason. It is to the man of science, who also gives attention to practical questions, and to the practitioner, who devotes part of his time to the prosecution of strictly scientific investigations, that we owe the rapid progress of the present day, both merging more and more into one class, that of pioneers in the domain of nature. It is such men that Archimedes must have desired when he refused to teach his disciples the art of constructing his powerful ballistic engines, exhorting them to give their attention to the principles involved in their construction, and that Telford, the founder of the Institution of Civil Engineers, must have had in his mind's eye, when he defined civil engineering as "the art of directing the great sources of power in nature."

These considerations may serve to show that although we see the men of both abstract and applied science group themselves in minor bodies for the better prosecution of special objects, the points of contact between the different branches of knowledge are ever multiplying, all tending to form part of a mighty tree—the tree of modern science—under whose ample shadow its cultivators will find it both profitable and pleasant to meet, at least once a year; and considering that this tree is not the growth of one country only, but spreads both its roots and branches far and wide, it appears desirable that at these yearly gatherings other nations should be more fully represented than has hitherto been the case. The subjects discussed at our meetings are without exception of general interest, but many of them bear an international character, such as the systematic collection of magnetic, astronomical, meteorological, and geodetical observations, the formation of a universal code for signalling at sea, and for distinguishing lighthouses, and especially the settlement of scientific nomenclatures and units of measurement, regarding all of which an international accord is a matter of the utmost practical importance.

As regards the measures of length and weight it is to be regretted that this country still stands aloof from the movement initiated in France towards the close of last century; but, considering that in scientific work metrical measure is now almost universally adopted, and that its use has been already legalized in this country, I venture to hope that its universal adoption for commercial purposes will soon follow as a matter of course. The practical advantages of such a measure to the trade of this country would, I am convinced, be very great, for English goods, such as machinery, or metal rolled to current sections, are now almost excluded from the continental market, owing to the unit measure employed in their production. The principal impediment to the adoption of the metre consists in the strange anomaly that although it is legal to use that measure in commerce, and although a copy of the standard metre is kept in the Standards' Department of the Board of Trade, it is impossible to procure legalized rods representing it, and to use a non-legalized copy of a standard in commerce is deemed fraudulent. Would it not be desirable that the British Association should endeavour to bring about the use in this country of the metre and kilogram, and, as a preliminary step, petition the Government to be represented on the International Metrical Commission, whose admirable establishment at Sèvres possesses, independently of its practical work, considerable scientific interest, as a well-found laboratory for developing methods of precise measurement?

Next in importance to accurate measures of length, weight, and time, stand, for the purposes of modern science, those of electricity.

The remarkably clear lines separating conductors from non-conductors of electricity, and magnetic from non-magnetic substances, enable us to measure electrical quantities and effects with almost mathematical precision; and, although the ultimate nature of this, the youngest scientifically investigated form of energy, is yet wrapt in mystery, its laws are the most clearly established, and its measuring instruments (galvanometers, electrometers, and magnetometers) are amongst the most accurate in physical science. Nor could any branch of science or industry be named in which electrical phenomena do not occur, to exercise their direct and important influence.

If then, electricity stands foremost amongst the exact sciences, it follows that its unit measures should be determined with the utmost accuracy. Yet, twenty years ago, very little advance had been made towards the adoption of a rational system. Ohm had, it is true, given us the fixed relations existing between electromotive force, resistance and quantity of current; Joule had established the dynamical equivalent of heat and electricity, and Gauss and Weber had proposed their elaborate system of absolute magnetic measurement. But these invaluable researches appeared only as isolated efforts, when, in 1862, the Electric Unit Committee was appointed by the British Association, at the instance of Sir William Thomson, and it is to the long-continued activity of this Committee that the world is indebted for a consistent and practical system of measurement, which, after being modified in details, received universal sanction last year by the International Electrical Congress assembled at Paris.

At this Congress, which was attended officially by the leading physicists of all civilized countries, the attempt was successfully made to bring about a union between the statical system of measurement that had been followed in Germany and some other countries, and the magnetic or dynamical system developed by the British Association, also between the geometrical measure of resistance, the (Werner) Siemens unit, that had been generally adopted abroad, and the British Association unit intended as a multiple of Weber's absolute unit, though not entirely fulfilling that condition. The Congress, while adopting the absolute system of the British Association, referred the final determination of the unit measure of resistance to an International Committee, to be appointed by the representatives of the several Governments; they decided to retain the mercury standard for reproduction and comparison, by which means the advantages of both systems are happily combined, and much valuable labour is utilized; only, instead of expressing electrical quantities directly in absolute measure, the Congress has embodied a consistent system, based on the Ohm, in which the units are of a value convenient for practical measurements. In this, which we must hereafter know as the "practical system," as distinguished from the "absolute system," the units are named after leading physicists, the Ohm, Ampère, Volt, Coulomb, and and Farad.

I would venture to suggest that two further units might, with advantage, be added to the system decided on by the International Congress at Paris. The first of these is the unit of magnetic quantity or pole. It is of much importance, and few will regard otherwise than with satisfaction the suggestion of Clausius that the unit should be called a "Weber," thus retaining a name most closely connected with electrical measurements, and only omitted by the Congress in order to avoid the risk of confusion in the magnitude of the unit current with which his name had been formerly associated.

The other unit I should suggest adding to the list is that of power. The power conveyed by a current of an Ampère through the difference of potential of a Volt is the unit consistent with the practical system. It might be appropriately called a Watt, in honour of that master mind in mechanical science, James Watt. He it was who first had a clear physical conception of power, and gave a rational method of measuring it. A Watt, then, expresses the rate of an Ampère multiplied by a Volt, whilst a horse-power is 746 Watts, and a Cheval de Vapeur 735.

The system of electro-magnetic units would then be:—

				C.G.S. Units.
(1) Weber, the unit of magnetic			quantity	$=10^8$
(2) Ohm	"	"	resistance	$=10^9$
(3) Volt	"	"	electromotive force	$=10^8$
(4) Ampère	"	"	current	$=10^{-1}$
(5) Coulomb	"	"	quantity	$=10^{-1}$
(6) Watt	"	"	power	$=10^7$
(7) Farad	"	"	capacity	$=10^{-9}$

The word energy was first used by Young in a scientific sense, and represents a conception of recent date, being the outcome of the labours of Carnot, Mayer, Joule, Grove, Clausius, Clerk-Maxwell, Thomson, Stokes, Helmholtz, Macquorn-Rankine, and other labourers, who have accomplished for the science regarding the forces in Nature what we owe to Lavoisier, Dalton, Berzelius, Liebig, and others as regards chemistry. In this short word energy we find all the efforts in nature, including electricity, heat, light, chemical action, and dynamics, equally represented, forming, to use Dr. Tyndall's apt expression, so many "modes of motion." It will readily be conceived that when we have established a fixed numerical relation between these different modes of motion, we know beforehand what is the utmost result we can possibly attain in converting one form of energy into another, and to what extent our apparatus for effecting the conversion falls short of realizing it. The difference between ultimate theoretical effect and that actually obtained is commonly called loss, but, considering that energy is indestructible, represents really secondary effect which we obtain without desiring it. Thus friction in the working parts of a machine represents a loss of mechanical effect, but is a gain of heat, and in like manner the loss sustained in transferring electrical energy from one point to another is accounted for by heat generated in the conductor. It sometimes suits our purpose to augment the transformation of electrical into heat energy at certain points of the circuit when the heat rays become visible, and we have the incandescence electric light. In effecting a complete severance of the conductor for a short distance, after the current has been established, a very great local resistance is occasioned, giving rise to the electric arc, the highest development of heat ever attained. Vibration is another form of lost energy in mechanism, but who would call it a loss if it proceeded from the violin of a Joachim or a Norman-Neruda?

(To be continued.)

THE "TIMES" ON PROFESSOR ATTFIELD'S ADDRESS TO THE BRITISH PHARMACEUTICAL CONFERENCE.

On Thursday last the *Times* contained in its editorial columns the following remarks on the address by Professor Attfield, printed on another page:—

"The Pharmaceutical Conference is a gathering of men whose doings and discussions should have no little interest for the general community. The dispensing chemist is not exactly a State functionary, but he is an important public servant. In the modern division of professional labour he is the necessary intermediary between the doctor and his patient. The doctor prescribes, the chemist compounds, the patient swallows. Armed with a slip of paper often not too legibly written and never intelligible to non-professional readers, the patient quits the physician's consulting room and goes to the chemist's shop. He is compelled to trust the latter to give him what the doctor has ordered. Doctor and patient, in fact, are entirely in the chemist's hands. The patient does not even know what it is the doctor has ordered, the doctor cannot tell that his orders are carried out. Even if the prescription is duly dispensed according to order, there is still not a little to be taken on trust. The drugs may be old or weak, or they may be of inferior quality. The case supposed, moreover, represents the *minimum* amount of trust ordinarily reposed by the public at large in the dispensing chemist. There must be times and occasions when the dispenser is ignorant, inadvertent, or shifting: when he either makes a sheer mistake, or is tempted to substitute one drug for another with which he happens to be unprovided. There are others when he is induced or even forced by the importunity of his customers to prescribe as well as dispense. There is still, in fact, a good deal of old-world simplicity, not to say superstition, in the popular resort to medical advice. Many good people in country places think nothing of a doctor who does not dose them well, and they discern no material difference in skill between the doctor himself and the chemist who gives them a draught and the old woman who mixes them a dose of simples. Indeed, a very little medical knowledge goes a very long way in country districts, and it is no wonder, therefore, that the chemist is often called upon to do the work of the medical man. All this, however, serves to show the importance to the community of a healthy and elevated tone of the pharmaceutical calling. There is no legal impediment to the sale of drugs, other than certain specified poisons, by anyone. It is true that no one is allowed to call himself a pharmaceutical chemist or to practise the calling of a chemist and druggist unless he is duly registered under conditions which attest his qualification to dispense medical prescriptions, but this statutory limitation does not prevent the sale of uncompounded drugs by any retail trader, nor does it in any way preclude a dispensing chemist from prescribing on his own account. All that the law requires is that 'persons keeping open shop for the retailing, dispensing, or compounding of poisons, and persons known as chemists and druggists, should possess a competent practical knowledge of their business, and to that end . . . . should be duly examined as to their practical knowledge.' These words, which are taken from the preamble to the Pharmacy Act, 1868, represent in summary the exisiting relations of pharmacy to the State. As such they form a convenient starting point for commenting on the address on that subject, delivered at Southampton, on Tuesday, by Professor Attfield, as President of the Pharmaceutical Conference for the present year.

"Professor Attfield considers that legislation in respect of pharmacy is at present in a very unsatisfactory state; but he does not offer any very definite suggestion for its improvement beyond the remark that, instead of scheduling certain drugs as poisons and placing restrictions on their sale, the law should rather schedule only such drugs as may safely be sold by unqualified persons. As, according to the same authority, 'all drugs are more or less poisons,' it is a little difficult to see how such a provision could be made to work in practice. On the whole, we are rather disposed to think, in spite of Professor Attfield, that the law does all that it can or need do at present; the rest may fairly be left to the corporate efforts and feeling of the members of the pharmaceutical calling and to the common sense of the public at large. Very possibly the schedule of poisons given in the Act needs revision and extension; but the Act empowers the Pharmaceutical Society, with the approval of the Privy Council, to enlarge it from time to time. But beyond this, all that the law need require, and probably all that it can practically enforce, is that persons who profess to compound medical prescriptions should be properly qualified to do so, and that their qualification should be publicly registered. No one, of course, would like to think that a prescription sent to the chemist's ran the risk of being made up by a man whose pharmaceutical skill was on a par with that of the chemist's apprentice in 'Pickwick.' The Pharmacy Act precludes such a catastrophe, and for the rest it is safer, perhaps, to trust to such indirect influences as are independent of positive legislation, and more or less outside its sphere. It is highly desirable, of course, that pharmaceutical chemists should be men of high character and good education, and such we understand to be the aim of the Pharmaceutical Conference. But the business of a dispensing chemist is in one sense a trade like any other, and as such it is subject, like any other trade, to the stimulating influence of competition and to the natural conditions of supply and demand. Professor Attfield desired that the chemist and pharmacist should be in reality as well as in name a druggist also—that he should be skilled in the preparation of drugs from the raw material as well as in the compounding of them. This is, no doubt, desirable in itself, but the tendency of modern commerce and industry is to division rather than to concentration, and it is not easy to see how the tendency is to be counteracted. The suggestion that pharmacists should be encouraged to recommend simple remedies compounded by themselves is a good deal more questionable. The practice is common enough, and it could not be easily checked, but certainly it hardly calls for direct encouragement. 'Let there be no pretence of professional medical treatment mixed up with pharmacy,' says Professor Attfield sensibly enough; but it is a little difficult to reconcile this principle with the remark which follows, to the effect that 'the druggist's recommendation of simple remedies should be founded on that knowledge and experience which come of much pharmaceutical familiarity with remedies, and on that common sense and perception in all that pertains to drugs with which a properly and specially educated pharmacist might be credited.'

"The fact is that there is no little variance between theory and practice in this matter. The theory, of course, is that to the doctor only should belong the power of prescribing remedies, and that the pharmacist has nothing to do but compound them. The physician is the man of science; the pharmacist is merely his instrument. Such is, no doubt, the ideal relation between the two, especially as regarded from the physician's point of view. But the popular mind does not always move in this elevated region, and popular practice is still almost as impatient of the solemn '*ordonnances des médecins*' as it was in the time of Molière. In scores of simple cases the chemist's advice is almost as good, or, at any rate, it is thought to be almost as good, as the doctor's; and, what is more to the point, it is a good deal cheaper to obtain. If chemists oftentimes do harm by prescribing, it must nevertheless be remembered that as often as not the real fault lies with the applicant for their advice. A man often goes to the chemist's shop not so much for specific advice as for the purpose of obtaining a remedy that he wants, or thinks he wants. He is hoarse, and thinks a gargle will do him good; he is bilious, and asks for a simple purgative or a saline draught; and the chemist has nothing more to do than to give him a remedy which he has compounded scores of times at the doctor's bidding in similar cases. Where is the line to be drawn? Common sense alone can draw it, and the common sense must quite as often be that of the patient himself as of the chemist to whom he applies. We are afraid that such a lax view as this of the duties and functions of the pharmacist will be regarded as flat heresy by the medical profession. We can only say that medical men are not wholly disinterested in the matter, and we may add that when the patient finds his way to the chemist's shop it is very often the doctor who has first shown it to him. There was a time when the doctor, especially the country doctor, was his own pharmacist. To this day the licence of the Apothecaries' Company is a qualification for the practice of medicine. The practice of medical men compounding their own drugs is by no means extinct, though it is discouraged and discountenanced by the medical profession at large. It has its good and its bad side, no doubt, and very likely the evil preponderates. But if medical men insist on abandoning the practice of pharmacy, it is certain that in many cases the pharmacist will have to supply their place. The practice of consulting pharmacists exists, and, human nature being what it is, we doubt if it is possible to do very much in the way of checking it. Medicine, in one sense, is a science or a whole assemblage of sciences demanding the highest skill and the widest experience for their mastery and practice; in another sense, it is an art of which almost every man considers himself to have at least a smattering. The higher sphere properly belongs to the physicians; if the pharmacists have gained a footing in the lower, it is only because they have thereby satisfied a popular need."

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Gerrard, Parker, Hooper, Brown, Dott, Mason, Bush and Co., Hearon and Co., Johnston, Hart, Quinlan, Lamble, Della Rosa, G. A. C., Observer, Nectandra, Wulfruna, Syrupus, Specific Gravity, Associate, North.

"THE MONTH."

Although August must decidedly be reckoned among the "dead" months of the year, it shares with September the fortune of being galvanized into some appearance of life by various *soi-disant* scientific meetings. Three such meetings have taken place during the past month, all of them more or less interesting to the pharmacist: the British Medical Association has met at Worcester, and the British Pharmaceutical Conference and the British Association for the Advancement of Science at Southampton.

First in order of date came the meeting of the British Medical Association, which possessed additional interest from the fact that it marked the expiration of fifty years since the establishment of the Association, under the name of the "Provincial Medical and Surgical Association," in the same old city of Worcester in 1832. Then the Association numbered 140 members; now it numbers 9500. But it made comparatively slow advance in its early history, only numbering about 2000 members at the end of its twenty-fifth year; in fact, the medical profession generally exhibited relatively little appreciation of the advantages involved in membership of the organization until about sixteen years ago, when Mr. Ernest Hart was appointed Editor of the Journal of the Association, since which time its progress has been very rapid. It was natural that Dr. W. Strange, the President for the year, should in his address contrast the position of medicine at the epoch of the birth of the Association and now, and the first portion of it was devoted to the "Revival of Medicine," as part of the outburst of the forces of thought and research after the repression due to the effects of a long period of war, whilst the second was entitled "The Survival of Medicine." The orator credited medical literature with being one of the chief of the forces that have operated to bring about great changes during the last fifty years, but in acknowledging the valuable services rendered by the *Lancet* he used a decidedly double-edged metaphor. After comparing that journal in its earlier years to a wasp buzzing about the drones of the medical hive, when he came to speak of it after its enlargement in 1831, he altered the figure. "We may now liken it to a weasel, or a still more unsavoury animal, the polecat, biting, scratching, driving out of their holes, with venomous scurrility, the 'bats,' as it called the hospital surgeons and councillors of the Royal College, and hanging them up, like vermin on a barn-door, to general obloquy. This was the function of the *Lancet*." The *Lancet* of to-day is naturally not quite pleased with this simile, although one certainly in accord with Dogberry's statement that "comparisons are odorous," and it quotes with some complacency a suggestion that weasels and polecats are not usually engaged in nailing bats to barn-doors; but it is willing to forgive this and much more in consideration of the kind manner in which Dr. Strange spoke of the late Mr. Wakley, and it assures its readers that the spirit in which that gentleman conducted the *Lancet* "is religiously, it may be said filially, preserved under the present Editor." If Dr. Strange's eulogy is of rather uncertain sound, the same cannot be said of his condemnations, as for instance, when he attacks the well-known "nuisance of modern medical literature," that "many a fresh investigator will treat his subject as if no one had ever done anything in it before." His utterances, also, respecting some of the evils attending modern consultations are no less sharp than true. "As regards consultants," he asks, "do we not recognize a solemn farce when Mr. A. or Mrs. B. returns from consulting, say some metropolitan celebrity, and tells us that Dr. C. has laid down all the rules for his or her future life, and indicated this or that health-resort as essential to recovery; and all in ten minutes' time and for a fee of one guinea? The issues of life and death, in the case of a stranger never seen before, solved in a ten or fifteen minutes' interview, and all for one guinea!" The "Address in Medicine" was delivered by Dr. W. F. Wade, and the "Address in Surgery" by Professor W. Stokes.

Next in order of time came the meeting of the British Pharmaceutical Conference, but the full report of the proceedings in another part of the Journal renders further notice here unnecessary. Then came the meeting of the British Association, with its sections covering all the fields of science. Amongst the topics dealt with by Dr. Siemens in his presidential address was that of artificial lighting, upon which he could speak with authority, consequent upon the work that he has done in improving the methods of lighting by both gas and electricity. It is therefore interesting to note that he thinks "gas lighting will hold its own as the poor man's friend." Its convenience as a lighting and heating agent constitutes gas "an institution of the utmost value to the artizan," and he considers "the time is not far distant when both rich and poor will largely resort to gas as the most convenient, the cleanest, and the cheapest of heating agents, and when raw coal will be seen only at the colliery or the gasworks." In a paper read before the Mechanical Science Section, Mr. William Sugg expressed a similar opinion as to the future of gas and said that at present the greatest hindrance to improvements was met with in those members of the public who supply themselves with the lowest priced burners and stoves they can buy and then blame the quality of the gas. He believes that if the consumers of gas would only acquire a moderate amount of information as to its properties, they would be enabled to use it with greater economy and comfort to themselves, and he considers that the easy manner in which gas can be made to produce either the light of a rushlight or the blaze of a thousand candles by a mere turn of the wrist, joined to the readiness by which it can be conveyed from one place to another, will always insure for it a large and increasing demand. Indeed there can be little doubt as to the future of gas, and the growing importance of the long list of substances mentioned by Dr. Siemens, which are looked upon at present as by-products in its manufacture, renders it probable that the time is not far distant when these will become the principal objects of the distillation of coal, and "gas" will take their place as a by-product. The address of the President of the Chemical Section, Professor G. D. Liveing, had for its subject the advance made in the dynamics of chemistry. In the Botanical Department of the Biological Section, Professor Lawson delivered an address on the progress of systematic botany during the last eight years.

In the Mechanical Science Section, also, a most interesting paper on "Recent Progress in Telephony" was read by Mr. W. H. Preece, of the General Post Office. Only six years have elapsed since the telephone was first mentioned to a British audience, at Glasgow, by Sir William Thompson, and now it is in practical use, more than a million and a half sterling is invested in its working in this country alone, and it is earning an annual revenue of more than £100,000. It is worthy of note that the original telephone receiver of Bell has scarcely been improved upon. The principal difficulty attending the use of the telephone is not due to any defect in the instrument itself, but to disturbing influences external to it. It is so sensitive that the minute quantity of electricity which makes up the currents is easily absorbed by competing conductors. When two or more telephone conductors run side by side, what is said on one can be overheard on the others, and when a telephone wire extends alongside telegraph wires every current on the telegraph circuit is repeated in the telephone, giving rise to a hissing bubbling sound which on busy lines entirely drowns speech. The only remedy for this evil at present found practically effective is to employ a complete metallic circuit, so contrived that the two wires are in very close proximity to each other or that they twist round each other so as to maintain a mean average equality of distance between themselves and the disturbing wires. The telephone has established beyond doubt the fact that currents of electricity actually traverse the earth's crust. Several cases are on record in which telephone circuits miles away from any telegraph wires, but in a line with the earth terminals, have picked up telegraphic signals. When, too, an electric light system uses the earth it stops all telephonic communication in the neighbourhood; on one day the whole telephonic communication of Manchester broke down from this cause, and on another occasion, in the city of London, the effect was so strong as not only to destroy telephonic communication but to ring the bells also. A telephone circuit in connection with the earth gives distinct evidence of every visible flash of lightning and there have been several cases of persons being knocked down while experimenting during a thunderstorm, though no personal injury has been sustained. In England the use of double wires diminishes danger from this source to a minimum, but on the continent and in America, where single wires are used, telephones are invariably protected by a lightning arrester.

An extremely interesting experiment has recently been made as to whether it is possible to communicate by means of electricity across seas and channels without the aid of wires. Large metal plates were immersed in the sea on opposite sides of the Solent, one set at Portsmouth and Ryde, six miles apart, and another set at Hurst Castle and Sconce Point, one mile apart. The Portsmouth and Hurst Castle plates were connected by a wire passing through Southampton, the Ryde and Sconce Point plates by a wire passing through Newport, the circuit being completed by the sea. The experiment was so far successful that signals were passed easily so as to be read by the Morse system, but communication by telephone was not found practicable.

The well-known theory of Dr. Andrews, that the liquid and gaseous states of matter are continuous, has been questioned by more than one observer, and Dr. J. B. Hannay, as the result of several hundreds of experiments wherein hydrogen was compressed over various liquids in which it is insoluble, has arrived at the conclusion that the two states are not more continuous than are the solid and liquid states, but are separated by an isothermal passing through the critical point. He points out (*Nature*, August 17) that by Andrews's method, where the liquid is in contact with its own vapour, the critical point is the only period when the direct passage from liquid to gas is visible, whilst the employment of hydrogen for retaining a free surface allows of the observation of the passage at any pressure, and he states that it takes place as suddenly at two hundred atmospheres pressure as the critical pressure. In fact he considers that the irregularities observed by Dr. Andrews in the vicinity of the critical point rather lend support to the view that a change of state takes place there. He states the change thus:—"The cohesion of the liquid state is weakened as the thermal motion increases, till the repulsion is in excess of the attraction and the gaseous state ensues." So far from the gaseous state of matter being continuous and indistinguishable, he considers that the liquid limit or absolute boiling point is the only fixed point among the properties of matter, and he proposes to give to it the name of the "cohesion limit."

It is known that metals can be volatilized, but in order to effect this in air or gas at the ordinary pressure, high temperatures are required, the employment of the electric arc being frequently necessary. Some experiments have been made by M. Demarçay to ascertain whether the temperature at which volatilization takes place is affected by diminishing the pressure. He reports (*Comptes Rendus*, xcv., 183) that so far as he has gone he finds that only a comparatively low temperature is required. When a metal is heated in a vacuum there is generally at the commencement a disengagement of gas which ceases after a time varying with the metal, and then a blackish layer is deposited upon a cool surface, which eventually takes a metallic aspect. The temperatures required for volatilization of the metals experimented with were—cadmium, 160° C.; zinc, 184° C.; antimony and bismuth, 292° C.; lead and tin, 360° C. If proper precautions are not taken, a thin layer of sub-oxide is formed on the surface of the metal when it is first heated, and this being less volatile than the metal prevents the volatilization until a temperature is reached much higher than those mentioned. A fissure appears then to be formed in the superficial coating of sub-oxide, and the deposit of volatilized metal commences suddenly. The author purposes to extend his experiments to platinum and iron.

Last month reference was made to experiments which appeared to show a relation between the molecular weights and melting points of certain groups of compounds. A paper communicated to the Academy of Sciences by M. Raoult (*Comptes Rendus*, xcv., 187) points to the existence of a physical constant at the other end of the scale. M. Raoult's experiments were made to determine the extent to which the freezing point of a liquid is lowered by the solution in it of various substances. Using chemically pure benzine, freezing at 4·96° C., he dissolved in it definite proportions of a series of compounds belonging to the groups of hydrocarbons, ethers and aldehydes. It was found that the coefficient of depression (*i.e.* the lowering of the point of congelation due to 1 gram of substance dissolved in 100 grams of benzine) varied considerably, but that if this coefficient of any of these bodies were multiplied by the molecular weight, the product was approximately constant, always being close to the number 50. The author deduces the law that acetones, ethers, hydrocarbons, and their derivatives, when dissolved in benzine in quantities proportional to their molecular weight, all lower the point of congelation of that liquid nearly the same number of degrees. At present it would appear that this property is independent of the nature, number or arrangement of the atoms composing the dissolved molecules.

In the *Scientific American* for August 12, there is a very interesting description of the arrangements for the supply of water to the city of Rochester in New York State. The city has two sources of supply, the water for fire and manufacturing purposes and the distribution of power being taken from the Genesee river, and the sweet water from Hemlock Lake, about thirty miles distant. The water is conveyed from the lake in iron pipes to a storage reservoir, and from thence to a distributing reservoir which is 117 feet below the level of the storage reservoir. This difference in level is taken advantage of for the purpose of thoroughly aërating the water before it is distributed into the city during warm weather, which is done by means of a fountain placed in the middle of the distributing reservoir. The fountain consists of a 24-inch pipe, turned vertically upwards, enlarged near the top to a diameter of 3 feet, and closed by means of a dome-shaped head provided with twenty-one orifices which may each be reduced in diameter or closed as desired. Through these orifices the whole of the sweet water for the supply of the city issues in jets, and is thus thoroughly exposed to the action of the atmosphere. The fountain is said to be visible in clear weather for a distance of many miles, and when all the orifices are closed except the centre one, and that is reduced to a diameter of 3 inches, the jet of water rises to the height of nearly 110 feet above the surface of the water in the distributing reservoir, or within 7½ feet of the elevation of its source in the storage reservoir 8¾ miles distant. The amount of water supplied daily in this way from Hemlock Lake is about three million gallons.

So many alkaloidal compounds have now been obtained from cinchona barks that the terminology has become sufficiently perplexing to render the elimination of any surplus names welcome. Some months ago Dr. Hesse described (*Pharm. Journ.*, [3], xii., 179), under the name "cinchamidine," an alkaloid obtained from the mother-liquor during the purification of homocinchonidine sulphate. He afterwards expressed an opinion (*Pharm. Journ.* [3], xii., 904), that this base was probably identical with Messrs. Forst and Böhringer's hydrocinchonidine, prepared by them from pure cinchonidine, but the formula calculated by him from the results of an analysis of the acid platino-chloride differed by 1 atom of carbon from that given by the other observers. Subsequent experiments have, however, induced Dr. Hesse to think that the excess of carbon was due to the presence of some neutral platinochloride in the salt analysed, and he now adopts for the alkaloid the formula of $C_{19}H_{24}N_2O$ and also the name "hydrocinchonidine" (*Annalen*, ccxiv., 1), since it appears to stand in the same relation to cinchonidine as hydroquinine does to quinine. Hydrocinchonidine is said to occur frequently in commercial preparations of cinchonidine and homocinchonidine, and Dr. Hesse describes several of its salts.

Further, Messrs. Forst and Böhringer have arrived at the conclusion (*Berichte*, xv., 1656) that the hydroconchinine separated by Dr. Hesse from the mother-liquors of quinidine (conchinine) sulphate is identical with the alkaloid obtained by them in the oxidation of quinidine by means of potassium permanganate, and called by them "hydroquinidine" ($C_{20}H_{26}N_2O + 2\frac{1}{2}H_2O$). They state that they have found hydroquinidine in samples of quinidine sulphate from various sources, and it would therefore appear to be a constant companion of quinidine in cinchona barks, just as cinchotine is of cinchonine, hydrocinchonidine of cinchonidine and hydroquinine of quinine. When an aqueous solution of the neutral sulphate is evaporated slowly, crystals are obtained containing 12 molecules of water of crystallization.

On the other hand Messrs. Forst and Böhringer have added to the cinchona terminology (*Berichte*, xv., 1659) the term "chitenidine," which they apply to an alkaloidal compound resembling chitenine that is formed, together with hydroquinidine and formic acid, in the oxidation of quinidine. This body had previously been observed, but not investigated, by Skraup. It is rather freely soluble in hot water, not so soluble in cold water, and still more difficultly soluble in alcohol. Its solution in dilute sulphuric acid has a blue fluorescence, which disappears upon the addition of hydrochloric acid. It is represented by the formula $C_{19}H_{22}N_2O_4 + 2H_2O$.

Professor G. Planchon, in the *Journal de Pharmacie*, this month, throws some fresh light on the source of cuprea bark. A microscopical examination of the specimens supplied to him by M. Triana showed that the barks derived from Bucaramanga, in the north, and from Llanos, the southern district, both present the same characters and are evidently both furnished by *Remijia pedunculata*. The cinchonamine bark of M. Arnaud presents different microscopical characters, and is referred by M. Planchon to *R. Purdieana*. He remarks that a microscopical examination has never yet deceived him in the solution of like problems. A singular confirmation of the value of this method of research occurs in the form of a postscript to M. Planchon's article, in which he states that since it was written M. Triana has received information to the effect that the cinchonamine bark does not come direct from Bucaramanga, but only passes through it, being collected near Antioquia on the other side of the Magdalena river. Further, that a large exporter of the cuprea bark has recognized the southern bark as the produce of *R. pedunculata*.

The products of the distillation of brucine with potash have been studied by M. Koninck (*Comptes Rendus*, xcv., 298). The crude product consisted of an oily mixture, presenting considerable analogy to the crude chinoleine resulting from the decomposition of cinchonine by potash. A considerable quantity of this oil was submitted to fractional distillation. The fractions between 90° and 140° C. were small and contained neutral and basic products; those between 140° and 160° contained a small quantity of a pyridic base, insoluble in water and having the composition of lutidine. Three fractions between 165° and 200° contained, the first a base presenting the principal characters of β-lutidine, the second a collidine probably identical with α-collidine, and the third a base identical with β-collidine, all three of which have been obtained from the chinoleine derived from cinchonine.

One of the reports to the Scientific Grants Committee of the British Medical Association, presented at the recent meeting at Worcester, contained a *résumé* by Dr. G. Thin of some of the results of his investigation upon the "Pathology of Parasitic Diseases of the Skin." With regard to the fungus of ringworm (*Trichophyton tonsurans*) he is of opinion that it is not a form of a common fungus, as has been supposed by some observers. He found that it could be cultivated artificially when moistened by vitreous humour, but when completely immersed in vitreous humour there was no evidence of its growth. This would appear to explain what takes place when in the treatment of ringworm recourse is had to applications which provoke inflammation, *i.e.*, an effusion of serum around the follicles, in which the *Trichophyton* cannot develope. In ringworm of the scalp, Dr. Thin says considerable caution is necessary in the choice of an application for provoking this curative inflammation; but in ringworm of the body, the parasite is so well within reach that it can be easily destroyed by one application of tincture of iodine and subsequent scrubbing with soap and water. With respect to *Microsporon furfur*, the fungus of pityriasis, and *Achorion Schœnleinii*, the fungus of favus, he has only obtained negative results. The destruction of the hair in *Alopecia areata* he considers to be due to minute bodies of definite and fixed shape and size, which are found in and on the hairs. They are distinct from the granular elements in hairs and are neither oily particles nor crystals, but have the refractive properties of and are bacteria (*Bacterium decalvans*). The disappearance of the hair, resulting in baldness, is due to a breaking up of the hair shaft by the multiplication in it of these organs.

The phenomena attending the preparation of a very alcoholic American-Indian beverage, called "chicha," from ungerminated maize, have been investigated by M. Marcano (*Comptes Rendus*, xcv., 345). The peculiarity consists chiefly in the active fermentation which goes on in a mass consisting nearly exclusively of starch that has not undergone any alteration except that produced by a short boiling with water. It was ascertained that this fermentation is coincident with the reproduction of well-defined vibrionic organisms, which were found on the outer pellicle of the maize grains, and also of the stalk. These organisms proved capable of resisting the action of boiling water during several minutes; they appeared to be most active at a temperature between 40° and 50°C., at which temperature they caused the fermentation of mannite, sugar of milk, saccharose and glucose. They seem to act directly upon young starch, such as occurs in the embryo of the grain; but also attack mature starch, though more slowly. In both cases there is a production of dextrine, carbonic acid gas, and alcohol.

An infusion of the curious scarlet seeds of the *Abrus precatorius* has long been used in the interior of Brazil as a popular remedy in the treatment of ophthalmic disorders. In some experiments made by Dr. de Wecker (*Comptes Rendus*, xcv., 299) to test the action of this remedy he found that a weak cold infusion, made from the powdered seeds, when applied as a lotion, rapidly produced a purulent ophthalmia of intensity corresponding to the number of applications made. The factitious ophthalmia thus produced disappeared in the course of ten days or a fortnight without any therapeutic intervention or danger to the cornea, and Dr. de Wecker is of opinion that this property possessed by the seeds of provoking a very intense ophthalmia of short duration could be utilized in ocular therapeutics in the treatment of granulations, conjunctival diphtheria, etc. The leaves of the plant are also used in the east as a remedy in croupal cough.

Dr. J. Ott describes, in *New Remedies* (p. 226), the physiological action of *Astragalus mollissimus*, one of the "loco" or crazy weeds of the Western States. Animals eat this plant when grass is scarce, and having once tasted it, they leave the sweetest grasses to eat the "loco." Two other plants are eaten by them in the same way, viz., *Oxytropis Lamberti* and *Sophoria sericea*. He finds that the astragalus is a powerful mydriatic, that it increases the flow of saliva, has a spinal tetanic action, a stupefying action on the brain, and reduces the force and frequency of the heart, killing mainly by arresting its action.

Evidence is brought forward in the *British Medical Journal* (p. 178) that the official solution of atropine of the British Pharmacopœia is liable to produce glaucoma, and that a very much weaker solution would serve to produce mydriasis or dilatation of the pupil. Dr. Ringer is of opinion that a solution formed by diluting the Pharmacopœia liquor with two or three hundred times its bulk of water would be sufficiently strong.

Dr. J. Lattey, writing to the same journal (p. 199), states that salicin possesses the peculiar property of relieving after-pains when opium is quite useless. He gives 15 grains for a dose, repeated every two hours until the pain ceases. He states he has never had to give more than three doses, two being usually effectual.

Dr. D. H. Cullimore records, in the *Lancet* (p. 216), a case of hydrophobia successfully treated by aconite, administered in conjunction with bromide of potassium and tincture of cinchona.

Dr. F. Hutchinson, of Scarborough, calls attention, in the *British Medical Journal* (p. 209), to the value of the local application of tincture of iodine in erysipelas, the effect in a case which came under his notice appearing to be almost magical. He does not attempt, however, to explain the action of the drug.

Dr. Schafer, in the *Berlin. klein. Wochenschrift* (*Therap. Gazette*, p. 266), has described a new use for Calabar bean. Having observed that it causes tetanus of the muscular coats of the intestines in animals, he tried it in cases of obstinate constipation dependent on atony of the coats of the bowels. The strength he used was, ext. physostigma, 0·05 gram; glycerine, 10·00 grams. A dose of six drops every three hours during the day gave relief in twenty-six hours.

Messrs. Heckel, Mourson and Schlagdenhauffen have sent to the French Academy (*Comptes Rendus*, xcv. 196) an account of the physiological action of globularine, $C_{15}H_{20}O_8$, and globularetine. The former in doses of 0·15 to 0·56 gram acts somewhat like theine; but in doses of 0·65 gram it produces toxic symptoms, lowering the pulse and the temperature and causing vertigo, headache, shivering, pain in the limbs, etc. It is this principle which has given to *Globularia* the reputation of having poisonous properties, and in consequence of which it obtained the name of *Frutex terribilis*. The globularetine, C_9H_6O, or resin of *Globularia*, is the purgative principle, but its action is less than that of the decoction of the plant, probably because in a natural state it is combined with mannite. It acts more rapidly as a purgative if dissolved in an alkaline solution. It resembles chrysophanic acid and aloin in the character of its effects, the dose varying from 0·125 gram to 1 gram. It also has a powerful action on the kidneys, raising the amount of solid matter excreted one-third above the normal quantity. Globularetine is very difficult to obtain in a state of purity, being always accompanied by a volatile principle which has a diuretic action.

According to Merck's Trade Report, experiments made by Dr. Hiller in the Charité at Berlin have shown that perfectly pure colocynthin is an excellent purgative, entirely devoid of the toxic and drastic effect produced by extract of colocynth. It is administered internally in doses of 1½ to 6 grains. It is a yellowish-white powder of a purely bitter taste, very soluble in water and alcohol.

Dr. Meredith, in the *Birmingham Medical Review*, recommends oil of peppermint as an external application for allaying the neuralgic pain so often complained of in cases of *Herpes zoster*. He has used it with great relief to the patient even when the eruption was out in a fresh florid condition (*Practitioner*, p. 134). He thinks that the value of this remedy in relieving neuralgic pain deserves to be better known.

Dr. E. Thompson recalls attention, in the *Lancet* (July 29, p. 136), to the use of the giant puff-ball, *Lycoperdon giganteum*, as a local hæmostatic. He states that it forms a most soft and comfortable surgical dressing, and that the powder it contains seems to possess antiseptic and anodyne properties. The mature plant is used. At this period it is about the size of a child's head and is covered with a thin skin; the latter is removed, and the capillitium and spores which form a dusty mass are used. Mr. Fagan, a leading surgeon in Belfast, found that it at once restrained bleeding from arteries in the bone in the neighbourhood of the orbit, after the failure of other means. The researches of Hayem (*Lancet*, p. 146), on the reason of the coagulation of the blood, show that the hæmostatic action of the puff-ball, as well as of all other spongy or powdery substances, depends upon the fact that healthy blood deposits hæmatoblasts or minute corpuscles on any foreign substance introduced into a vein, which become adhesive points for the subsequent attachment of particles of fibrin. This action, however, also takes place when the vessels themselves assume abnormal conditions, as when cut or altered by disease. The hæmatoblasts undergo change and become confluent more rapidly under the influence of warmth, which explains the power of warm water to arrest hæmorrhage. The hæmorrhagic tendency is believed to depend upon the absence from or small quantity of hæmatoblasts in the blood, since transfusion of blood has been found to arrest hæmorrhage in such cases.

MM. Weber and Thomas, of the French army (*Lancet*, p. 152), state that they have prepared tow in a chemically pure state, of perfect whiteness, soft, very elastic and readily absorbent, easily impregnated with antiseptics, and cheap. It is obtained by treating ordinary tow with caustic soda, and afterwards washing with solution of hypochlorite of soda to bleach it, the alkali being subsequently removed by hydrochloric acid. The cost of the tow is stated to be 1½ fr. to 1¾ fr. per kilo, or when carbolized 2 fr. to 2½ fr. per kilo. To impregnate it with carbolic acid, a solution of 3 parts of the acid in 2 of alcohol is sprinkled on sheets of filter paper laid between sheets of tow and placed in a closed box. In forty-eight hours the acid is said to pass entirely into the tow. The tow is thus made to contain 10 per cent. of carbolic acid.

The medical papers are now largely discussing phthisis from various aspects, and it is within the limits of possibility that the pharmaceutical chemist may be called upon to provide test solutions for detecting the *Bacillus tuberculosus*. It may be as well for him to know therefore that Dr. H. Gibbes, Curator of the King's College Museum, London, publishes, in the *Lancet* (p. 183), a new method of detecting the *Bacillus tuberculosus* in phthisical sputa, which he says he has found more successful than either Koch's or Ehrlich's process. The solutions he uses are those of magenta crystals and chrysoidin, and the formula given is:—Magenta crystals, 2 grams; pure aniline, 3 grams; alcohol, specific gravity ·830, and distilled water, 20 cubic centimetres. The aniline is dissolved in the spirit and then rubbed up with the magenta in a glass mortar, adding the spirit gradually until all is dissolved, then adding the water slowly while stirring. The solution should be kept in a stoppered bottle. The solution of chrysoidin is a saturated one in distilled water, a crystal of thymol being added to preserve it. Dilute nitric acid, made of 1 part of commercial acid and 2 of distilled water, is used to remove the excess of colour after using the magenta stain. According to Dr. Gibbes the bacilli, when mounted, can be detected with daylight by an ordinary ¼ inch objective, and a ⅛ dry glass will show with the same illumination that they are rows of spherical bodies.

In the *Medical Times and Gazette* (p. 165), appears an official report from Surgeon-Major T. Edmonston Charles, of the Indian army, recommending the use of coca for assuaging thirst during great exertion in hot countries. He is so satisfied as to its thirst-assuaging powers that he remarks, "Had our troops been provided with this leaf in Afghanistan, instead of the disaster after Maiwand our military historians would have had to chronicle a strategic movement to the rear on Candahar. Had the Russian detachment possessed this leaf they would have reached Khiva over the route they were sent to cross instead of having been forced to relinquish the attempt and retire demoralized with their ranks thinned by death in consequence of want of water." He states also that he has seen an infusion of coca relieve the intense headache of nervous exhaustion, ward off the failure of nerve power during prolonged fever, and enable patients to struggle through other exhausting diseases. That coca does possess valuable properties in the fresh state there can be but little doubt, or it would not be so extensively used in Bolivia and Peru, but the leaves as imported into this country do not generally seem to possess the activity with which they are credited by Dr. Charles. Even in Bolivia "coca fresca" is always used, the leaves, as the writer is assured by a resident in Bolivia, being never kept for more than three months. How far the activity of the drug may be due to a volatile oil, as in coffee, has yet to be determined, but a tincture prepared from the fresh leaves by a careful pharmacist would be fitter for experiment than the dried leaves. The coca plant is now being cultivated in Ceylon, and if the experiment be tried, as Dr. Charles suggests, with the Indian contingent sent to Egypt, some interesting results may be obtained.

The stacte of Scripture has been generally referred to liquid storax. But Mr. Heathcote, of Inhambane, in Africa, points out that the native name for a resin found on the east coast and which is fragrant when pounded and burnt, or even when boiled in water, is stakate and staka. Of the tree yielding this resin, which he describes as a kind of copal, he has discovered a forest 200 miles long, running parallel with the coast and midway between it and the first range of mountains, and about 100 miles from Inhambane. This copal tree is remarkable for its enormous height, so that the trees look with respect to the others like an ordinary tree in a hayfield (*Nature*, p. 351). Mr. Heathcote has collected about six tons of the resin.

Whether the present mode of cultivating lavender (*i.e.*, growing it for four years only) is the best may be open to question, seeing how often old and large plants are covered with blossom. The *Gardeners' Chronicle* (p. 262) mentions two hedges of lavender, in the terrace-garden at Pusey Park, Faringdon, which are literally sheeted with blossom. The hedges are four feet or so in width, and make a free growth every summer, but they are cut back every September to a width of twenty inches or so, and break out again into profuse growth in spring.

Dr. Paul Sorauer, of Proskau, Silesia, has originated the idea of forming an international association of the botanists and entomologists most competent to study the diseases of plants and the means by which they may be obviated or cured (*Gardeners' Chronicle*, p. 176). Among the objects proposed are the collection of statistics respecting plant diseases under differences of locality, soil, climate, etc., observations on the power of particular varieties to resist disturbing influences, and experiments with a view to discover the best varieties of plants to be cultivated in different localities. Growers of henbane and lavender will doubtless be glad to forward observations to Dr. Sorauer, if they can only obtain in return information as to the best means of obviating the fungus disease in the lavender and of destroying the insect enemies of the henbane.

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Continued from page* 130.)

FERRI TANNAS (*Tannate of Iron*).

Solution of chloride of iron (ferric; specific gravity, 1·480–1·484)	35
Tannic acid	30
Alcohol (stronger)	12
Water of ammonia	q.s.
Distilled water	q.s.

Dilute the solution of chloride of iron with 200 parts of distilled water; precipitate completely with water of ammonia, collect the precipitate, wash it well, and mix it with a solution of the tannic acid in 40 parts of distilled water. Macerate for a few hours, and then add the alcohol. Collect the precipitate upon a strainer, wash it, and dry it.

It should be a coal-black powder.

PLUMBI TANNAS (*Tannate of Lead*).

Solution of subacetate of lead	100
Tannic acid	38
Distilled water	q.s.

Dilute the solution of subacetate of lead with 500 parts of distilled water, and add to it the tannic acid, previously dissolved in 500 parts of distilled water. Let the mixture stand a few hours, collect the precipitate upon a filter, wash it with about 500 parts of cold distilled water, and dry it at 25°–30° C. (77°–86° F.).

TINCTURA ALEXIPHARMACA HUXHAMI (*Huxham's Compound Tincture*).

Huxham's Tincture (of Bark).

Red cinchona (Javanese or East Indian), in coarse powder	48
Orange peel, deprived of the inner white layer	36
Serpentaria, bruised	9
Saffron, finely cut	4
Stronger alcohol	240
Water	240

Macerate for seven days, express, and filter.

TINCTURA ANTASTHMATICA (*Anti-Asthmatic Tincture*).

Licorice root, cut and bruised	12
Iris (blue flag) root	6
Squill, dried and bruised	3
Saffron, finely cut	2
Alcohol	214
Benzoic acid	1
Sugar	18

Macerate the first four ingredients with the alcohol during fourteen days; then express and dissolve in the strained liquid the acid and sugar. Finally filter.

TINCTURA ANTIFEBRILIS WARBURGI (*Warburg's Fever Tincture*).

(Abbreviated Formula.)

Tincture of orange peel	5
Compound tincture of aloes	20
Stronger alcohol	15
Spirit of camphor	2
Sulphate of quinine	1

Dissolve the sulphate of quinine in the alcohol, and add the other liquids.

N.B.—Tincture of orange peel (Pharm. Neerl.) is prepared by macerating 1 part of sweet orange peel (only the outer yellow portion) with 6 parts of alcohol for fourteen days.

Compound tincture of aloes (Pharm. Neerl.) is prepared by mixing equal parts of tincture of aloes (aloes 1, alcohol 8), tincture of myrrh (myrrh 1, stronger alcohol 8), and tincture of saffron (saffron 1, alcohol 8).

Spirit of camphor (Pharm. Neerl.) is composed of camphor 1, stronger alcohol 12 parts.

TINCTURA CHINOIDINI (*Tincture of Chinoidin*).

Purified chinoidin, in fine powder	2
Hydrochloric acid	1
Alcohol	17

Dissolve the chinoidin in the alcohol and acid, and filter.

TINCTURA DIGITALIS ÆTHEREA (*Ethereal Tincture of Digitalis*).

Digitalis, dried and in coarse powder	2
Ether	5
Stronger alcohol	15

Macerate during seven days, express, filter (avoiding loss by evaporation), and preserve the filtrate in a dark place.

TINCTURA GELSEMII (*Tincture of Gelsemium*).

Gelsemium, in powder	1
Alcohol	10

Macerate during three days, express and filter.

TINCTURA HYRACEI (*Tincture of Hyraceum*).

Cape hyraceum	1
Distilled water	6
Stronger alcohol	2

Macerate the hyraceum during six days with the distilled water. Then add the alcohol and filter.

[We quote this, *not* for the purpose of advising its use, but to attach to it a criticism. We think the time has arrived when the unscientific, empirical use of excrementitious medicines should finally be abandoned.—ED. N. R.]

(*To be continued.*)

* From *New Remedies*, August, 1882.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 2, 1882.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE PROPERTIES OF ANTISEPTICS.

THE literary history of antiseptics is a long string of contradictions. Almost without exception the virtues of every substance vaunted as an antiseptic have been challenged; nearly every investigator has had his pet antiseptic which he has "proved" by experiment to be better than any other, and even such a body as carbolic acid has been declared on the one hand to be an energetic germicide, and on the other as only producing unfavourable conditions for the development of germs. Some explanation of this is no doubt to be found in the varying conditions under which experiments have been made by different investigators, as well as in the unwarranted inferences that have been frequently drawn from the results obtained. Some experiments recently made by M. LE BON appear also to show that not only the antiseptic itself, but the condition of the substance upon which it is used, exercises a powerful influence upon the result obtained and has to be taken into consideration. For instance, an aqueous liquor containing one-tenth of its weight of minced flesh gives off at the commencement of putrefaction an odour that is very fetid, but which is destroyed by a relatively small quantity of an antiseptic. If, however, the putrefaction be allowed to go on, after about two months there will be developed in the same liquid new bodies, having a special odour, which requires at least double the quantity of the same antiseptic for its destruction. Again, if the relative power of antiseptics be estimated by taking as a basis their disinfecting properties upon a given weight of such a liquid as that mentioned, it would appear, according to M. LE BON, that amongst the most powerful disinfectants are potassium permanganate, chloride of lime, sulphate of iron acidified by acetic acid, carbolic acid and the glyceroborates of sodium and potassium. He found, for instance, that to disinfect 10 c.c. of the flesh liquid it required 500 c.c. of saturated aqueous solution of salicylic acid, 80 c.c. of a saturated solution of carbolic acid, 80 c.c. of a 10 per cent. solution of glyceroborate of sodium, and only a few drops of a 1 per cent. solution of potassium permanganate. But there is no parallelism between the disinfectant action of an antiseptic and its action upon microbes, for potassium permanganate, which is one of the most powerful disinfectants, was found to exercise no appreciable action upon them, whilst alcohol, which hinders for a long time their development, exercises upon the products of putrefaction only a very slight disinfectant action. There would seem, therefore, to be no relation between the power of preventing the initiation of putrefaction and that of arresting it when it has appeared. Alcohol and carbolic acid, which are preservative agents *par excellence*, have only a very feeble action upon putrefaction that has commenced. In fact, with the exception of a very small number of powerful poisons, such as bichloride of mercury, the greater number of reputed antiseptics have scarcely any action upon bacteria. This is notably the case with carbolic acid, which, curiously enough, M. LE BON considers to be one of the best mediums that can be employed to preserve living bacteria.

Another experiment illustrating the difference that may exist unsuspected in the same substances treated antiseptically at different periods was made by introducing frogs into a flask at the bottom of which was a thin layer of the flesh liquor before mentioned. It was observed that at the commencement of the putrefaction the liquid, although rich in sulphuretted hydrogen, possessing an extremely fetid odour, swarming with bacteria and very virulent when injected under the skin, exercised no appreciable action upon the animals respiring in it; but the same liquid at the end of two months, though no longer possessing virulent properties when injected under the skin, killed in a few minutes the animals who had to breathe in it. There is, therefore, no parallelism between the virulent power of a putrefying body and the toxic power of the volatile compounds that are given off from it; indeed the two properties seem to be inverse the one of the other. M. LE BON reports that the extremely toxic nature of the volatile products of putrefaction were on more than one occasion demonstrated upon himself and other persons who happened to enter his laboratory during the course of his experiments.

The inferences that may be drawn from the results obtained by M. LE BON, as to the circumspection required in estimating the value of antiseptics, are to some extent confirmed by observations recently made by Herr HERZEN upon the varying influence of boracic acid upon different fermentations. He reports that whilst the conversion of starch into glucose by means of the salivary or pancreatic ferment is not influenced by boracic acid, even when the menstruum is a saturated solution, the conversion of glucose into alcohol is favoured by the presence of boracic acid even in very minute quantity. On the other hand only a very small quantity of boracic acid is necessary to completely prevent the conversion of alcohol into acetic acid. In respect also to the fermentations of albuminoid bodies boracic acid shows a marked difference in its behaviour, the conversion of albumen and fibrin into peptone and tryptone by means of pepsine and trypsine being remarkably accelerated by it, whilst putrefactive fermentation is entirely prevented.

THE INLAND REVENUE REPORT.

The Report of the Commissioners of Her Majesty's Inland Revenue for the year ending the 31st of March last, which has just been issued, contains the usual report of the Principal of the Laboratory. From it we learn that the work under his superintendence has recently very largely increased, the number of samples examined last year having amounted to upwards of 26,000, or an increase of 8000 as compared with the number mentioned in the last report. This increase is attributed principally to the beer duty and to the new regulations for determining the obscuration of foreign spirits on importation. But besides the analyses made in connection more especially with the Customs and Inland Revenue Departments, there is now a large amount of work done in the Laboratory on behalf of other departments of the State, especially in the examination of samples of goods supplied under contract. The necessity for the service thus rendered to the State may be estimated by the fact that, taking the India Office for an example, out of four hundred and eighty-eight general samples submitted, eighty-seven, or 17 per cent. were reported against. Nearly one-half of the samples of wine analysed fell below the standard, and 68 per cent of the samples of brandy, which by the terms of the contract was required to be derived solely from the fermented juice of the grape, had to be rejected as containing variable proportions of grain spirit. The adulteration of oils, too, has been found to have lately become very general, sophistication being effected in more subtle and ingenious ways than formerly. For the Board of Trade eighty-six samples of lime juice and five hundred and fifty samples of lemon juice had been examined, with the result that 6 per cent. of the lime juice and 16 per cent. of the lemon juice (the latter representing more than 14,000 gallons) were rejected. Most of the rejected lemon juice, though otherwise satisfactory, contained free pulpy matter, having been prepared early in the season when lemons are required for making candied peel, and the squeezing is done expeditiously, so that the juice is looked upon rather as a by-product. The pulpy matter has, however, to be got rid of by filtration before the juice is fit for use on shipboard, and as this operation is tedious, attempts are made to get juice containing pulpy matter passed in order to avoid the inconvenience and expense of clarification.

Another duty performed in the Inland Revenue Laboratory is the examination of samples referred by magistrates for analysis under the 22nd section of the Sale of Food and Drugs Act. Of these during the year there were forty-one, consisting of milk, butter, coffee, bread, oatmeal, beer, mustard and whisky, and in fifteen cases the Laboratory officials were unable to support the certificates of the public analysts. Certain samples of milk were received from Dundee, concerning which the prosecutors did not charge the defendants either with adding water or abstracting cream, but asked for a conviction on the ground that the milk was of inferior quality. The total solids in each case were between 11 and 12 per cent., and the proportion of fat, though low, was not lower than is found in genuine milk of poor quality. On receiving a report to this effect the Procurator Fiscal asked for an opinion as to the liability of persons selling milk of low quality, and in reply the Principal of the Laboratory pointed out that the Act of 1875 is silent on the question of standards, from which he inferred that no penalty is incurred by the sale of milk in the state in which it is yielded by a cow in healthy condition under the usual changes of food and season. Another sample of milk was remarkable for the low amount of "solids not fat" and the high amount of mineral matter, especially chlorides, it contained. In this case the cow was reported to be healthy and well fed and to have been milked in the presence of the analyst. Two samples of coffee, which, according to the certificates of the analyst, contained one 10 per cent. and the other 27 per cent. of chicory were found to be quite free from that substance.

The principal report contains one or two points worthy of mention. The licences issued to patent medicine vendors during the year numbered 18,765, and the amount realized for patent medicine stamps reached £144,884, being an increase of £6,205 on the previous year. A falling off in the consumption of beer is connected, among other causes, with the manufacture of temperance drinks, which has been exceedingly brisk. Although some of these contain no alcohol, others are stated to contain a certain amount of spirit generated by fermentation, and it has been found necessary to insist upon the conditions that such drinks shall not be made from malt and hops or contain more than 3 per cent. of proof spirit.

THE BRITISH ASSOCIATION.

The meeting of the British Association at Southampton has been continued during the past week, and on the whole, though not so numerously attended as some meetings in previous years, it has been fairly successful. The difficulty as to the place of meeting next year, caused by the withdrawal of the invitation from Oxford, has been solved by a resolution accepting an invitation from Southport, the President-Elect being Professor Cayley. A vigorous, though unsuccessful effort was made by a section of the members to secure the acceptance of an invitation to the Association to meet next year in the Dominion of Canada, the invitation having the support of the Governor-General and the Premier of the Dominion. It was decided, however, by a considerable majority, that the Association should meet in Montreal in 1884, the other candidates being Birmingham, Aberdeen and Nottingham.

We are requested by the President of the British Pharmaceutical Conference to say that the title of his Address, printed in the last number of this Journal, is "The Relation of Pharmacy to the State."

Provincial Transactions.

LEEDS CHEMISTS' ASSOCIATION.

At a special meeting of the Committee, held at the Church Institute, on August 24, 1882, Mr. E. Yewdall, Vice-President, in the chair:

It was resolved, on the motion of Mr. R. Reynolds, seconded by Mr. P. Jefferson:—"That the Committee of the Leeds Chemists' Association record their sorrow at the death of their President, Mr. T. B. Stead, who was a founder of the Association twenty years ago, and who had been one of its constant supporters ever since. Mr. Stead's sound business-like sense, genial manner, and readiness to work for the general good had secured for him the esteem of his fellow chemists. The Committee respectfully tender to Mrs. Stead and her family the assurance of their sympathy under this bereavement."

The Hon. Secretary, Mr. J. Hellowell, was requested to forward to Mrs. Stead a copy of the above resolution, and to enter the same on the minutes of the Association.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page 177.*)

Additional Delegates who were Present.

We are informed by a correspondent that, in addition to the gentlemen who were mentioned last week as representing various Associations at the Conference, Mr. George Ward, F.C.S., F.I.C., and Mr. F. W. Branson were present as delegates from the Leeds Chemists' Association.

The reading of papers was then proceeded with. The first paper read was the following—

First Report on the Differences between the Essential Oils of Cinnamon and Cassia.

BY A. H. JACKSON, B.SC., PH.C.

This investigation was begun in answer to a question on the Conference Blue List, and the work has been done in the Laboratories of the Owens College, Manchester.

The oils were distilled by Mr. Umney from carefully selected samples of barks:—100 lbs. of the bark of *Cinnamomum Zeylanicum* yielded nearly 8 ounces of the essential oil of cinnamon, and 200 lbs. of the bark, whose source is variously ascribed to the *Cassia lignea*, *Laurus cassia* and *Cinnamomum aromaticum*, yielded nearly 16 ounces of the essential oil of cassia; thus the barks practically yielded $\frac{1}{2}$ per cent. of oil on distillation.

The aim in these experiments was to treat both oils in a similar way, in the hope of separating some product from the one that is either not contained in the other, or is contained in a different proportion, and as a physical examination only involved a very slight consumption of material, the oils were tested from both a physical and a chemical standpoint, although the Conference question only asks for a chemical distinction.

Physical Examination.

Effects on the Senses.—The oils had a pale-brown colour, distinctive and characteristic odours, sweet taste, the cinnamon being more fiery than the cassia.

Effects on Polarized Light.—Gladstone says that oil of cassia has no effect (*Journ. Chem. Soc.*, xvii., 3). The 'Pharmacographia' puts cassia as 0°·1 dextro-rotatory with a column 50 mm. long, and cinnamon as slightly lævo-rotatory; whilst Symes says that cassia has a lævo-rotatory power of 1° and cinnamon none, with a column 100 mm. long.

Relative Densities.—The density was calculated from the formula $\Delta = \frac{m}{w}(Q-\lambda)+\lambda$, where m = the apparent weight in air; Q = density of the water used; λ = density of the air, at the time of weighing, in relation to water at 4° C. as the unit; w = the apparent weight of a volume of water of density; Q equal to the volume of the body. 1st weighings at 17° C.:—Empty flask = 28·466 grams; flask of water = 93·251 grams; water = 64·785 grams; flask of cassia = 95·583 grams; cassia = 67·117 grams; flask of cinnamon = 93·889 grams; cinnamon = 65·423 grams. Therefore, cassia $\Delta = 1{\cdot}0346$; cinnamon $\Delta = 1{\cdot}0086$. 2nd weighings at 14° C.:—Empty flask = 28·466 grams; flask of water = 93·257 grams; water = 64·791 grams; flask of cassia = 95·819 grams; cassia = 67·353 grams; flask of cinnamon = 94·013 grams; cinnamon = 65·547 grams. Therefore cassia $\Delta = \frac{67{\cdot}353}{64{\cdot}791}({\cdot}9993 - {\cdot}0012) + {\cdot}0012 = 1{\cdot}0387$; cinnamon $\Delta = \frac{65{\cdot}547}{64{\cdot}791}({\cdot}9993 - {\cdot}0012) + {\cdot}0012 = 1{\cdot}0109$.

The mean of these two determinations fixes the density of cassia at 1·0366, and cinnamon at 1·0097 in vacuo and compared with water at its maximum density.

The published densities vary somewhat. Thus, that of cassia is put as 1·0297 at 15·5° C. (in Watts's Dictionary); as 1·059 at 11° C. (Watts's Supplement); as 1·066 ('Pharmacographia'); as 1·053 at 15·5° C. (Symes); whilst that of cinnamon is put as 1·035 ('Pharmacographia'); as 1·008 at 25° C. (Gmelin's 'Chemistry'); 1·025 at 15·5° C. (Symes).

Their *Absorption Spectra* were tried with negative results.

Refractive Energy.—The angle (ϕ) of an empty, hollow, triangular prism, was determined by observing the distance through which it had to be rotated in order to see a ray of light reflected from both sides of the angle, which measured—1st reading, 57° 58′; 2nd reading, 58° 5′ 10″; mean, 58° 1′ 35″ = ϕ. The prism was then filled with the essential oils, and the minimum deviation (δ) of a ray of *Na* light measured:—

	Direct Reading.	Prism Reading.
1st experiment .	1° 27′ 0″	319° 24′ 20″
2nd ,, .	1° 25′ 20″	319° 25′ 40″
Mean	1° 26′ 10″	319° 25′ 0″

360° − (319° 25′ − 1° 26′ 10″) = 42° 1′ 10″ = δ for cinnamon.

	Direct Reading.	Prism Reading.
1st experiment .	1° 26′ 40″	317° 29′ 0″
2nd ,, .	1° 26′ 0″	317° 28′ 0″
Mean	1° 26′ 20″	317° 28′ 30″

360° − (317° 28′ 30″ − 1° 26′ 20″) = 43° 57′ 50″ = δ for cassia.

The index of refraction (μ) was calculated from the formula $\mu = \frac{\sin\frac{1}{2}(\delta+\phi)}{\sin\frac{1}{2}(\phi)}$.

$$\mu = \frac{\sin\frac{1}{2}(42^\circ\ 1'\ 10'' + 58^\circ\ 1'\ 35'')}{\sin\frac{1}{2}(58^\circ\ 1'\ 35'')} = \frac{\sin 50^\circ\ 1'\ 22\frac{1}{2}''}{\sin 29^\circ\ 0'\ 47\frac{1}{2}''} = \frac{6424811}{4850110} = 1{\cdot}32446 \text{ for cinnamon.}$$

$$\mu = \frac{\sin\frac{1}{2}(43^\circ\ 57'\ 50'' + 58^\circ\ 1'\ 35'')}{\sin\frac{1}{2}(58^\circ\ 1'\ 35'')} = \frac{\sin 50^\circ\ 59'\ 42\frac{1}{2}''}{\sin 29^\circ\ 0'\ 47\frac{1}{2}''} = \frac{6293863}{4850110} = 1{\cdot}29767 \text{ for cassia.}$$

The specific refractive energy was then equal to $\left(\frac{\mu-1}{d}\right)$ where (d) is the density of the oils at 15·5° C., thus cinnamon $= \frac{1{\cdot}32446-1}{1{\cdot}0107} = {\cdot}32102$, and cassia $= \frac{1{\cdot}29767-1}{1{\cdot}0377} = {\cdot}28685$. This energy is said to be due to the contained cinnamaldehyde.

From these observations it may be inferred that neither the relative densities nor the refractive energies are sufficient guides in distinguishing mixtures of these oils.

Chemical Examination.

These oils consist chiefly of cinnamaldehyde, together with small quantities of cinnamic acid, resins, and unexamined hydrocarbons. The acid and resins are probably due to oxidation of the oil, as they increase in amount with age and exposure. Of the latter, Mulder has examined two, viz., the α-resin, fusible at 60° and soluble in cold alcohol; and the β-resin, fusible at 145°, soluble in hot alcohol, but sparingly so in cold. There is said to be an unexamined camphor in oil of cinnamon, and a stearoptene in oil of cassia ('Pharmacographia'). Rochleder and Hlasiwetz found in oil of cassia a crystalline deposit to which they gave the name of 'benzhydrol,' and the formula $C_{14}H_{15}O_{2\frac{1}{2}}$ (Wurtz's 'Dictionary'). Bizio says that cinnamon becomes turbid at 20° from a deposition of camphor; and Margueron that it freezes several degrees below zero, and then melts at 5° (Gmelin's 'Chemistry,' vol. xiii.). In Gerhardt's edition of Liebig's 'Chemistry,' essence of canelle is said to solidify at $-5°$, and to leave crystals at $-20°$.

Fractional Distillation.—All temperatures measured with a centigrade thermometer. A portion of the oil of cassia, being neutral but turbid, was added to some fused $CaCl_2$ and ether; then decanted and the ether distilled off, after which the temperature rose to 218° and half the oil came over, leaving a solid black residue. This distillate was separated into six parts by heating in a small retort:—

1st. Distilled under 220°, small portions of a yellow and a light brown liquid which do not mix.

2nd. Distilled about 225°, brown liquid.

3rd. Distilled at 242° to 244°, large portion of brown liquid.

4th. Distilled at 245°, pale yellow, about half the bulk of the brown and more fragrant.

5th. Distilled about 250°, yellowish-brown liquid from which fragrant and acicular crystals separated out after some weeks.

6th. Distilled above 255°, small portion of dark brown liquid. Residue, a brownish-black solid, from which white fumes arose on strongly heating, but nothing more came over.

Bertagnini's Method.—This was thought to be productive of a better result than the method of fractionation. So that a portion of the cassia was shaken, in small quantities at a time, with a saturated solution of potassium bisulphite, whereby a white magma and a small lot of yellowish liquid separated out; this was filtered and washed with methylated spirit by the aid of a Bunsen pump; the residue, on the filter, supposed to be a crystalline mass of cinnamaldehyde and potassium bisulphite was put aside for further investigation. To the filtrate were added water and sodium chloride; a very small quantity of oil separated out and floated on the surface. The supernatant oil, removed by a separating funnel, was treated with fused potassium carbonate to remove water, then dissolved out by anhydrous ether; after evaporation of the ether there was left a clear, brown oil, smelling of sawdust and patchouli (30); a pipette, which had been first tried for the removal of the supernatant oil, was washed with methylated spirit and then with strong sulphuric acid, whereby a brownish-violet colour was developed.

Some of the oil of cinnamon was treated in the same way and with a similar result. Each oil yielded about three times its weight of the washed, damp, fresh, crystalline magma.

Sometimes the oils did not combine with the potassium bisulphite; and at other times so entirely combined as apparently to leave no yellow liquid (as if there was nothing but cinnamaldehyde present); some of the lots liquefied and apparently separated into their original state immediately after combination. These liquefied mixtures of cassia and bisulphite were put into a retort, with some water, and distilled by passing steam through it; a brown residue (1) was left.

To the distillate sodium chloride was added and it was re-distilled; from the opalescent distillates a few drops of a yellow liquid separated, floating on the surface and smelling of oil of bitter almonds.

Residue (1). On boiling, some of this clear, brown, fragrant, thick solution with cupric sulphate and caustic soda, it became yellowish-red and turbid; in a little time it separated into a yellowish-brown liquid and a reddish-brown residue, consisting of red cuprous oxide and an oily substance, which, on addition of water, formed a yellow, turbid solution smelling of benzyaldehyde; therefore No. 1 probably contains a glucoside or glucose.

As it is probable that the cinnamaldehyde is the only constituent of these oils which combines with the potassium bisulphite, it is in the filtrate from their magmas that the cause of difference between the oils is likely to be found. But, as the oils are said to consist almost entirely of the cinnamaldehyde, there is but a very small quantity of material, and that largely diluted, left for the investigation.

The PRESIDENT said pharmacists had long wanted to know something of the differences and the causes of the differences between the oils of cinnamon and of cassia, and the Committee had asked Mr. Jackson to endeavour to throw some light on the subject, and he would now propose a vote of thanks to him for the skill with which he had so far accomplished the work. Mr. Jackson had confirmed what had been previously observed, that the specific gravity of cinnamon oil was considerably below that of cassia, for although the specific gravities had been given very differently by different observers, still taking them all it was clear that the specific gravity of cassia was considerably above that of oil of cinnamon. The numbers Mr. Jackson had quoted were for cassia from 1066 to 1030, and for cinnamon from 1035 to 1008; but he himself found the specific gravity of oil of cassia was 1037, while that of cinnamon was 1010. There seemed to be no great difference in the refractive energy. Finally Mr. Jackson said the chief cause of the difference would unfortunately be found in a material which was present in a very small proportion in both these oils, for each of them consisted largely of cinnamaldehyde. This was unfortunate, because though they were anxious that gentlemen should work at such subjects as this, which required special skill and expensive materials, at the cost of the Conference, still there must be a limit, and if they were to spend £10 or so simply to get from one pound of oil only a very small quantity of the material, which then only *might* contain what caused the difference between the two oils, he feared their funds would be exhausted before they arrived at any very satisfactory conclusion.

The vote of thanks was carried unanimously.

The next paper read was—

ON THE ALKALOIDAL VALUE OF BELLADONNA PLANTS AT DIFFERENT PERIODS OF GROWTH.

BY A. W. GERRARD, F.C.S.

At last year's meeting of this Conference I presented my first report on belladonna, the main features of which demonstrated the relative atropine value of cultivated and wild plants. The wild variety was found to be richest in atropine, and, contrary to general opinion, the leaf in both varieties was found to be richer than the root.

In continuation, I have been able to examine this summer two specimens of the first year's growth of the plant; likewise the second year's growth at three periods of development, viz., before, during, and after flowering. The object as regards the second year's plant was to determine at what period it attains its maximum therapeutic value.

Immediately on receipt of the fresh plants, the leaves and roots were separated and well dried, the estimation of the atropine being completed in less than a month from the time of collection. This rapidity of manipulation was considered advisable, to avoid as much as possible the changes plants undergo by keeping.

In the present experiments the process by which the atropine has been estimated differs from that described in my first report, the method of extraction, however, has been the same; the difference is that I have employed a volumetric instead of a gravimetric method.

For this purpose, I titrate the ethereal alkaloidal residue with a centinormal sulphuric acid, 100 parts of which is made to exactly neutralize 1 part of pure atropine. The alkaloid residue being but sparingly soluble in water I dissolve it in alcohol and colour with litmus, so as to clearly indicate the critical point. This method I find both rapid and accurate; to test it, two samples of commercial atropine, and two made by myself from cultivated and wild plants, gave upon titration, figures agreeing within 1 per cent. This result, whilst demonstrating the accuracy of the method, also shows that commercial atropine is a very pure substance.

The first year's plants examined were both uncultivated, one grown in Yorkshire on a chalk soil, the other in Sussex in leaf mould; none of these plants appeared to have flowered, they averaged 6 inches in height and twenty of them yielded on drying 203 grains of leaf and 165 grains of root. These two varieties gave the following results:—

Atropine in 100 *parts Wild Belladonna, First Year's Growth.*

	Roots.	Leaves.
From chalk soil . . .	·21	·23
From leaf mould . . .	·09	·22

The only value of this experiment is to show that the plant in the first year of its growth contains about half the quantity of atropine present in older plants, and practically this is of little importance, as on account of its small growth it is never collected for the druggist's use. The result also helps to confirm what I have stated in my previous paper, viz., that a chalky soil favours the formation of atropine.

Examination of Second Year's Plant.

The cultivated kind only was subjected to analysis. It was grown by Mr. Ransom, of Hitchin, and gathered in the months of May, June and July, June being the month when it is usually collected for the druggist's use, and would be expected to have arrived at maturity. The plants I received averaged 3 feet in height. The May plant, though not fully developed, had the most luxuriant crop of leaves. On the June plants the flowers were abundant, but the leaves were small. The July plant was covered with unripe fruits and small leaves.

Atropine in 100 *parts Cultivated Belladonna, Second Year's Growth.*

When collected.	Leaves.	Roots.
May	·25	·21
June	·36	·32
July	·34	·32

This result shows that the plant before flowering is not rich in active principles, but it appears that at the period of flowering the full development is reached and maintained into the fruiting season. Especially worthy of attention is the increase in the June yield of atropine, it being one-third more than obtained from the May plant. The experiment also shows a simultaneous development of root and leaf, and not the exhaustion of the former to strengthen the latter. The inference from this is that root and leaf should be gathered at the same period.

Throughout these experiments, as on former occasions, the leaves have uniformly yielded more atropine than the roots.

The PRESIDENT said this was a strictly pharmaceutical report, and considering the powerful effect of such alkaloids as atropine on the human system any researches on such bodies was of extreme importance. He gathered that in speaking of atropine Mr. Gerrard alluded to what he defined last year rather as a double alkaloid, as he said he would not tie himself to the statement that the alkaloid he obtained was chemically pure atropine.

Mr. GERRARD said he used the term atropine in the general sense, as usually accepted.

Mr. NAYLOR asked if these results were to be considered as commensurate with those obtained last year, because one would rather suppose, inasmuch as he had employed a different method for estimating the total alkaloid, there would be some slight deviation. The process of manipulation was very much shortened and therefore it was probable that by the former process there would be a greater amount of loss.

Mr. EKIN said this was of course only a preliminary report, and as he understood that Mr. Gerrard was going to continue the subject he would ask him if he thought it worth while to examine further the accuracy of the sulphuric acid determination. It certainly had the merit of extreme simplicity, but it might be worth further investigation as to whether it really did indicate the amount of alkaloid. Mr. Gerrard had told them that what he understood by the name alkaloid, as generally received, was a mixture, and that of itself introduced a little uncertainty, but this would be much increased if there were any doubt thrown on the method of determination. In such a very delicate operation the indications of litmus would be hardly sufficiently delicate. He would suggest to Mr. Gerrard, if he continued this method of estimating the alkaloids, whether he would not find methyl orange or some similar body give much narrower indications than were possible with litmus. He hoped they would be careful in drawing deductions as to the difference in quality of plants grown on cultivated soil and in their natural state from so comparatively small a number of experiments.

Mr. MARTINDALE asked if the volumetric test by sulphuric acid would not reckon the uncrystallizable alkaloid as well as the crystallizable atropine, and thus lead to error. Some manufacturers found that a great deal of uncrystallizable alkaloid was produced.

Mr. PLOWMAN would be glad if Mr. Gerrard would explain exactly what he meant by saying that he used a centinormal solution, 100 parts of which would exactly neutralize 1 part of pure atropine. With reference to Mr. Naylor's remarks, it was only fair to notice that the gravimetric operation would hardly be practicable for estimating an amount of atropine such as was described by Mr. Gerrard last year. Some modification must be adopted in order to get any results at all.

Mr. HOLMES said it was interesting to note the statement that belladonna grown on chalky soil yielded more alkaloid than that grown on other soil. He had seen the plant growing on calcareous and on non-calcareous soil, and he had found that when growing on chalky or calcareous soil it was far more luxuriant, which might account for the presence of more alkaloid.

A vote of thanks having been passed to Mr. Gerrard for his paper,

Mr. GERRARD, in reply, said he spoke of the total alkaloids because there was some uncertainty whether the product obtained was one definite substance or not. There was this difference between the process now employed and the one he adopted last year, that there was not so much mechanical loss involved in the present process, because there were not so many operations in it. In working out long processes, involving several precipitations and recrystallizations, there must be a mechanical loss, and therefore the percentages now given would be somewhat higher than those given before. Nevertheless, they were not very much so. The process he followed before was to obtain the alkaloid in as pure a state as possible, and to weigh it as alkaloid, and to do that, he ensured the thorough exhaustion of the mother-liquor of atropine, endeavouring, as far as possible to avoid mechanical loss. In reply to Mr. Ekin, who doubted whether the residue he obtained would be all alkaloid, he might say that the residue was not all alkaloid, but it was not all neutralized by sulphuric acid. All which was neutralized by the sulphuric acid he assumed to be alkaloid, and he believed it to be nothing else; because when ammonia was used to treat an extractive substance it liberated merely alkaloidal hydrates, and the sulphuric acid simply took them out together with colouring matters and some resins; but these latter would not neutralize sulphuric acid, therefore, he had a right to assume that what the sulphuric acid neutralized was alkaloid. Mr. Martindale had spoken of uncrystallizable substances, not atropine, in the alkaloidal residue. He had worked a good deal with alkaloids and on atropine, and he had always found what was usually called the uncrystallizable residue by further manipulation to be capable of crystallization, and if the sulphuric acid solution of his alkaloid was again precipitated the alkaloid could be easily extracted by pure ether in a crystalline state.

An adjournment for luncheon then took place.

(To be continued.)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The President's Address.

(Concluded from page 179.)

Electricity is the form of energy best suited for transmitting an effect from one place to another; the electric current passes through certain substances, the metals, with a velocity limited only by the retarding influence caused by electric charge of the surrounding dielectric, but approaching probably under favourable conditions that of radiant heat and light, or 300,000 kilometres per second; it refuses, however, to pass through oxidized substances, glass, gums, or through gases except when in a highly rarefied condition. It is easy, therefore, to confine the electric current within bounds, and to direct it through narrow channels of extraordinary length. The conducting wire of an Atlantic cable is such a narrow channel; it consists of a copper wire, or strand of wires, 5 mm. in diameter, by nearly 5000 kilometres in length, confined electrically by a coating of guttapercha about 4 mm. in thickness. The electricity from a small galvanic battery passing through this channel prefers the long journey to America in the good conductor, and back through the earth, to the shorter journey across the 4 mm. in thickness of insulating material. By an improved arrangement the alternating currents employed to work long submarine cables do not actually complete the circuit, but are merged in a condenser at the receiving station after having produced their extremely slight but certain effect upon the receiving instrument. So perfect is the channel and so precise the action of both the transmitting and receiving instruments employed, that two systems of electric signals may be passed simultaneously through the same cable in opposite directions, producing independent records at either end. By the application of this duplex mode of working to the Direct United States cable under the superintendence of Dr. Muirhead, its transmitting power was increased from twenty-five to sixty words a minute, being equivalent to about twelve currents or primary impulses per second.

The minute currents here employed are far surpassed as regards delicacy and frequency by those revealed to us by that marvel of the present day, the telephone. The electric currents caused by the vibrations of a diaphragm acted upon by the human voice, naturally vary in frequency and intensity according to the number and degree of those vibrations, and each motor current, in exciting the electro-magnet forming part of the receiving instrument, deflects the iron diaphragm occupying the position of an armature to a greater or smaller extent according to its strength. Savart found that the fundamental *la* springs from 440 complete variations in a second, but what must be the frequency and modulations of the motor current and of magnetic vibrations necessary to convey to the ear, through the medium of a vibrating armature, such a complex of human voices and of musical instruments as constitutes an opera performance. And yet such performances could be distinctly heard and even enjoyed as an artistic treat by applying to the ears a pair of the double telephonic receivers at the Paris Electrical Exhibition, when connected with a pair of transmitting instruments in front of the footlights of the Grand Opera. In connection with the telephone, and with its equally remarkable adjunct, the microphone, the names of Riess, Graham Bell, Edison and Hughes will ever be remembered.

Regarding the transmission of power to a distance the electric current has now entered the lists in competition with compressed air, the hydraulic accumulator, and the quick running rope as used at Schaffhausen to utilize the power of the Rhine fall. The transformation of electrical into mechanical energy can be accomplished with no further loss than is due to such incidental causes as friction and the heating of wires; these in a properly designed dynamo-electric machine do not exceed 10 per cent., as shown by Dr. John Hopkinson, and, judging from recent experiments of my own, a still nearer approach to ultimate perfection is attainable. Adhering, however, to Dr. Hopkinson's determination for safety's sake, and assuming the same percentage in reconverting the current into mechanical effect, a total loss of 19 per cent. results. To this loss must be added that through electrical resistance in the connecting line wires, which depends upon their length and conductivity, and that due to heating by friction of the working parts of the machine. Taking these as being equal to the internal losses incurred in the double process of conversion, there remains a useful effect of $100-38=62$ per cent., attainable at a distance, which agrees with experimental results, although in actual practice it would not be safe at present to expect more than 50 per cent. of ultimate useful effect, to allow for all mechanical losses.

In using compressed air or water for the transmission of power the loss cannot be taken at less than 50 per cent., and as it depends upon fluid resistance it increases with distance more rapidly than in the case of electricity. Taking the loss of effect in all cases as 50 per cent., electric transmission presents the advantage that an insulated wire does the work of a pipe capable of withstanding high internal pressure, which latter must be more costly to put down and to maintain. A second metallic conductor is required, however, to complete the electrical circuit, as the conducting power of the earth alone is found unreliable for passing quantity currents, owing to the effects of polarization; but as this second conductor need not be insulated, water or gas pipes, railway metals or fencing wire, may be called into requisition for the purpose. The small space occupied by the electro-motor, its high working speed, and the absence of waste products, render it specially available for the general distribution of power to cranes and light machinery of every description. A loss of effect of 50 per cent. does not stand in the way of such applications, for it must be remembered that a powerful central engine of best construction produces motive power with a consumption of two pounds of coal per horse-power per hour, whereas small engines distributed over a district would consume not less than five; we thus see that there is an advantage in favour of electric transmission as regards fuel, independently of the saving of labour and other collateral benefits.

To agriculture, electric transmission of power seems well adapted for effecting the various operations of the farm and fields from one centre. Having worked such a system myself in combination with electric lighting and horticulture for upwards of two years, I can speak with confidence of its economy, and of the facility with which the work is accomplished in charge of untrained persons.

As regards the effect of the electric light upon vegetation there is little to add to what was stated in my paper read before Section A last year, and ordered to be printed with the report, except that in experimenting upon wheat, barley, oats, and other cereals sown in the open air, there was a marked difference between the growth of the plants influenced and those uninfluenced by the electric light. This was not very apparent till towards the end of February, when, with the first appearance of mild weather, the plants under the influence of an electric lamp of 4000 candle power placed about 5 metres above the surface, developed with extreme rapidity, so that by the end of May they stood above 4 feet high, with the ears in full bloom, when those not under its influence were under 2 feet in height, and showed no sign of the ear.

In the electric railway first constructed by Dr. Werner Siemens, at Berlin, in 1879, electric energy was transmitted to the moving carriage or train of carriages through the two rails upon which it moved, these being sufficiently insulated from each other by being placed upon well creosoted cross sleepers. At the Paris Electrical Exhibition the current was conveyed through two separate conductors making sliding or rolling contact with the carriage, whereas in the electric railway now in course of construction in the north of Ireland (which when completed will have a length of twelve miles) a separate conductor will be provided by the side of the railway, and the return circuit completed through the rails themselves, which in that case need not be insulated; secondary batteries will be used to store the surplus energy created in running downhill, to be restored in ascending steep inclines, and for passing roadways where the separate insulated conductor is not practicable. The electric railway possesses great advantage over horse or steam-power for towns, in tunnels, and in all cases where natural sources of energy, such as waterfalls, are available; but it would not be reasonable to suppose that it will in its present condition compete with steam propulsion upon ordinary railways.

The deposition of metals from their solutions is perhaps the oldest of all useful applications of the electric current, but it is only in very recent times that the dynamo current has been practically applied to the refining of copper and other metals, as now practised at Birmingham and elsewhere, and upon an exceptionally large scale at Ocker, in Germany. The dynamo machine there employed was exhibited at the Paris Electrical Exhibition, its peculiar feature being that the conductors upon the rotating armature consisted of solid bars of copper 30 mm. square, in section, which were found only just sufficient to transmit the large quantity of electricity of low tension necessary for this operation. One such machine consuming 4-horse-power deposits about 300 kilograms of copper per twenty-four hours; the motive power at Ocker is derived from a waterfall.

Electric energy may also be employed for heating purposes, but in this case it would obviously be impossible for it to compete in point of economy with the direct combustion of fuel for the attainment of ordinary degrees of heat. Bunsen and Ste.-Claire Deville have taught us, however, that combustion becomes extremely sluggish when a temperature of 1800° C. has been reached, and for effects at temperatures exceeding that limit the electric furnace will probably find advantageous applications. Its specific advantage consists in being apparently unlimited in the degree of heat attainable, thus opening out a new field of investigation to the chemist and metallurgist. Tungsten has been melted in such a furnace, and 8 pounds of platinum have been reduced from the cold to the liquid condition in twenty minutes.

The largest and most extensive application of electric energy at the present time is to lighting, but, considering how much has of late been said and written for and against this new illuminant, I shall here confine myself to a few general remarks. Joule has shown that if an electric current is passed through a conductor the whole of the energy lost by the current is converted into heat; or if the resistance be localized, into radiant energy comprising heat, light, and actinic rays. Neither the low heat rays nor the ultra-violet of highest refrangibility affect the retina, and may be regarded as lost energy, the effective rays being those between the red and violet of the spectrum, which in their combination produce the effect of white light.

Regarding the proportion of luminous to non-luminous rays proceeding from an electric arc or incandescent wire, we have a most valuable investigation by Dr. Tyndall, recorded in his work on 'Radiant Heat.' Dr. Tyndall shows that the luminous rays from a platinum wire heated to its highest point of incandescence, which may be taken at 1700° C., formed $\frac{1}{24}$th part of the total radiant energy emitted, and $\frac{1}{10}$th part in the case of an arc light worked by a battery of fifty Grove's elements. In order to apply these valuable data to the case of electric lighting by means of dynamo currents, it is necessary in the first place to determine what is the power of fifty Grove's elements of the size used by Dr. Tyndall, expressed in the practical scale of units as now established. From a few experiments lately undertaken for myself, it would appear that fifty such cells have an electromotive force of 98·5 volts, and an internal resistance of 13·5 ohms, giving a current of 7·3 ampères when the cells are short-circuited. The resistance of a regulator such as Dr. Tyndall used in his experiments may be taken at 10 ohms, the current produced in the arc would be 4 ampères (allowing 1 ohm for the leads), and the power consumed 160 watts; the light power of such an arc would be about 150 candles, and comparing this with an arc of 3308 candles produced by 1162 watts, we find that 7·3 times the electric energy produce 22 times the amount of light measured horizontally. If, therefore, in Dr. Tyndall's arc $\frac{1}{10}$th of the radiant energy emitted was visible as light, it follows that in a powerful arc of 3300 candles, fully one-third are luminous rays. In the case of the incandescence light (say a Swan light of 20 candle power) we find in practice that nine times as much power has to be expended as in the case of the arc light; hence $\frac{1}{27}$th part of the power is given out as luminous rays, as against $\frac{1}{24}$th in Dr. Tyndall's incandescent platinum—a result sufficiently approximate considering the wide difference of conditions under which the two are compared.

These results are not only of obvious practical value, but they seem to establish a fixed relation between current, temperature, and light produced, which may serve as a means to determine temperatures exceeding the melting point of platinum with greater accuracy than has hitherto been possible by actinimetric methods in which the thickness of the luminous atmosphere must necessarily exercise a disturbing influence. It is probably owing to this circumstance that the temperature of the electric arc, as well as that of the solar photosphere, has frequently been greatly over-estimated.

The principal argument in favour of the electric light is furnished by its immunity from products of combustion, which not only heat the lighted apartments, but substitute carbonic acid and deleterious sulphur compounds for the oxygen upon which respiration depends; the electric light is white instead of yellow, and thus enables us to see pictures, furniture and flowers as by daylight; it supports growing plants instead of poisoning them, and by its means we can carry on photography and many other industries at night as well as during the day. The objection frequently urged against the electric light, that it depends upon the continuous motion of steam or gas engines, which are liable to accidental stoppage, has been removed by the introduction into practical use of the secondary battery; this, although not embodying a new conception, has lately been greatly improved in power and constancy by Planté, Faure, Volckmar, Sellon, and others, and promises to accomplish for electricity what the gas-holder has done for the supply of gas and the accumulator for hydraulic transmission of power.

It can no longer be a matter of reasonable doubt, therefore, that electric lighting will take its place as a public illuminant, and that even though its cost should be found greater than that of gas, it will be preferred for the lighting of drawing-rooms and dining-rooms, theatres and concert-rooms, museums, churches, warehouses, showrooms, printing establishments and factories, and also the cabins and engine-rooms of passenger steamers. In the cheaper and more powerful form of the arc light, it has proved itself superior to any other illuminant for spreading artificial daylight over the large areas of harbours, railway stations, and the sites of public works. When placed within a holophote the electric lamp has already become a powerful auxiliary in effecting military operations both by sea and land.

The electric light may be worked by natural sources of power such as waterfalls, the tidal wave, or the wind, and it is conceivable that these may be utilized at considerable distances by means of metallic conductors. Some five years ago I called attention to the vastness of those sources of energy, and the facility offered by electrical conduction in rendering them available for lighting and power-supply, while Sir William Thomson made this important matter the subject of his admirable address to Section A last year at York, and dealt with it in an exhaustive manner.

The advantages of the electric light and of the distribution of power by electricity have lately been recognized by the British Government, who have just passed a Bill through Parliament to facilitate the establishment of electrical conductors in towns, subject to certain regulating clauses to protect the interests of the public and of local authorities. Assuming the cost of electric light to be practically the same as gas, the preference for one or other will in each application be decided upon grounds of relative convenience, but I venture to think that gas-lighting will hold its own as the poor man's friend.

Gas is an institution of the utmost value to the artizan; it requires hardly any attention, is supplied upon regulated terms, and gives with what should be a cheerful light a genial warmth, which often saves the lighting of a fire. The time is moreover not far distant, I venture to think, when both rich and poor will largely resort to gas as the most convenient, the cleanest, and the cheapest of heating agents, and when raw coal will be seen only at the colliery or the gasworks. In all cases where the town to be supplied is within say thirty miles of the colliery, the gasworks may with advantage be planted at the mouth, or still better at the bottom of the pit, whereby all haulage of fuel would be avoided, and the gas, in its ascent from the bottom of the colliery, would acquire an onward pressure sufficient probably to impel it to its destination. The possibility of transporting combustible gas through pipes for such a distance has been proved at Pittsburg, where natural gas from the oil district is used in large quantities.

The quasi monopoly so long enjoyed by gas companies has had the inevitable effect of checking progress. The gas being supplied by meter, it has been seemingly to the advantage of the companies to give merely the prescribed illuminating power, and to discourage the invention of economical burners, in order that the consumption might reach a maximum. The application of gas for heating purposes has not been encouraged, and is still made difficult in consequence of the objectionable practice of reducing the pressure in the mains during daytime to the lowest possible point consistent with prevention of atmospheric indraught. The introduction of the electric light has convinced gas managers and directors that such a policy is no longer tenable, but must give way to one of technical progress; new processes for cheapening the production and increasing the purity and illuminating power of gas are being fully discussed before the Gas Institute; and improved burners, rivalling the electric light in brilliancy, greet our eyes as we pass along our principal thoroughfares.

Regarding the importance of the gas supply as it exists at present, we find from a Government return that the capital invested in gasworks in England, other than those of local authorities, amounts to £30,000,000; in these 4,281,048 tons of coal are converted annually, producing 43,000,000,000 cubic feet of gas, and about 2,800,000 tons of coke; whereas the total amount of coal annually converted in the United Kingdom may be estimated at 9,000,000 tons, and the by-products therefrom at 500,000 tons of tar, 1,000,000 tons of ammonia liquor, and 4,000,000 tons of coke, according to the returns kindly furnished me by the managers of many of the gasworks and corporations. To these may be added say 120,000 tons of sulphur, which up to the present time is a waste product.

Previous to the year 1856—that is to say, before Mr. W. H. Perkin had invented his practical process, based chiefly upon the theoretical investigations of Hoffman, regarding the coal-tar bases and the chemical constitution of indigo—the value of coal-tar in London was scarcely a halfpenny a gallon, and in country places gasmakers were glad to give it away. Up to that time the coal-tar industry had consisted chiefly in separating the tar by distillation into naphtha, creosote, oils, and pitch. A few distillers, however, made small quantities of benzene, which had been first shown—by Mansfield, in 1849—to exist in coal-tar naphtha mixed with toluene, cumene, etc. The discovery, in 1856, of the mauve or aniline purple gave a great impetus to the coal-tar trade, inasmuch as it necessitated the separation of large quantities of benzene, or a mixture of benzene and toluene, from the naphtha. The trade was further increased by the discovery of the magenta or rosaniline dye, which required the same products for its preparation. In the meantime, carbolic acid was gradually introduced into commerce, chiefly as a disinfectant, but also for the production of colouring matter.

The colour industry utilizes even now practically all the benzene, a large proportion of the solvent naphtha, all the anthracene, and a portion of the naphthalene resulting from the distillation of coal-tar; and the value of the colouring matter thus produced is estimated by Mr. Perkin at £3,350,000.

The demand for ammonia may be taken as unlimited, on account of its high agricultural value as a manure; and, considering the failing supply of guano and the growing necessity for stimulating the fertility of our soil, an increased production of ammonia may be regarded as a matter of national importance, for the supply of which we have to look almost exclusively to our gasworks. The present production of 1,000,000 tons of liquor yields 95,000 tons of sulphate of ammonia; which, taken at £20 10*s*. a ton, represents an annual value of £1,947,000.

The total annual value of the gasworks by-products may be estimated as follows:—

Colouring matter	£3,350,000
Sulphate of ammonia	1,947,000
Pitch (325,000 tons)	365,000
Creosote (25,000,000 gallons) . .	208,000
Crude carbolic acid (1,000,000 gallons)	100,000
Gas coke, 4,000,000 tons (after allowing 2,000,000 tons consumption in working the retorts) at 12*s*.	2,400,000
Total . . .	£8,370,000

Taking the coal used, 9,000,000 tons, at 12*s*., equal

£5,400,000; it follows that the by-products exceed in value the coal used by very nearly £3,000,000.

In using raw coal for heating purposes these valuable products are not only absolutely lost to us, but in their stead we are favoured with those semi-gaseous by-products of the atmosphere too well known to the denizens in London and other large towns as smoke. Professor Roberts has calculated that the soot in the pall hanging over London on a winter's day amounts to fifty tons, and that the carbonic oxide, a poisonous compound, resulting from the imperfect combustion of coal, may be taken as at least five times that amount. Mr. Aitken has shown, moreover, in an interesting paper communicated to the Royal Society of Edinburgh, last year, that the fine dust resulting from imperfect combustion of coal is mainly instrumental in the formation of fog; each particle of solid matter attracting to itself aqueous vapour; these globules of fog are rendered particularly tenacious and disagreeable by the presence of tar vapour, another result of imperfect combustion of raw fuel, which might be turned to much better account at the dye-works. The hurtful influence of smoke upon public health, the great personal discomfort to which it gives rise, and the vast expense it indirectly causes through the destruction of our monuments, pictures, furniture, and apparel, are now being recognized, as is evinced by the success of recent Smoke Abatement Exhibitions. The most effectual remedy would result from a general recognition of the fact that wherever smoke is produced, fuel is being consumed wastefully, and that all our calorific effects, from the largest down to the domestic fire, can be realized as completely and more economically, without allowing any of the fuel employed to reach the atmosphere unburnt. This most desirable result may be effected by the use of gas for all heating purposes with or without the addition of coke or anthracite.

The cheapest form of gas is that obtained through the entire distillation of fuel in such gas producers as are now largely used in working the furnaces of glass, iron, and steel works; but gas of this description would not be available for the supply of towns owing to its bulk, about two-thirds of its volume being nitrogen. The use of water-gas, resulting from the decomposition of steam passing through a hot chamber filled with coke, has been suggested, but this gas is also objectionable, because it contains, besides hydrogen, the poisonous and inodorous gas carbonic oxide, the introduction of which into dwelling-houses could not be effected without considerable danger. A more satisfactory mode of supplying heating separately from illuminating gas would consist in connecting the retort at different periods of the distillation with two separate systems of mains for the delivery of the respective gases. By resorting to improved means of heating the retorts with gaseous fuel, such as have been in use at the Paris gasworks for a considerable number of years, the length of time for effecting each distillation may be shortened from six hours, the usual period in former years, to four, or even three hours, as now practised at Glasgow and elsewhere. By this means a given number of retorts can be made to produce, in addition to the former quantity of illuminating gas of superior quality, a similar quantity of heating gas, resulting in a diminished cost of production and an increased supply of the valuable by-products previously referred to.

The greater efficiency of gas as a fuel results chiefly from the circumstance that a pound of gas yields in combustion 22,000 heat units, or exactly double the heat produced in the combustion of a pound of ordinary coal. This extra heating power is due partly to the freedom of the gas from earthy constituents, but chiefly to the heat imparted to it in effecting its distillation. Recent experiments with gas-burners have shown that in this direction also there is much room for improvement.

The amount of light given out by a gas flame depends upon the temperature to which the particles of solid carbon in the flame are raised, and Dr. Tyndall has shown that of the radiant energy set up in such a flame, only the $\frac{1}{25}$th part is luminous; the hot products of combustion carry off at least four times as much energy as is radiated, so that not more than one hundredth part of the heat evolved in combustion is converted into light. This proportion could be improved, however, by increasing the temperature of combustion, which may be effected either by intensified air currents or by regenerative action. Supposing that the heat of the products of combustion could be communicated to metallic surfaces, and be transferred by conduction or otherwise to the atmospheric air supporting combustion in the flame, we should be able to increase the temperature accumulatively to any point within the limit of dissociation; this limit may be fixed at about 2300° C., and cannot be very much below that of the electric arc. At such a temperature the proportion of luminous rays to the total heat produced in combustion would be more than doubled, and the brilliancy of the light would at the same time be greatly increased. Thus improved, gas-lighting may continue its rivalry with electric lighting both as regards economy and brilliancy, and such rivalry must necessarily result in great public advantage.

In the production of mechanical effect from heat, gaseous fuel also presents most striking advantages, as will appear from the following consideration. When we have to deal with the question of converting mechanical into electrical effect, or *vice versâ*, by means of the dynamo-electrical machine, we have only to consider what are the equivalent values of the two forms of energy, and what precautions are necessary to avoid losses by the electrical resistance of conductors and by friction. The transformation of mechanical effect into heat involves no losses except those resulting from imperfect installation, and these may be so completely avoided that Dr. Joule was able by this method to determine the equivalent values of the two forms of energy. But in attempting the inverse operation of effecting the conversion of heat into mechanical energy we find ourselves confronted by the second law of thermodynamics, which says that whenever a given amount of heat is converted into mechanical effect another but variable amount descends from a higher to a lower potential, and is thus rendered unavailable.

In the condensing steam-engine this waste heat comprises that communicated to the condensing water, whilst the useful heat, or that converted into mechanical effect, depends upon the difference of temperature between the boiler and condenser. The boiler pressure is limited, however, by considerations of safety and convenience of construction, and the range of working temperature rarely exceeds 120° C., except in the engines constructed by Mr. Perkins, in which a range of 160° C., or an expansive action commencing at fourteen atmospheres, has been adopted with considerable promise of success, as appears from an able report on this engine by Sir Frederick Bramwell. To obtain more advantageous primary conditions we have to turn to the caloric or gas-engine, because in them the coefficient of efficiency expressed by $\frac{T-T'}{T}$, may be greatly increased. This value would reach a maximum if the initial absolute temperature T could be raised to that of combustion, and T′ reduced to atmospheric temperature, and these maximum limits can be much more nearly approached in the gas-engine worked by a combustible mixture of air and hydrocarbons than in the steam-engine.

Before many years have elapsed we shall find in our factories and on board our ships engines with a fuel consumption not exceeding one pound of coal per effective horse-power per hour, in which the gas producer takes the place of the somewhat complex and dangerous steam boiler. The advent of such an engine and of the dynamo-machine must mark a new era of material progress at least equal to that produced by the introduction of steam power in the early part of our century. Let us consider what would be the probable effect of such an engine upon that most important interest of this country—the merchant navy.

According to returns kindly furnished me by the Board of Trade and 'Lloyd's Register of Shipping,' the total value of the merchant shipping of the United Kingdom may be estimated at £126,000,000, of which £90,000,000 represent steamers having a net tonnage of 3,003,988 tons; and £36,000,000 sailing vessels, of 3,688,008 tons. The safety of this vast amount of shipping, carrying about five-sevenths of our total imports and exports, or £500,000,000 of goods in the year, and of the more precious lives connected with it, is a question of paramount importance. It involves considerations of the most varied kind: comprising the construction of the vessel itself, and the material employed in building it; its furniture of engines, pumps, sails, tackle, compass, sextant, and sounding apparatus, the preparation of reliable charts for the guidance of the navigator, and the construction of harbours of refuge, lighthouses, beacons, bells, and buoys, for channel navigation. Yet notwithstanding the combined efforts of science, inventive skill, and practical experience—the accumulation of centuries—we are startled with statements to the effect that during last year as many as 1007 British-owned ships were lost, of which fully two-thirds were wrecked upon our shores, representing a total value of nearly £10,000,000. Of these ships 870 were sailing vessels and 137 steamers, the loss of the latter being in a fourth of the cases attributable to collision. The number of sailing vessels included in these returns being 19,325, and of steamers 5505, it appears that the steamer is the safer vessel, in the proportion of 4·43 to 3·46; but the steamer makes on an average three voyages for one of the sailing ship taken over the year, which reduces the relative risk of the steamer as compared with the sailing ship per voyage in the proportion of 13·29 to 3·46. Commercially speaking, this factor of safety in favour of steam-shipping is to a great extent counterbalanced by the value of the steam-ship, which bears to that of the sailing vessel per net carrying ton the proportion of 3 : 1, thus reducing the ratio in favour of steam-shipping as 13·29 to 10·38, or in round numbers as 4 : 3.

In considering the question how the advantages thus established in favour of steam-shipping could be further improved, attention should be called in the first place to the material employed in their construction, A new material was introduced for this purpose by the Admiralty in 1876–78, when they constructed at Pembroke dockyard the two steam corvettes, the *Iris* and *Mercury*, of mild steel. The peculiar qualities of this material are such as to have enabled shipbuilders to save 20 per cent. in the weight of the ship's hull, and to increase to that extent its carrying capacity. It combines with a strength 30 per cent. superior to that of iron such extreme toughness that in the case of collision the side of the vessel has been found to yield or bulge several feet without showing any signs of rupture, a quality affecting the question of sea risk very favourably. When to the use of this material there are added the advantages derived from a double bottom, and from the division of the ship's hold by means of bulkheads of solid construction, it is difficult to conceive how such a vessel could perish by collision either with another vessel or with a sunken rock. The spaces between the two bottoms are not lost, because they form convenient chambers for water ballast, but powerful pumps should in all cases be added to meet emergencies.

If to the improvements already achieved could be added an engine of half the weight of the present steam engine and boilers, and working with only half the present expenditure of fuel, a further addition of 30 per cent. could be made to the cargo of an Atlantic propeller vessel—no longer to be called a steamer—and the balance of advantages in favour of such vessels would be sufficient to restrict the use of sailing craft chiefly to the regattas of this and neighbouring ports.

The admirable work on the 'British Navy,' lately published by Sir Thomas Brassey, the Civil Chief Lord of the Admiralty, shows that the naval department of this country is fully alive to all improvements having regard to the safety as well as to the fighting qualities of Her Majesty's ships of war, and recent experience goes far to prove that although high speed and manœuvring qualities are of the utmost value, the armour plate which appeared to be fast sinking in public favour is not without its value in actual warfare.

The progressive views perceptible in the construction of the navy are further evidenced in a remarkable degree in the hydrographic department. Captain Sir Frederick Evans, the hydrographer, and Vice-President of the British Association, gave us at York last year a very interesting account of the progress made in that department, which, while dealing chiefly with the preparation of charts showing the depth of water, the direction and force of currents, and the rise of tides near our shores, contains also valuable statistical information regarding the more general questions of the physical conditions of the sea, its temperature at various depths, its flora and fauna, as also the rainfall and the nature and force of prevailing winds. In connection with this subject the American Naval Department has taken an important part, under the guidance of Captain Maury and the Agassiz father and son, whilst in this country the persistent labours of Dr. William Carpenter deserve the highest consideration.

Our knowledge of tidal action has received a most powerful impulse through the invention of a self-recording gauge and tide predicter, which will form the subject of one of the discourses to be delivered at our present meeting by its principal originator, Sir William Thomson.

The application of iron and steel in naval construction rendered the use of the compass for some time illusory, but in 1839 Sir George Airy showed how the errors of the compass, due to the influence experienced from the iron of the ship, may be perfectly corrected by magnets and soft iron placed in the neighbourhood of the binnacle, but the great size of the needles in the ordinary compasses rendered the correction of the quadrantal errors practically unattainable. In 1876, Sir William Thomson invented a compass with much smaller needles than those previously used, which allows Sir George Airy's principles to be applied completely.

Sir William Thomson has also enriched the art of navigation by the invention of two sounding machines; the one being devised for ascertaining great depths very accurately in less than one-quarter the time formerly necessary, and the other for taking depths up to 130 fathoms without stopping the ship in its onward course. In both these instruments steel pianoforte wire is used instead of the hempen and silken lines formerly employed; in the latter machine the record of depth is obtained not by the quantity of wire run over its counter and brake wheel, but through the indications produced upon a simple pressure gauge consisting of an inverted glass tube, whose internal surface is covered beforehand with a preparation of chromate of silver, rendered colourless by the sea-water up to the height to which it penetrates. The value of this instrument for guiding the navigator within what he calls "soundings" can hardly be exaggerated; with the sounding machine and a good chart he can generally make out his position correctly by a succession of three or four casts in a given direction at given intervals, and thus in foggy weather is made independent of astronomical observations and of the sight of lighthouses or the shore. By the proper use of this apparatus, such accidents as happened to the mail steamer *Mosel* not a fortnight ago would not be possible. As regards the value of the deep-sea instrument I can speak from personal experience, as on one occasion it enabled those in charge of the cable s.s. *Faraday* to find the end of an Atlantic cable, which had parted in a gale of wind with no other indication of the locality than a single sounding, giving a depth of 950 fathoms. To recover the cable a number of soundings in the supposed neighbourhood of the broken end were taken, the 950 fathom contour line was then traced upon a chart, and the vessel thereupon trailed its grapnel two miles to the eastward of this line, when it soon engaged the cable 20 miles away from the point where dead reckoning had placed the ruptured end.

The time allowed me for addressing you on this occasion is wholly insufficient to do justice to the great engineering works of the present day, and I must therefore limit myself to making a short allusion to a few only of the more remarkable enterprises.

The great success, both technically and commercially, of the Suez Canal, has stimulated M. de Lesseps to undertake a similar work of even more gigantic proportions, namely, the piercing of the Isthmus of Panama by a ship canal, 40 miles long, 50 yards wide on the surface, and 20 yards at the bottom, upon a dead level from sea to sea. The estimated cost of this work is £20,000,000, and more than this sum having been subscribed, it appears unlikely that political or climatic difficulties will stop M. de Lesseps in its speedy accomplishment. Through it, China, Japan, and the whole of the Pacific Ocean will be brought to half their present distance, as measured by the length of voyage, and an impulse to navigation and to progress will thus be given which it will be difficult to over-estimate.

Side by side with this gigantic work, Captain Eads, the successful improver of the Mississippi navigation, intends to erect his ship railway, to take the largest vessels, fully laden and equipped, from sea to sea, over a gigantic railway across the Isthmus of Tehuantepec, a distance of 95 miles. Mr. Barnaby, the chief constructor of the navy, and Mr. John Fowler have expressed a favourable opinion regarding this enterprise, and it is to be hoped that both the canal and the ship railway will be accomplished, as it may be safely anticipated that the traffic will be amply sufficient to support both these undertakings.

Whether or not M. de Lesseps will be successful also in carrying into effect the third great enterprise with which his name has been prominently connected, the flooding of the Tunis-Algerian Chotts, thereby re-establishing the Lake Tritonis of the ancients, with its verdure-clad shores, is a question which could only be decided upon the evidence of accurate surveys, but the beneficial influence of a large sheet of water within the African desert could hardly be matter of doubt.

It is with feelings not unmixed with regret that I have to record the completion of a new Eddystone lighthouse in substitution for the *chef-d'œuvre* of engineering erected by John Smeaton more than one hundred years ago. The condemnation of that structure was not, however, the consequence of any fault of construction, but was caused by inroads of the sea upon the rock supporting it. The new lighthouse, designed and executed by Mr., now Sir, James Douglass, engineer of Trinity House, has been erected in the incredibly short time of less than two years, and bids fair to be worthy of its famed predecessor. Its height above high water is 130 feet, as compared with 72 feet, the height of Telford's structure, which gives its powerful light a considerably increased range. The system originally suggested by Sir William Thomson, some years ago, of distinguishing one light from another by flashes following at varied intervals, has been adopted by the Elder Brethren in this as in other recent lights in the modified form introduced by Dr. John Hopkinson, in which the principle is applied to revolving lights, so as to obtain a greater amount of light in the flash.

The geological difficulties which for some time threatened the accomplishment of the St. Gothard Tunnel have been happily overcome, and this second and most important sub-Alpine thoroughfare now connects the Italian railway system with that of Switzerland and the south of Germany, whereby Genoa will be constituted the shipping port for those parts.

Whether we shall be able to connect the English with the French railway system by means of a tunnel below the English Channel is a question that appears dependent at this moment rather upon military and political than technical and financial considerations. The occurrence of a stratum of impervious grey chalk, at a convenient depth below the bed of the Channel, minimizes the engineering difficulties in the way, and must influence the financial question involved. The protest lately raised against its accomplishment can hardly be looked upon as a public verdict, but seems to be the result of a natural desire to pause pending the institution of careful inquiries. These inquiries have been made by a Royal scientific Commission, and will be referred for further consideration to a mixed Parliamentary Committee, upon whose report it must depend whether the natural spirit of commercial enterprise has to yield in this instance to political and military considerations. Whether the Channel Tunnel is constructed or not the plan proposed some years ago by Mr. John Fowler of connecting England and France by means of a ferry boat capable of taking railway trains would be a desideratum justified by the ever-increasing intercommunication between this and continental countries.

The public inconvenience arising through the obstruction in traffic by a sheet of water is well illustrated by the circumstance that both the estuaries of the Severn and of the Mersey are being undermined in order to connect the railway systems on the two sides, and that the Frith of Forth is about to be spanned by a bridge exceeding in grandeur anything as yet attempted by the engineer. The roadway of this bridge will stand 150 feet above high-water mark, and its two principal spans will measure a third of a statute mile each. Messrs. Fowler and Baker, the engineers to whom this great work has been entrusted, could hardly have accomplished their task without having recourse to steel for their material of construction, nor need the steel used be of the extra mild quality particularly applicable for naval structures to withstand collision, for, when such extreme toughness is not required steel of very homogeneous quality can be produced, bearing a tensile strain double that of iron.

When the British Association met at Southampton on a former occasion, Schönbein announced to the world his discovery of gun-cotton. This discovery has led the way to many valuable researches on explosives generally, in which Mr. Abel has taken a leading part. Recent investigations by him, in connection with Captain Noble, upon the explosive action of gun-cotton and gunpowder confined in a strong chamber, which have not yet been published, deserve particular attention. They show that while by the method of investigation pursued about twenty years ago by Karolye (of exploding gunpowder in very small charges in shells confined within a large shell partially exhausted of air), the composition of the gaseous products was found to be complicated and liable to variation, the chemical metamorphosis which gun-cotton sustains, when exploded under conditions such as obtain in its practical application, is simple and very uniform. Among other interesting points noticed in this direction was the fact that, as in the case of gunpowder, the proportion of carbonic acid increases, while that of carbonic oxide diminishes with the density of the charge.

Messrs. Noble and Abel are also continuing their researches upon fired gunpowder, being at present occupied with an inquiry into the influence exerted upon the chemical metamorphosis and ballistic effects of fired gunpowder by variation in its composition, their attention being directed especially to the discovery of the cause of the more or less considerable erosion of the interior surface of guns produced by the exploding charge—an effect which, notwithstanding the application of devices in the building up of the charge specially directed to the preservation of the gun's bore, has become so serious that, with the enormous charges now used in our heavy guns, the erosive action on the surface of the bore produced by a single round is distinctly perceptible. As there appeared to be *primâ facie* reasons why the erosive action of powder upon the surface of the bore at the high temperatures developed should be at any rate in part due to its one component sulphur, Noble and Abel have made comparative experiments with powders of usual composition and with others in which the proportion of sulphur was considerably increased, the extent of erosive action of the products escaping from the explosion vessel under high tension being carefully determined. With small charges a particular powder containing no sulphur was found to exert very little erosive action as compared with ordinary cannon powder; but another powder, containing the maximum proportion of sulphur tried (15 per cent.), was found equal to it under these conditions, and exerted very decidedly less erosive action than it, when larger charges were reached. Other important contributions to our knowledge of the action of fired gunpowder in guns, as well as decided improvements in the gunpowder manufactured for the very heavy ordnance of the present day, may be expected to result from a continuance of these investigations. Professor Carl Himly, of Kiel, having been engaged upon investigations of a similar nature, has lately proposed a gunpowder in which hydrocarbons precipitated from solution in naphtha take the place of the charcoal and sulphur of ordinary powder, this powder has amongst others the peculiar property of completely resisting the action of water, so that the old caution, "Keep your powder dry," may hereafter be unnecessary.

The extraordinary difference of condition, before and after its ignition, of such matter as constitutes an explosive agent leads us up to a consideration of the aggregate state of matter under other circumstances. As early as 1776 Alexander Volta observed that the volume of glass was changed under the influence of electrification, by what he termed electrical pressure. Dr. Kerr, Govi, and others, have followed up the same inquiry, which is at present continued chiefly by Dr. George Quincke, of Heidelberg, who finds that temperature, as well as chemical constitution of the dielectric under examination, exercises a determining influence upon the amount and character of the change of volume effected by electrification; that the change of volume may under certain circumstances be effected instantaneously as in flint glass, or only slowly as in crown glass, and that the elastic limit of both is dimished by electrification, whereas in the case of mica and of guttapercha an increase of elasticity takes place.

Still greater strides are being made at the present time towards a clearer perception of the condition of matter when particles are left some liberty to obey individually the forces brought to bear upon them. By the discharge of high tension electricity through tubes containing highly rarefied gases (Geissler's tubes), phenomena of discharge were produced which were at once most striking and suggestive. The Sprengel pump afforded a means of pushing the exhaustion to limits which had formerly been scarcely reached by the imagination. At each step the condition of attenuated matter revealed varying properties when acted upon by electrical discharge and magnetic force. The radiometer of Crookes imported a new feature into these inquiries, which at the present time occupy the attention of leading physicists in all countries.

The means usually employed to produce electrical discharge in vacuum tubes was Ruhmkorff's coil; but Mr. Gassiot first succeeded in obtaining the phenomena by means of a galvanic battery of 3000 Leclanché cells. Dr. De La Rue, in conjunction with his friend, Dr. Hugo Müller, has gone far beyond his predecessors in the production of batteries of high potential. At his lecture "On the Phenomena of Electric Discharge," delivered at the Royal Institution, in January, 1881, he employed a battery of his invention consisting of 14,400 cells (14,832 volts), which gave a current of 0·054 ampère, and produced a discharge at a distance of 0·71 inch between the terminals. During last year he increased the number of cells to 15,000 (15,450 volts), and increased the current to 0·4 ampère, or eight times that of the battery he used at the Royal Institution.

On the occasion of his lecture, Dr. De La Rue produced, in a very large vacuum tube, an imitation of the aurora borealis; and he has deduced from his experiments that the greatest brilliancy of aurora displays must be at an altitude of from 37 to 38 miles—a conclusion of the highest interest, and in opposition to the extravagant estimate of 281 miles at which it had been previously put.

The President of the Royal Society has made the phenomena of electrical discharge his study for several years, and resorted in his important experiments to a special source of electric power. In a note addressed to me, Dr. Spottiswoode describes the nature of his investigations much more clearly than I could venture to give them. He says: "It had long been my opinion that the dissymmetry shown in electrical discharges through rarefied gases must be an essential element of every disruptive discharge, and that the phenomena of stratification might be regarded as magnified images of features always present, but concealed under ordinary circumstances. It was with a view to the study of this question that the researches by Moulton and myself were undertaken. The method chiefly used consisted in introducing into the circuit intermittence of a particular kind, whereby one luminous discharge was rendered sensitive to the approach of a conductor outside the tube. The application of this method enabled us to produce artificially a variety of phenomena, including that of stratification. We were thus led to a series of conclusions relating to the mechanism of the discharge, among which the following may be mentioned:—

"1. That a stria, with its attendant dark space, forms a physical unit of a striated discharge.

"2. That the origin of the luminous column is to be sought for at its negative end.

"3. That the time occupied by electricity of either name in traversing a tube is greater than that occupied in traversing an equal length of wire, but less than that occupied by molecular streams (Crookes's radiations) in traversing the tubes.

"4. That the brilliancy of the light with so little heat may be due in part to brevity in the duration of the discharge.

"5. That striæ are not merely loci in which electrical is converted into luminous energy, but are actual aggregations of matter.

"This last conclusion was based mainly upon experiments made with an induction coil excited in a new way —viz., directly by an alternating machine, without the intervention of a commutator or condenser. This mode of excitement promises to be one of great importance in spectroscopic work, as well as in the study of the discharge in a magnetic field, partly on account of the simplification which it permits in the construction of induction coils, but mainly on account of the very great increase of strength in the secondary currents to which it gives rise."

These investigations assume additional importance when we view them in connection with solar—I may even say stellar—physics, for evidence is augmenting in favour of the view that interstellar space is not empty, but is filled with highly attenuated matter of a nature such as may be put into our vacuum tubes. Nor can the matter occupying stellar space be said any longer to be beyond our reach for chemical and physical test. The spectroscope has already thrown a flood of light upon the chemical constitution and physical condition of the sun, the stars, the comets, and the far distant nebulæ, which have yielded spectroscopic photographs under the skilful management of Dr. Huggins, and Dr. Draper, of New York. Armed with greatly improved apparatus the physical astronomer has been able to reap a rich harvest of scientific information during the short periods of the last two solar eclipses; that of 1879, visible in America, and that of May last, observed in Egypt by Lockyer, Schuster, and by continental observers of high standing. The result of this last eclipse expedition has been summed up as follows:—"Different temperature levels have been discovered in the solar atmosphere; the constitution of the corona has now the possibility of being determined, and it is proved to shine with its own light. A suspicion has been aroused once more as to the existence of a lunar atmosphere, and the position of an important line has been discovered. Hydrocarbons do not exist close to the sun, but may in space between us and it."

To me personally these reported results possess peculiar interest, for in March last I ventured to bring before the Royal Society a speculation regarding the conservation of solar energy, which was based upon the three following postulates, viz.:—

1. That aqueous vapour and carbon compounds are present in stellar or interplanetary space.

2. That these gaseous compounds are capable of being dissociated by radiant solar energy while in a state of extreme attenuation.

3. That the effect of solar rotation is to draw in dissociated vapours upon the polar surfaces, and to eject them after combustion has taken place back into space equatorially.

It is therefore a matter of peculiar gratification to me that the results of observations here recorded give considerable support to that speculation. The luminous equatorial extensions of the sun which the American observations revealed in such a striking manner (with which I was not acquainted when writing my paper) were absent in Egypt; but the outflowing equatorial streams I suppose to exist could only be rendered visible by reflected sunlight, when mixed with dust produced by exceptional solar disturbances or by electric discharge; and the occasional appearance of such luminous extensions would serve only to disprove the hypothesis entertained by some, that they are divided planetary matter, in which case their appearance should be permanent. Professor Langley, of Pittsburg, has shown by means of his bolometer, that the solar actinic rays are absorbed chiefly in the solar instead of in the terrestrial atmosphere, and Captain Abney has found by his new photometric method that absorption due to hydrocarbons takes place somewhere between the solar and terrestrial atmosphere. In order to test this interesting result still further, he has lately taken his apparatus to the top of the Riffel with a view of diminishing the amount of terrestrial atmospheric air between it and the sun, and intends to bring a paper on this subject before Section A. Stellar space filled with such matter as hydrocarbon and aqueous vapour would establish a material continuity between the sun and his planets, and between the innumerable solar systems of which the universe is composed. If chemical action and reaction can further be admitted, we may be able to trace certain conditions of thermal dependence and maintenance, in which we may recognize principles of high perfection, applicable also to comparatively humble purposes of human life.

We shall thus find that in the great workshop of nature there are no lines of demarcation to be drawn between the most exalted speculation and commonplace practice, and that all knowledge must lead up to one great result, that of an intelligent recognition of the Creator through His works. So then, we members of the British Association and fellow-workers in every branch of science may exhort one another in the words of the American bard who has so lately departed from amongst us:—

"Let us then be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labour and to wait."

Parliamentary and Law Proceedings.

Poisoning by Washing Soda.

Mr. Carttar, West Kent Coroner, held an inquest on Saturday, August 26, at Greenwich, on the body of Sarah Ann Houess, five years of age.

The evidence of the mother was that on Wednesday she left the child at home by herself, and during her absence the child drank some water from a kettle on the hob, in which witness had placed a handful of common soda to cleanse it before leaving home. On her return she gave the child some magnesia, and she vomited, and did not appear much the worse, but the next day the symptoms were alarming and she went to the relieving officer and obtained an order for medical attendance. On Dr. Hartt seeing the child he found her in a dying state and gave no hopes of her recovery, and she died on Thursday afternoon. The child was in the habit of drinking from the kettle.

Dr. Hartt, the parish surgeon, said the appearances of the child were consistent with alkaline poisoning, and the child must have suffered great pain. Three ounces of common soda dissolved in water had been known to kill an adult, and the deceased was presumed to have taken about an ounce.

The jury returned a verdict that the deceased died from drinking common washing soda and water from a kettle by misadventure.

Children Poisoned by Laburnum Pods.

Dr. Scott, of Barnsley, has had under his care three children who narrowly escaped being poisoned by eating laburnum pods, in Loche Park, Barnsley. The lads, named Fisher, Siddons, and Adams, reside in Winn Street and Heeles Street. They went to the park, and seeing the pods on some laburnum trees, they mistook them for wild lints and ate a quantity of them. Fisher, who is about seven years of age, ate the most pods and was taken seriously ill on his way home. When he reached a field near the Agness Colliery he was unable to proceed further, and falling down exhausted, he was discovered two or three hours afterwards in an insensible condition. For some time he was not expected to recover. The other two lads were not so seriously affected as Fisher, but were ill for some time.—*Yorkshire Post.*

Poisoning by Spirit of Salt.

On the 24th ult., Mr. Collier held an inquest at Hackney on the body of George Childs, a butcher's assistant, aged 77. From the evidence it appeared that the deceased had been much distressed by the expectation that an allowance he received weekly from the parish would be stopped. He was seen to drink something that was smoking from a cup and immediately began retching. Medical assistance was obtained, but deceased died the same night, the doctor attributing the death to poisoning by spirit of salt.

The jury returned a verdict that deceased committed suicide whilst suffering from temporary insanity.

Correspondence.

⁂ No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

The Future of Pharmacy.

Sir,—If "H. S." and "W. B." consider themselves merely *distributors* of drugs, then, doubtless, they have been considerably overpaid. It is no use waiting, as "H. S." suggests, for an Act of Parliament to raise our status, neither the present nor any future Government will grant us the sole right of dealing in non-poisonous preparations, and if we are to follow the advice of "H. S." and sink to the level of the grocer and the huckster, then we might as well give up the "poison" trade and become general dealers at once, without any special training or examination, for pecuniarily the poison trade could be very well spared. Any amelioration of our condition must come from ourselves and must be the result of our own combined and undivided efforts; we must teach the public that the pharmacist and the retailer (pure and simple) of drugs are distinct persons. But how can reform proceed from a body of men so many of whom have not nearly so much *esprit de corps* as a crossing sweeper and whose sole aim and purpose is, like that of the historic quaker, to make money somehow, honestly if they can, but anyhow to make it? Often when trying to persuade others to join the Society or contribute to the Benevolent Fund I am asked, "Why should I join or support such a Society whilst so many men who are officially connected with it are robbing me of my living by supplying all my neighbours with my particular class of goods?" I am quite sure that in this district at all events one of the main reasons for so few men joining us is the bad odour into which these men have dragged the Society. As to its being "pettish" to Boycott people who cater for grocers, stores, etc., I could tell "H. S." of one wholesale house whose loss of trade was such as to compel it to give up supplying stores. I could also tell him of more than one wholesale house who would refuse to supply them at any price. I do not wonder, if "H. S." be largely engaged in this class of trade, that (pecuniarily at all events) he is well satisfied with his position. I saw an order some time ago for 50 gallons of "paregoric without opium," which was supplied to a chemist at 1*s*. 3*d*. per lb., and by him sold to grocers, provision dealers, etc., for retail, at 2*s*. 8*d*. and 3*s*. per lb. The county analyst, it is true, objected to some of it, but these analysts are at times very fastidious. The police records have repeatedly shown the class of goods supplied by men whose position and education ought to place them far beyond every suspicion of such rascality. These men ought to be treated as the medical profession treat quacks and owners of "6*d*. dispensaries"—ostracize them altogether, have nothing to do with them, and show the public that though these individuals be with us, they are not of us; that while we do not forget that we are tradesmen, we remember that we are something better than mere retailers, and that the lives of our customers and the honour of our craft are worth more in our estimation than the mere acquisition of riches by means which would put even "the heathen Chinee" to shame.

131, *Embden Street, Manchester*. J. Hart.

Sir,—I think few of the readers of our Journal will disagree in the main with the two letters, signed respectively H. S. and W. B., but there are one or two points in that of the latter to which I beg to offer a protest. Firstly, the assertion that the profits of the chemist and druggist have been too high. Fifty years ago they may have been so, but of late years, No! If they have been, how is it that many, I might, I think, say most, have failed to make more than a living, possibly a comfortable one, but not sufficient for them to rest from their arduous labours?

Again, W. B. says his cutting neighbour makes as much per cent. on his turnover as is necessary to carry on his business. Very likely; but suppose he sold nothing but chemists' articles; how would he get on? For are there no profits in the drysaltery trade? There are; but the public does not know so well how much is got out of drysaltery. Not that I mean to say the profits are exorbitant; for where I sell a pound of Epsom salts my drysaltery neighbour will perhaps sell a hundredweight of soda, and why should he not get as much profit?

But fearing I am trespassing too much on your space, I would just say that I think if we were to write and work more in the direction of getting doctors to give up dispensing and yield us that most legitimate part of our business, we, on our part giving up counter prescribing, I say if we were to work more for this end, we should be doing more towards brightening the prospect of the future of pharmacy than the almost, if not quite useless discussions as to stores and cutting grocers will achieve.

G. A. C.

Leeches.

Sir,—My experience of leech keeping coincides very much with Mr. Lamble's; I only change the water once in six or nine months, and keep them in a shaded place. I also keep them well supplied with water plants, those I have found most suitable being the American water weed (*Anacharis alsinastrum*), and the pond weed (*Potamogeton natans*). During the last twelve months the "death rate" did not average one per month. I prefer to get the "weeds" from some pit or canal, rather than purchase them, as then they are invariably rich in the lower forms of life, and with a 1-inch lens or a good "platyscopic" "Aquam" may spend many a pleasant hour in watching the movements of the water flea or the cyclops, and studying the different forms of fresh water polype. I have also found the last two seasons that the leeches have deposited their ova on the sides of the glass, from which in due time a fresh generation of leeches has been developed; there ought to be from 3 to 4 inches of shingle at the bottom of the aquarium.

Manchester. J. Hart.

P.S.—For the past two or three weeks, from a variety of circumstances, I have not been able to keep up my supply of plant life, and the mortality, as a consequence, has rapidly increased.

Sir,—Allow me to say that my experience in keeping leeches agrees with Mr. Lamble's, and corroborates the conclusions he arrives at. For the last three years I have lost scarcely any leeches. I keep them in an aquarium on the counter, have no plants in the water, only sand and a few smooth pebbles. I change the water very seldom, only once in two or three months, unless a leech should die, or from any cause the water smells decidedly fetid; but, as a rule, for a long time the water has only a brackish smell, which I take no notice of. I sometimes clean down the inside of aquarium in the same water and leave it unchanged. I conclude that the leeches' natural *habitat* is in quiet undisturbed semi-stagnant waters. I only buy the best leeches. I may say that the water I use is similar to that used by Mr. Lamble, as I am a near neighbour. The character of the water may probably make a difference elsewhere. Observer.

"*North*."—The point was fully discussed in this Journal about five years ago. See especially the opinion of Professor Redwood upon the meaning of symbols used in prescriptions (*Pharm. Jour.*, [3], viii., 471).

W. Johnston.—The plants sent are greatly in excess of the number we can undertake to name as a rule. In future the number must be limited to six. Those now sent are—1. *Tussilago Farfara*. 2. *Alchemilla vulgaris*. 3. *Angelica sylvestris*. 4. *Ægopodium Podograria*. 5. *Heracleum Sphondylium*. 6. *Lapsana communis*. 7. *Epilobium montanum*. 8. *Geranium robertianum*. 9. *Stellaria graminea*. 10. *Galium verum*. 11. *Lychnis vespertina*. 12. *Rumex Acetosa*. 13. *Torilis Anthriscus*. 14. *Centaurea nigra*. 15. *Scabiosa succisa*. 16. *Geum urbanum*. 17. *Prunella vulgaris*. 18. *Geranium dissectum*. 19. *Achillea ptarmica*. 20. Send specimen with stem leaves.

Communications, Letters, etc., have been received from Messrs. Della Rosa, Fletcher, Schacht, Woodland, Lubberly Lout, Wopper.

MADAGASCAR DRUGS.

BY E. M. HOLMES, F.L.S.

(*Concluded from page* 123.)

LEAVES AND FLOWERS.

FAMAMO, *Mundulia Telfairii*, Boj.—This drug consists of leaflets, mostly detached from their rachis, which bears scars of having borne four or five opposite pairs of leaflets. The leaflets are entire, slightly unequal at the base, about the size and shape of Tinnevelly senna, but more rigid and with many slender lateral veins placed at a very acute angle to the midrib. They have no odour; they taste somewhat like senna, but have an acrid after-taste. The young twigs are woody, with a pale brown bark having darker longitudinal stripes (See Famamo root, before, p. 121).

FANJANONANDRA.—This drug consists of the leafy shoots of *Anthospermum plicatum*, H.B., a heath-like rubiaceous undershrub. The leaves are opposite, about ¾ inch long, a line in breadth, decurrent and having opposite subulate stipules. When examined with a lens they are seen to have two lines at the back, which indicate the three close longitudinal plaits of the leaf, more easily seen on transverse section. Under a Coddington lens the leaf is seen to be studded with minute immersed oil glands. The taste is very bitter and aromatic, but not perceptibly astringent, and any hæmostatic power it possesses is probably owing to its essential oil. The Malagasy name means "stoppage of blood," and the drug is used for that purpose.

HARONGA.—This consists of the leaves or twigs of *Haronga Madagascariensis*, Choisy (Hypericaceæ). The leaves are opposite, smooth, short-stalked, oblong, entire, with prominent veins underneath, which are placed at almost a right angle to the midrib. The taste is very astringent. In Madagascar the leaves are used, as well as those of the Harongana kelifodia (*Psidium pomiferum*), in diarrhœa and dysentery. In Mauritius (according to Bouton, *l. c.*, p. 19) the yellow juice which flows from the incised stems is used as an application to ringworm and a skin disease called Tampane.

NIFIN AKANGA. (*Commelyna Madagascariensis*).—Bracts heart-shaped, seven veined, enclosing small blue flowers more conspicuous than the linear subulate leaves. Used in malarial diseases and as an application to recent sores, but possesses no marked taste or odour.

RAMBIAZANA.—The leaves are alternate, narrowly oblanceolate, entire, with three principal veins; about 1 to 2 inches long and ¼ to ½ inch broad, tapering much below, the leaves and stems being densely covered with down, which on the veins and stem is of a yellowish tint. The taste is aromatic and slightly bitter. The flowers are minute and in small corymbs, and apparently belong to the Compositæ, and, so far as can be judged from the imperfect material, an undescribed species of *Vernonia*. The plant is said to be emetic and expectorant.

SANGAN (*Sangan andivolahy*).—This consists of the flowers and unilateral flower-spikes of *Hyptis pectinata*, Poit. (Labiatæ), an undershrub, growing 6 or 7 feet high. The dried florets, which are not much larger than those of santonica, have a very bitter, slightly aromatic taste, resembling that of white horehound, for which it might perhaps form a substitute in Madagascar.

HANIDRAISÒA.—The leafy twigs of *Aphloia theæformis*, Benth. (Flacourtiaceæ). It is known to possess emetic properties. This plant is also called Voa-fotsy, and is said to be used in strangury or suppression of urine, in which emetics are known to be useful, probably by reflex action; also in dropsy and gonorrhœa.

The leaves are slightly bitter and astringent and have a flavour like that of tea. They are ovate, leathery, smooth, ¾ to 3 inches long, shortly stalked and serrate in the upper half.

TSIAVARAMONINA.—Leaves hispid, scabrous, crenate, alternate. Used with Hanisandroa for condylomata and other syphilitic tumours. Taste and odour not marked.

FRUITS AND SEEDS.

LANDEMO or TENDEMILAHY.—The fruits of *Anthocleista Madagascariensis*, Baker (*Journ. Bot.*, June, 1882, p. 173). These are small ovate fruits, with a dark brown wrinkled surface. A transverse section shows the fruit to be four-celled, the walls being soft and spongy. The taste is pleasantly bitter. The fruits are about the size of a hazel nut, but when mature are stated by Baker to be 1¼ inch long. These, as well as the leaves, are used in malarial fever.

SÈNA SÈNA.—Consists of dark brown fruits about the size of a walnut, the pericarp being dry and covered with rigid prominences or papillæ. It contains several (4 to 8) seeds, of the shape and size of the seeds of the Baobab tree, being convex on one side, and having the two other sides meeting at an angle. The seeds are immature, but appear to have ruminated albumen and a structure like that of the Anonaceæ. The fruits are used in coughs and catarrh, especially for children, one fruit being scraped for a dose. Judging from the warm aromatic taste of the seeds they probably act as a stimulant to the mucous membrane, like those of *Xylopia æthiopica*, A. Rich.

The fruit bears a strong resemblance to that of *Melodorum verrucosum*, in the Kew Museum, but that fruit is pear-shaped and contains plano-convex seed.

TAÌMBÒRON TSILOZA (*Chenopodium ambrosioides*, Lin.).—Used in Madagascar, as in other countries, as an anthelminthic, chiefly for round worms.

TANGENA.—A root named Titsarana and said to be the root of the Tangena, has a blackish, easily separable, scaly bark, the central portion of which is reddish and micaceous; the wood is whitish and porous, the medullary rays being visible to the naked eye as slender radiating lines. It has no perceptible taste.

TÀNANTÀNAMA-FOTSY (*Curcas purgans*, L.).—The seeds of this plant are well known to possess purgative and emetic properties. In Madagascar it is, however, chiefly used externally as a hæmostatic, a practice which is not unknown in India, where the milky juice is applied to wounds and in drying covers them with a varnish like collodion (*Pharm. Journ.*, [3], v. 1028; vii., 730). The hæmostatic property of the plant probably deserves more attention than it has hitherto received.

TÀNANTÀNA-MÀNGA (*Ricinus communis*, L.).—The seeds of the Madagascar plant are very small, being only about 5 or 6 lines long and 3 broad; they have a greyish tint. The oil is obtained from the seeds by boiling them.

TANTÈRAKALA (*Embelia micrantha*, Alp.).—These fruits are about the size of a red currant or black pepper. They have a wrinkled reddish-black husk or skin, which, when removed, is found to contain a single seed, which like others of the genus is readily distinguished by being marked with white dots formed apparently by the infolding of the endopleura into the horny albumen; the lower half of the seed has a cup-shaped cavity. The taste is slightly acrid or pungent. In Madagascar the fruit is given for worms, the wood of the shrub being administered as a tonic. In the Mauritius, where it is called Liane Poilly,* after M. Grillot Poilly, who made known its value in nephritis, of which he was cured by a native by means of a decoction of the plant.

The fruits of another species, *E. Ribes*, Burm., are used in India as a remedy for the tapeworm, in the dose of a teaspoonful for a child and a dessertspoonful for an adult twice a day, and according to Dr. Dymock with success, the worm being expelled dead (*Pharm. Journ.*, [3], vii., p. 3; Dutt, 'Hind. Mat. Med.,' p. 183).

VÀTOLÀLAKA.—The grey seeds of *Cæsalpinia Bonducella*, Roxb., used by natives as parturient and emetic. In the Mauritius the leaves and seed of this plant are used for gonorrhœa and allied diseases, and the seeds powdered and mixed with pepper are used as a febrifuge. The Mauritius name† is "Sogar gota," and the French "Cadoque" (Bouton, 'Fl. Méd. de Maurice,' p. 43). This author appears to have followed Bojer in confounding this species with *C. Bonduc*, which has yellow seeds.

The dose used in Madagascar for promoting expulsion of the placenta is the kernel of one seed, scraped and drunk in water.

VÈRAKA.—The fruits of *Schrebera Golungensis*, Baker. These are fig-shaped, woody, about 1½ inch long, and ⅝ inch broad in the widest part, dehiscing loculicidally into two valves, the dissepiments remaining attached to the valves. They have neither taste nor odour, and unless the seeds, which are not present, possess some marked properties, it is difficult to understand how the fruit can be of any service in dyspepsia or malarial diseases, for which, according to Dr. Parker, it is used, as well as for abscess.

VOANTAMÈNAKA-VAVY.—*Quisqualis* species. The drug consists of the fruit, which differs from that of *Quisqualis indica*, L., in having a short stalk ¼ inch long, in its more oval or globular shape, not tapering gradually towards the end, and in its pale brown colour.

It is stated by Dr. Parker (p. 669) to be used for flat worms of different kinds. For this purpose it is quite probable that it may be an effectual remedy, *Q. indica* being used in China, India and the East generally for lumbrici, four or five seeds being given to children to eat (Hanbury, 'Science Papers,' p. 231, fig. 3; Dr. Porter Smith, 'Chinese Mat. Med.,' p. 182; 'Ind. Pharm.,' p. 90). It is worthy of note, however, that Bouton ('Fl. Méd. de Maurice,' p. 53) states that in a larger dose than above mentioned the seeds of *Q. indica* produce spasms and other disagreeable symptoms.

ALOES.

Madagascar aloes presents an appearance resembling a black extract, but is brittle, like pitch. The powder is of a pale dull brown, with a slight greenish tint. The surface and the fracture have a glassy lustre. In odour and taste it resembles Cape aloes. When a fragment is treated with strong sulphuric acid on a piece of white porcelain it colours the acid yellow at first and then becomes pasty and colours it of a deep crimson. Nitric acid produces no effect upon it. A piece of Cape aloes treated in the same manner does not give a crimson colour with sulphuric acid, but with nitric acid alone, or with nitric acid added after sulphuric acid it gives a dark dull green colour. It would therefore appear probable that it is derived from a different species of aloe, probably the only large species known to grow in Madagascar.

VESICANTS.

The insect used as a vesicant in Madagascar, and which is a species of *Epicauta*, nearly allied to *E. rufficollis*, is rather smaller than the true cantharides, but similar in shape. It has a bluish metallic lustre, resembling that of the common *Meloe majalis*, except that the thorax is of a yellowish brown colour. According to Mr. Waterhouse, it differs from the Indian species, *E. rufficollis*, in having the scutellum yellow, the eyes more separated, the head more square behind, and the sculpture of the head and thorax generally more delicate. It has not as yet received a name.

The remainder of the drugs brought by Dr. Parker do not possess any distinctive taste or odour, or any properties which are worthy of notice.

* Bouton, 'Fl. Méd. de Maurice,' p. 92.

† See Baker ('Fl. Mauritius and Seychelles,' p. 83).

HAILSTORMS AND FORESTS.

The Geneva Correspondent of the *Times* writes, under date September 1:—"Hailstorms, as is well known, often play sad havoc in Switzerland as well as in other parts of Europe. They generally last only a few minutes, but in that time the crops of a whole district may be destroyed, trees stripped of their fruit and leaves, and even potatoes in the ground hacked to pieces. Birds are sometimes killed by the hundred, and a grape-vine touched by a hailstone is ruined for ever. Seven years ago there was a hailstorm in this canton, which in less than five minutes did damage estimated at a million of francs. In some districts there are mutual hail insurance societies as in other countries there are mutual fire insurance societies. In these circumstances everything relating to the phenomena and causes of these visitations is studied with great interest, and papers on the subject read at the late meeting of the association of Swiss Geographical Societies, held this week at Geneva, by Herren Beaumont and Riniker, of Aargau, are attracting considerable attention in scientific circles. The utility of forests as a safeguard against avalanches and a hindrance to *tourments* and snow-drifts has often been pointed out, but it has never before been suggested that forests are a preservation against hailstorms. Such, however, is the opinion of Herr Riniker, who is chief forester of Canton Aargau. He says that where there are forests there are no hailstorms, and in support of this theory he adduces a remarkable fact, for the accuracy of which he and many others can personally vouch. In the south of Aargau there is a little chain of mountains known as the Lindenberge. The Lindenberge are about 20 kilomètres long, of an average height, above sea level, of some 800 feet, and completely covered with wood. About twenty years, ago the forest was divided in two places by wide gaps, with the consequence that the valleys at the foot of the mountains were soon afterwards visited with frequent hailstorms. The hail-charged clouds were seen to traverse the gaps. In 1868 the wider of the two open spaces was closed by a plantation of firs, and since 1871 no hailstorm has crossed the forest. In explanation of this phenomenon Herr Riniker suggests that, as hailclouds are saturated with positive electricity and trees conduct from the earth negative electricity, the meeting of the two currents develops sufficient heat to prevent the complete congelation of the clouds and even to thaw the hailstones contained in them—for the clouds of this description pass very near the earth—and so convert the frozen particles into rain. If further observation should confirm the accuracy of Herr Riniker's conclusions in this regard, the importance of forests in countries where hailstorms are frequent will be greatly increased."

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 9, 1882.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ROYAL COMMISSION ON THE MEDICAL ACTS.

On a recent occasion we laid before our readers a *résumé* of the Report of the Royal Commission appointed last year to inquire into the working of the Medical Acts. At that time the evidence upon which that Report was based had not been published, but it has this week been issued in the form of a bulky blue book of more than four hundred pages. With respect to the general scope of the Report it will be remembered that it dealt with topics that, apart from their general public interest, were essentially and almost exclusively medical, whilst the subject of counter prescribing, to which numerous attempts at legislation as well as litigious experiences during recent years had given a somewhat factitious importance, was dealt with very curtly, and only by implication, in a single sentence which stated that in the opinion of the Commission it would be undesirable to prevent unregistered persons from practising, but that they should be prevented from representing themselves as being registered, or from assuming titles which would lead the public to believe that they are regular medical men. Of course this would include, and indeed go far beyond the limits of the "counter practice" which has been claimed as being within the right of chemists and druggists, and even this brief reference proves, so far as the Royal Commission reflects public opinion, that the position which has been maintained by chemists and druggists in respect to this question is in harmony with the feeling of the community in general.

It appears that very little evidence was presented to the Commissioners upon the subject of counter prescribing, and even this was mainly incidental to evidence upon the subject of unlicensed practice, using the term in the wide sense of doing all that a qualified practitioner may do. It may be of interest, however, to briefly indicate the nature of even this small amount of evidence.

First in importance, perhaps, should be ranked the evidence of Dr. B. W. Richardson, on account of his appearing as the representative of the British Medical Defence Association. In reply to Professor Huxley, Dr. Richardson said that the "tenour of the wish" of this Association is that every description of practice for gain by persons whose names are not on the Medical Register should be prohibited, and that the majority of the members desired to put a stop to "counter practice," in which feeling they were in accord with the general professional sentiment. He admitted, however, that there exists a difference of opinion upon this point, and that he himself differed from many of his colleagues, since he believed that such suppression was not possible or desirable. An enactment that would prevent a person from getting what help he might choose in a case of illness where, as put by Professor Huxley, "the local doctor, whatever his abilities may be, is a person whose habits are not altogether favourable to clearness of head," Dr. Richardson considered would be a very strong measure, such as would not be likely to pass the House of Commons. The course favoured by this witness was the same as suggested by him some time since, that to a certain extent "counter practice" should receive formal recognition as an absolute necessity, and that "the Apothecaries' Company should take up the whole of that part of medicine." It is worthy of notice that as one of the elements to be taken into account in dealing with the question, Dr. Richardson expressed an opinion that, at the present moment, in a political point of view the chemists and druggists are quite as potent as the medical profession, and that as "they have a Pharmaceutical Society conducting itself uncommonly well in the matter, and with such authority that they are outbidding the profession of medicine" (whatever that may mean), the best course would be "to allow a certain limited measure of counter practice."

Mr. H. Nelson Hardy, President of the Medical Alliance, was unable through illness to attend the Commission, but sent in a long statement on behalf of that Association. In it, under the head "Unqualified Practice," the fact is recalled that in the Government Bill of 1870 was a provision for repealing sections 9 to 24 of the Apothecaries Act, 1815, and the opinion is expressed that the repeal of the 20th or penal section, without the enactment of any equivalent, "would have thrown open the practice of medicine to the fourteen thousand chemists who now keep shops in England and Wales." By the way, it may be remarked that this is far in excess of the number of chemists and druggists keeping open shop, even when Scotland is included. The "equivalent" that Mr. Hardy proposes, if the penal clause be repealed, is to the effect that "Any person registered under the Act who for gain engages in the medical treatment of diseases shall for each offence be liable on summary conviction to a fine not exceeding £20." The statement includes a pretty full abstract of the report of the case of the *Society of Apothecaries* v. *Shepperley*, though whether the writer is satisfied or dissatisfied with the result in that case is hardly evident. Mr. Hardy's absence saved him the necessity of having to explain more in detail how he would suppress "counter practice."

Dr. James Grey Glover, whose connection with the *Lancet* gives additional interest to his opinion, when asked whether he would extend the penal clauses so far as to bring "counter practice" under their cognizance, replied that he would not, although in taking that position he thought he was perhaps not representing general opinion. He believed that counter practice never could be stopped, and that it was not desirable that it should be. But if a chemist and druggist went out to visit and posed as a medical man, and carried on medical practice in the ordinary sense of the word, or in severe cases, he thought a clause should be so constructed as to overtake that kind of practice. Whilst he would do nothing against quackery as such, but leave the utmost freedom to the public to employ whom they please, he would punish the false use of titles very severely. It may be hoped that this rational view will become more and more characteristic of the staff of our esteemed contemporary.

The foregoing will give a fair idea, we believe, of all which is to be found in these "Minutes of Evidence" that applies strictly to what is entitled to be termed "counter practice." There is much besides that refers to irregular medical practice, but some of it is of such a nature as to indicate that one of the most pressing problems to be solved is how best to bring the qualified and registered *mal*-practitioner under control. As might have been expected from the terms of the Report, the whole tenour of the evidence given on the subject of "counter practice" justifies the position taken up by the Pharmaceutical Society in relation to it. It has not been the policy of the Pharmaceutical Society to foster or in any way encourage irregular medical practice, but simply to insist that if a chemist and druggist thinks fit to sell to a customer who demands it a remedy for a simple ailment he is acting within his right and does not render himself liable to a legal penalty. But, as has often been pointed out in these columns, the real remedy against "counter practice" lies in the hands of the medical profession to apply; for there can be little doubt that in proportion as chemists and druggists are entrusted with the work for which they are specially trained, namely the dispensing of the prescriptions of qualified practitioners, they will be less inclined, even in semblance, to encroach on the domain of medical men.

PHARMACEUTICAL GATHERINGS.

At the time of writing this note the Annual Meeting of the German Pharmaceutical Association is being held in the city of Berlin, under the presidency of Dr. Brunnengräber, and it is pleasant to know that invitations to be present at this meeting have been courteously forwarded to several English pharmacists. In Germany the business of the Annual Meeting extends over four days, and besides being associated with a pharmaceutical exhibition it is enlivened by several social gatherings; this year it commenced on Tuesday last and culminates on Friday evening in a visit to the Zoological Gardens, where there are to be a concert, supper, fireworks and ball.

On Tuesday next, the 12th inst., the American Pharmaceutical Association is to commence its Annual Meeting, at Niagara Falls, and although this is also a "far cry," an invitation to British pharmacists from the President, Professor P. W. Bedford, has not been wanting. By the courtesy of Mr. G. S. Seabury, we have been favoured with an early copy of the programme, from which we learn that the proceedings at this meeting also last four days. Concerts and excursions to the "rapids" and other places are to vary the monotony of the business, and the meeting promises to be a very successful one.

Close in succession comes the meeting of the Austrian Pharmaceutical Association in Agram, the principal city of Croatia, the reception of guests commencing on Saturday evening, and the opening meeting taking place on the following day. Here again the local Association extend a cordial invitation to the members of other pharmaceutical associations, and we have no doubt that this welcome might be construed to include the pharmacists of this country. It is proposed to bring this meeting to an end by an excusion to Banjaluka, in Bosnia, on Tuesday, the 19th.

It is worthy of notice that in all these cases there is a fixed tariff for the tickets entitling the holder to partake in the festivities of the meeting. It appears to be considered, and we believe rightly so, that all that is to be expected from the local members is that they should make such arrangements as shall best secure the comfort of their visitors, and see that they are effectually carried out. No doubt in most cases this expectation is exceeded, but at any rate it is left with those most concerned to determine to what extent extra expenses shall be incurred.

THE LIBRARY AND MUSEUM.

We are requested by the Secretary, in order to prevent disappointment, to remind our readers that, in accordance with a resolution of the Council at its meeting in July, the Library and Museum will be closed entirely during September for repairs.

FIRE AT A CHEMIST'S.

We regret to learn that in the course of a destructive fire, which broke out in St. Albans shortly before midnight on the 26th ult., the premises of Mr. Arthur E. Ekins, pharmaceutical chemist, and Local Secretary to the Pharmaceutical Society, were nearly entirely destroyed. The fire appears to have originated in the cellar of an ironmonger next door, in which a large quantity of petroleum and colza and linseed oils was stored.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 192.)

Upon resuming, the first paper read was—

A New Styptic of Indigenous Growth.

BY PROFESSOR QUINLAN, B.A., M.D., M.R.I.A., F.K.Q.C.P., *Senior Physician to St. Vincent's Hospital, Dublin; Professor of Materia Medica and Therapeutics to the Catholic University, and Examiner in the same to the Royal University of Ireland.*

The great advances of chemical and of physical science and their application to medical and surgical purposes have much enlarged the means available for the treatment of disease, and in few departments more than in those connected with pharmacy, which, partly owing to chemical research and partly to botanical discovery, have expanded into an important speciality in the hands of eminent special investigators. It is, however, hardly to be doubted that all this great progress is accompanied by a certain disadvantage in medicine and surgery as well as in pharmacy. In the former we have at our disposal the microscope, chemical tests and other means of precision, which are rapidly giving to several departments of the healing art somewhat of the aspect of exact science; but often we are disposed to lean too much upon those scientific aids and to neglect that minute observation of symptoms by which the old physicians, all unlearned in science, accomplished such wonders of diagnosis. Similarly, in pharmacy, the great advances made by our special inquirers cause us to look towards purely chemical remedies and to overlook many of the valuable old simples which in their day were found so useful; and in discarding which we have (while getting rid of much rubbish) certainly sacrificed some really potent drugs. Many of them are safe, efficacious and accessible; and I propose briefly to bring under your notice one of them, which in its day had a great reputation, but which in latter times has been quite forgotten, with which I accidentally came in contact, and on investigation found very useful.

About a twelvemonth ago I was paying a domestic visit to a rather primitive part of the country, and when walking through the fields was urgently requested by the family of a small cottager to come to the aid of a little child who was stated to be bleeding to death. I found that this young patient was suffering from croup, and that on his windpipe some leeches had been incautiously applied by the cottager's family. Everyone knows the difficulty frequently found in stopping such hæmorrhage in infants; and it is a maxim in such cases that leeches should always be applied in some position where pressure can be resorted to if necessary. In this case the least pressure caused the appearance of immediate suffocation; the child had become quite blanched, and being away from home and not on professional duty I had no surgical appliances about me. I was having a search made for cobwebs and was about to heat a small piece of iron, when a neighbour came in with a large handful of leaves which he chewed and applied to the bleeding spot with immediate success. I recognized the leaves as those of the *Plantago lanceolata*, or ribbed grass; and a number of trials made in hospital and elsewhere satisfied me as to their hæmostatic power, either in the chewed form or in that of the dried leaves, applied to bleeding surfaces. Satisfied as to efficacy, my next effort was to examine whether the observation had been anticipated by others; and I found that while modern writers are silent upon the matter, it is referred to enthusiastically by their predecessors from Pliny down to old Culpepper, "Student in Physick and Astrology." Shakspere alludes to it on several occasions; for example, Romeo, speaking of a wounded shin, says—

"Your plantain leaf is excellent for that"
(Act i., scene 2);

and, again, in reference to a wounded head (in 'Love's Labour Lost')—

"No salve, sir, but a plantain"
(Act iii., scene 1).

Culpepper's 'Herbal,' p. 285, contains the following statement:—

"The juice of the plantain clarified and drank for divers days together stayeth all manner of fluxes, even womans courses when they flow too abundantly. It is good to stay spitting of blood, or the making of foul or bloody water, also too frequent bleeding of wounds."

I may further mention that the Gaelic name of the herb is equivalent to the words "healing plant."

The plantains constitute in themselves a small natural order, and are described in detail in Sowerby's 'English Botany,' vol. vii., pp. 166 to 175, both inclusive. This little order contains two genera, viz., the *Plantago*, which embraces five species; and the *Littorella*, to which we need not further allude. The two herbs which I found useful are the *Plantago lanceolata*, var. *vulgaris* (Sowerby, plate, 1164), and the *Plantago lanceolata*, var. *timbali* (Sowerby, plate, 1165), both of which are simply ribbed grass, and to be met with in every meadow; in fact, as the great Roman naturalist, in lauding them, quaintly says "trodden under every man's foot." After a careful series of experiments I have arrived at the following preparations, which I here exhibit, and for the goodness of which it will be sufficient to say that they have been prepared by Dr. John Evans, State Apothecary and Chemist to the Queen and to the Prince of Wales, 49, Dawson Street, Dublin. They are:—

1. The dried leaves of both species. They are intended for external application, and their action is partly physiological and partly mechanical. In fact it much resembles that of matico, and like it it is somewhat ribbed.

2. A species of external linctus, comprising the leaves pounded in a mortar with glycerine added to preserve them. This is intended to imitate the chewed leaves, and to be available at a time of year when the green leaves might not be forthcoming.

3. The juice with sufficient alcohol to prevent it spoiling. This is intended for internal use. It has a hot astringent taste, but not disagreeable, and somewhat reminds one of that of the cardiac tincture of rhubarb.

4. The juice with glycerine. This was designed for physiological experiment on the capillaries, so as to avoid the fallacy incidental to an alcoholized preparation, and for cases in which alcohol would be unsuitable.

5. The green extract. This is made in the ordinary way, first separating the chlorophyll, then eliminating the albumen, and finally reducing the juice and chlorophyll to the consistence of an extract. With this preparation I have not as yet obtained satisfactory results.

Chemically examined the plantain juice is found not to be a tannin, and to be compatible with both the ferrous and ferric salts, the alkaloids, metallic salts, and the preparations of ergot. For obvious reasons in all the chemical and physiological experiments I employed the plantain juice pure, but its compatibility with well-known astringents and hæmostatics is, of course, an additional recommendation. The juice evaporated to dryness and incinerated yields an ash, containing much phosphate and scarcely any carbonate. If the tail of a gold fish be placed in the field of the microscope at 400 × so as to well display the circulation, and if the juice be applied to the web, after a little the following remarkable effects are observed. The circulation in the larger vessels is not interfered with, but in the capillaries there is a tendency to retardation, almost amounting to stasis. It is thus evident that the juice possesses hæmostatic properties, due to some vegetable principle, which is not a member of the tannin series so common in the vegetable kingdom. It is probably to this principle that the hot astringent taste is due.

This would not be the place to enter into therapeutical details. I will, however, ask the indulgence of the Conference to permit me to say that I have constantly used the leaves, and with the very best results, in cases of external hæmorrhage suitable to styptics. In cases of internal bleeding from the lungs, the kidneys, the bowels, and in menorrhagia I have got fair results from large and repeated doses of the juice, either fresh or fortified with alcohol or glycerine.

I recommend with confidence this ancient and once well-known styptic, so safe, so accessible, and, as I have found, successful. Many valuable lives have been saved, in the absence of surgical appliances, by the impromptu tourniquet of a pocket handkerchief tied round the bleeding limb and twisted with a stick. In like manner it can at least do no harm to furnish the practitioner in an emergency with a means of arresting capillary hæmorrhage, which, should regular medicaments be not forthcoming, can be obtained in the nearest field or rural path in any quantity, and by the most uninstructed persons.

The PRESIDENT, having proposed a vote of thanks to Professor Quinlan, said it would be interesting to know his opinion as to whether styptics acted chemically or physically, and if chemically, whether he thought it possible that one principle or more than one produced the action; if physically, as it would seem to act in the case of the tail of the fish, whether by exosmosis or endosmosis. He might not be able to give much information on these points at present, but from the skill with which he had treated this paper it was to be hoped that he would continue his researches on styptics, so that at some future time he might give the Conference a paper on the general action of styptics.

Professor TICHBORNE said there was no doubt that a great many of these old remedies had been sadly neglected of late years, and very good reasons had now been given why this one should be resuscitated, assuming it proved perfectly efficacious, because it was always at hand. He should like to ask how the succus was prepared, for he observed that it had a very dark colour, and the question occurred to him whether a stone or an iron press or mortar had been used. He would also ask if Professor Quinlan had investigated it for substances allied to catechuic acid or catechu compounds, which did not, under ordinary circumstances, give the strong reactions with iron which were found with ordinary tannic or gallic acid.

Mr. GILES said he might mention, as germane to the subject, another indigenous plant of very common occurrence, which also had valuable properties, viz., *Scrophularia nodosa*, a plant which when applied to that troublesome malady, a boil, in its inflammatory stage, was more effectual in subduing the irritation than anything he had ever met with.

Mr. GERRARD asked if Professor Quinlan had experimented at all with this drug in cases of diarrhœa, to ascertain if it was a good internal astringent as well as external. The paper was interesting, as it added another to the list of astringents which acted as such without the presence of tannin. Professor Quinlan had spoken of the action of the glycerine extract on the capillaries, and of the care he took to avoid the use of alcohol, but he did not see much difference between the addition of ordinary alcohol and glycerine to the preparation, glycerine itself being an alcohol; it was a very powerful body; when applied locally, it abstracted water, and in the pure state acted as an irritant.

Mr. PLOWMAN said a styptic might act chemically, perhaps more particularly in favouring the coagulability of the blood, or it might act by causing contraction of the smaller blood vessels. In the experiment on the tail of the fish, Professor Quinlan did not say whether the smaller blood vessels were contracted or not, or whether the stasis or condition approaching stasis took place without any diminution in the calibre of those smaller vessels. In all probability if there were such an actual diminution in the calibre, the active principle in the styptic would act through the nervous system.

Mr. BROWNEN asked whether any experiments had been made to ascertain the effect of the chewed leaves as compared with whole ones; the process of mastication was the initiatory process of digestion and might possibly set free the styptic agent existing in the leaves, or cause the development of something not present in the natural leaf. If it were so it would facilitate the identification of the styptic body.

Mr. SCHACHT would like to ask one further question, though its solution would not bear on the power of the juice or of the medicinal properties which were said to exist; but it might help to explain the first experiment which brought this matter under Professor Quinlan's attention, namely, the external application of the leaves in mass. Had Professor Quinlan in his microscopical examination directed attention to the leaf itself, to see whether or not it was covered with any special hairy processes which might serve the well-known purpose of distributing the blood over a large surface and thus promoting its more speedy and complete coagulation.

Mr. POLLARD said it was desirable to be as precise as possible in the terms made use of, and it did not seem to him that the word linctus was quite appropriate in this case.

Professor QUINLAN said he quite admitted that, and should be glad of any suggestion which would enable him to get rid of it.

Mr. SOUTHALL said that this interesting paper was very appropriate after the remarks in the President's address on the knowledge or want of knowledge possessed by chemists and druggists of our indigenous plants. If one looked at old herbals the great bulk of the plants were said to possess the same properties, so that one could not gather much information from them; the same set of qualities were attributed to a large number of very different plants. The use of some of these old plants seemed to be now revived, for instance, parsley-piert (*Alchemivll arvensis*) and crouch grass (*Triticum repens*) were not unfrequently used both by herbalists and in pharmacy.

Mr. BORLAND inquired if any investigation had been made as to the season at which these leaves were collected. Attention had already been drawn to the very proper point that regard should be paid to the period at which the collection of the articles of the materia medica was made. He might add that the *Plantago lanceolata* had long been used as a styptic in the part of Scotland from which he came, applied to cut wounds. Farm servants, when they met with any accident, would take one of the long leaves and bind it round the part; but the argument advanced in support of its medicinal action was solely a mechanical one, and he was not aware until now that it was supposed to possess any other property than that of acting as a covering to the wound. He should like to know if the plant was believed to possess these medicinal properties at all seasons of the year when it was found.

Professor QUINLAN said he wished he had heard some of these suggestions before, but he had noted them carefully, and would endeavour to take advantage of them. It appeared to him that the action of the plantain in either the dried or chewed form, but particularly in the dried form, was partly mechanical and partly physiological, but he had no means of saying whether it was also chemical. The first question put by Professor Tichborne was as to how the juice was prepared, and he might say that when he took a bale of leaves to Dr. Evans and told him what he wanted, that gentleman expressed his regret that a powerful hydraulic press which he possessed was out of order. But he told him that even if it had been in order he should have asked him not to use it. It was prepared in a large marble mortar and pestle, worked by two men. He attributed the dark colour to the chlorophyll. He thanked Professor Tichborne for the suggestion about catechuic acid, which had not occurred to him, but he would look into it. Mr. Giles's remark was most valuable, and confirmed the idea he had formed that in throwing over a great mass of rubbish they had at the same time sacrificed a number of very useful remedies, many of which were described in the old book of Nicholas Culpepper, student in astrology and physic, as he described himself. He stated that this was a herb of Venus and not of Mars, but he had not thought it necessary to trouble the Conference with the astronomical portions of his directions. That very morning he had heard from a member of the Conference a remarkable example of one of these old remedies, which had proved immediately efficacious in the cure of some children suffering from chronic whooping cough, one of the most troublesome maladies with which the physician had to deal, and which was almost impossible to cure except by change of air. He should make it his business to look up this local herb, ascertain its scientific name, and investigate its properties. He had not tried the plantago in cases of diarrhœa, but simply as a styptic. With reference to the question of alcohol and glycerine, when he tried any experiments of this kind he always made it a rule to try the effect of the subsidiary agents by themselves; he tried both alcohol and glycerine in the diluted form, and found under the microscope that alcohol caused certain effects which glycerine did not. There was nothing one required to be more careful of in conducting any research than these side effects, which one did not expect. These leaves were collected in May and June, when they were in perfection. He had not examined them microscopically; no doubt if they were so examined something would be found which would account more or less for their mechanical action.

A paper was then read entitled—

Some Experiments on English Oil of Lavender.

BY W. A. SHENSTONE.

Oil of lavender has been the subject of several researches, most of which have been undertaken by foreign chemists, the following being among the chief statements that have been made concerning it.

1. That it sometimes deposits camphor in cold weather, and that the camphor is identical with common camphor. Most of the experimenters who have obtained camphor from this oil, however, have probably done so after the application of some oxidizing process; further, Messrs. Flückiger and Hanbury state in 'Pharmacographia' that they have not been able to ascertain the above fact, and after some experience in the manufacture of the oil, and a good deal of observation during the last ten years, I also have been unable to obtain any confirmation of the first part of this statement, so that I think it is probably erroneous.

2. That it contains a hydrocarbon, isomeric with that from turpentine oil, which is said by Lallemand to boil at so high a temperature as 200° C. to 210° C., and which does not yield a crystalline hydrochloride. It will be seen in the sequel that recent experiments do not confirm these statements concerning the properties of the hydrocarbon in lavender oil.

The most recent contribution to the subject is that of M. Bruylants, an account of which appears in the *Journal de Pharmacie et de Chimie* for 1879.

M. Bruylants working with pure oil of French lavender flowers has obtained from it, by fractional distillation to the amount of 25 per cent., a product which after rectification over sodium he recognized as a terpene by its boiling point, 162° C., its vapour density and its action with iodine. When strongly cooled and treated with hydrochloric acid gas, it yielded a solid hydrochloride. He also believes the oil contains, to the extent of 65 per cent., a mixture of borneol and camphor, being led to this conclusion by the facts that determinations of carbon and hydrogen give numbers which are consistent with such an hypothesis; that after treatment with a mixture of potassium bichromate and dilute sulphuric acid it yielded camphor, and after treatment with phosphorus pentoxide he obtained a mixture of a terpene and cymene. The former in greater proportion however.

As M. Bruylants was unable to separate any solid constituent by applying to the mixture a temperature of − 25° C., and as there are many cases in which the solid constituents of similar oils are separated quite easily by cooling, I am inclined to doubt their presence in this case, especially as M. Bruylants' results are consistent with other explanations. Cymene is not unknown as an apparent constituent of essential oils, so that its isolation by the above method is hardly a sufficient indication of the presence of camphor. And again, since bodies having the same composition as camphor have been obtained by the action of oxidizing agents on several substances, its isolation under these circumstances rather suggests that the above constituent consists of one or more liquid oxygenated bodies which yield camphor when treated with oxidizing agents, and that French lavender oil is in the main a mixture of these and of the above described terpene.

About six years ago Dr. Tilden was kind enough to put into my hands a considerable quantity of fine English oil of lavender, and I devoted a good deal of time to its examination. My results are by no means complete as, unfortunately, all my material was destroyed in a fire which occurred at Exeter in 1878, and I have been deterred from returning to the subject since by pressure of other engagements, and by the very high price of the material. Probably I should not have brought them before the Conference now had not the experiments of M. Bruylants on French oil seemed to me to give an interest to my incomplete work which by itself it hardly possesses.

The quantity of material with which I experimented was rather more than 850 cubic centimetres. When distilled about one-third came over below 185° C., and one-half of the remainder between 185° C. and 207° C. The distillation was stopped at this stage as there was evidence of decomposition. An aqueous liquid, acid to litmus, came over with the distillates. The residue in the retort was finally distilled in a current of carbon dioxide, keeping the temperature low, in order to lose as little of the volatile constituents as possible. The portion distilling below 185° C. was again distilled, ebullition began at about 176° C. and nearly half came over below 180° C. The various portions which distilled above 180° C. were fractionated so as to get as much as possible of the lower boiling product, which was added to the above. During these operations there was constant separation of water, and I may here observe that this occurred throughout my work; portions which had been heated for weeks with metallic sodium still yielding traces of moisture when subsequently distilled.

The result of these operations was that I had a product boiling at 176° C. to 180° C. amounting to nearly one-third of the oil taken, about the same quantity boiling from 200° C. to 207° C., 140 c.c. boiling a few degrees above 180° C., and a black resin amounting to about 25 per cent. of the substance operated on. There is no doubt from the results of a distillation *in vacuo*, subsequently described, that this last was to a great extent a product of decomposition.

The portion which boiled below 180° C. was digested for many days with large excess of metallic sodium, the liquid being from time to time distilled off from a brown solid which separated, steam distillation being employed when necessary to avoid the application of excessive heat. The product was fractionated and the portion which then came over at 170° to 175° C. was subjected to further prolonged treatment with sodium to destroy oxygenated compounds, and finally yielded a liquid which distilled at 167° to 169° C. The quantity of this substance was less than 1 per cent. of the oil taken, and as I could not hope to further purify so small a quantity, I decided to examine it.

I had no apparatus for organic analysis at the time and by Dr. Tilden's kind consent Dr. G. H. Morris made some analyses of it for me. He found that it contained about 3 per cent. of oxygen, but had a vapour density nearly corresponding to that of a terpene of formula $C_{10}H_{16}$. I myself examined the very small quantity which remained from his experiments, and found that the substance was a colourless oil with a camphoraceous fragrant odour, but not that of lavender oil. When well cooled with ice and salt and saturated with hydrochloric acid gas it yielded white needle-like crystals of a hydrochloride, which I collected and dried by pressing between filter paper. I was, however, unable to examine or preserve them as the quantity was too small for purification, and in their then impure state they quickly melted at ordinary temperatures and so disappeared. When treated with hydrochloric acid and subsequently with ferric chloride the oil behaved like a terpene. These results seem to indicate that it was a terpene, but still contained a little of the higher boiling constituents of the oil.*

Unfortunately my examination of the higher boiling fractions was hardly begun before it was brought to a close by the fire previously alluded to. In the course of the separation of the small quantity of terpene, however, I observed that under the action of heat they were modified with the production of water and with an increase of boiling point. In an experiment to test this point I found that a portion of the oil, which boiled at 184° C., after heating for two hours and a quarter with an inverted condenser had its boiling point raised to 192° C., but that subsequent heating had not much effect upon it.† As regards the composition of this part of the oil, it appears to be highly oxygenated. Dr. Morris has made an analysis of a fraction boiling at about 200° C. and he found that it yielded only 83·6 per cent. of carbon and hydrogen, from which it appears to contain about 16 per cent. of oxygen.

I had also fortunately made the following experiments with the view of obtaining, if possible, any solid constituents the oil might contain:—

1. A portion of lavender oil was placed in a distilling flask sealed to a receiver, the arrangement was exhausted by a Sprengel pump till the pressure in the apparatus was equivalent to less than one inch of mercury, and then hermetically closed. The receiver was well cooled and the oil distilled at as low a temperature as possible until only one fourth remained; the residue had the consistence of a syrup and was of a pale colour, but gave no sign of crystallizing after standing for a month, nor did it do so on cooling by means of freezing mixtures.

2. Small portions of the oil of lavender and of one of the higher boiling fractions were cooled with a mixture of solid carbon dioxide and ether. They became exceedingly viscid, but gave no signs of crystallizing, even when minute fragments of camphor were added to them. It is difficult to believe, after these experiments, that the oil contains any notable quantity of crystalline constituents.

From the independent experiments of M. Bruylants and myself it seems that the English and foreign oils differ very decidedly in the amounts of terpene they contain; that in each case it is a terpene yielding a crystallizable hydrochloride which is present; and that probably neither of the oils contains much crystalline constituent, but that both, and this applies particularly to the English oil, are chiefly composed of one or more liquid oxygenated bodies, which there is reason to believe yield camphor on oxidation, and which appear to undergo some degree of change during distillation. The statement in the books that lavender oil contains a hydrocarbon boiling at 200° to 210° C. is doubtless incorrect, as Dr. Morris's analysis shows that the distillate collected at near that temperature contains a large amount of oxygen. The further study of the oxygenated constituents will probably be most conveniently conducted with the English oil, as in that it is mixed with less hydrocarbon than in the foreign product.

In conclusion, I can only regret that I have not a more complete account of this matter to bring before the members of the Conference.

* It is not, of course, certain that this substance had not been produced from other constituents of the oil during distillation. Its resemblance to the terpene obtained by M. Bruylants, however, inclines me to the belief that it was not so.

† Professor Letts, who has very kindly shown me some unpublished notes of experiments on lavender oil, has also observed this rise of boiling point under the influence of heat.

The PRESIDENT, having proposed a vote of thanks to Mr. Shenstone, which was carried unanimously,

Mr. JACKSON asked if Mr. Shenstone had examined the optical properties of the terpene from French and English oils before assuming that they were the same.

Mr. SHENSTONE said that he did not assume that they were the same. He had not examined the optical properties, though he had intended doing so, because his material was unfortunately destroyed before he arrived at that stage.

The next paper read was on—

TERPIN HYDRATE; ITS PREPARATION AND CRYSTALLOGRAPHY.

BY R. H. PARKER.

This subject was brought under my notice by a sample of crystals of unknown composition, many of them remarkably well formed, found by my friend, Mr. W. Adams, of Shrewsbury, in a jar of "Furniture Oil," some of which had been sent to a customer who complained that it scratched the furniture; another bottle, carefully strained, was sent out, but it also come back in about a month with a note stating that it contained "bits of glass." The stock jar on examination was found to contain a considerable quantity of the crystals in question. The exact formula from which the furniture oil was made could not be referred to with certainty; it was probably made from one consisting chiefly of linseed oil, turpentine, butter of antimony and methylated spirit. A sample made according to this formula, however, has given no crystals during four years.

An examination of the substance proved it to be entirely volatile, and its elementary composition was soon found to be limited to C, H and O. When searching for nitrogen by heating with soda-lime, the production of a highly aromatic camphoraceous odour was observed. Further information as to the nature of the substance was sought by ultimate analysis. Several well-formed colourless crystals, evidently very pure, were selected, carefully wiped and powdered. ·1878 gram gave ·1995 H_2O and ·4375 CO_2; ·1787 gave ·1897 H_2O and ·4163 CO_2. Having observed its relation to ordinary solvents, a search among bodies approaching this composition suggested that the substance in question was terpin hydrate. On comparison, a specimen of that substance was found to possess the same crystalline form and produced the same peculiar odour when heated with soda-lime. The percentage of carbon found was too high, probably due to the specimen not being absolutely pure. The following are the figures obtained:—

	1.	2.	$C_{10}H_{18}(OH)_2,H_2O$.
C. . . .	63·53	63·53	63·16
H. . . .	11·80	11.79	11·58

The attempt to produce the substance from the furniture oil having failed, the ordinary process was adopted, *i.e.*, a mixture of turpentine, nitric acid and alcohol. Processes are recorded by Wiggers, Deville, Berthollet, Tilden and others giving different proportions of ingredients and stating numerous conditions probably conducive to the formation of terpin hydrate, but neither details the exact method of mixing the ingredients or states what conditions really assist its formation.

Strong nitric acid, as is well known, acts violently on turpentine and on alcohol, the products varying with the temperature and strength of the acid; the latter and the order of mixing are most important points to observe in the manufacture of terpin hydrate.

My first experiments were made with nitric acid, specific gravity 1·42; a mixture of five volumes of turpentine with two of methylated spirit was kept cool while two volumes of acid were stirred in; this was agitated occasionally for a few days, poured into a shallow dish and a little spirit added at intervals. A dark brown mixture resulted separating into two layers, but no crystals appeared during many months.

In the next series the action of the acid on the turpentine was encouraged by floating the spirit on the oil, and pouring the acid through a funnel-tube to form a third layer at the bottom of the vessel, in this case the strong acid was in direct contact with the turpentine. The temperature rose rapidly, and an explosive ebullition took place, much vapour was disengaged, and the spirit afterwards boiled quietly for some time. A deep red syrupy liquid resulted which showed no tendency to crystallize; it was very soluble in alcohol, the solution bearing considerable dilution with water.

The opposite line of action was next adopted, the acid was diluted with water and mixed with the spirit before adding the oil; this proved to be the correct process and crystals were invariably produced. Nitric acid of specific gravity 1·25 yielded most satisfactory results, when stronger than specific gravity 1·3, no terpin was formed.

Attention was now directed to the conditions most favourable to the production of crystals. Insolation did not appear to influence the result to any important extent. Crystals appeared sooner and in greater abundance in shallow than in deep layers of liquid; the depth should be about a centimetre. Slight occasional rotation of the vessel hastened the appearance of crystals.

The production of *colourless* crystals was favoured by the use of rectified in the place of methylated spirit, of freshly distilled turpentine in preference to that which has been long exposed to air and by the exclusion of air from contact with the mixed ingredients. The latter condition was arrived at by placing a circle of glass, accurately fitting the vessel, so as to touch the surface of the liquid. The advantages gained by this precaution and by the use of rectified spirit were not sufficiently great to warrant their adoption in a manufacturing process. The exclusion of air seemed to favour the production of a larger proportion of crystals.

The following is the process finally adopted:—

Preparation of Terpin Hydrate.

Mix one volume of nitric acid, specific gravity 1·25, with one volume of methylated spirit, cool, place the mixture in a shallow glass dish and float upon it two volumes of oil of turpentine, rotate the vessel occasionally, and in three or four days crystals appear, allow to remain undisturbed for about fourteen days, collect the crystals on muslin, wash with cold water, drain, and dry by exposure to air, re-crystallize, if necessary, from slightly diluted alcohol.

The two layers soon acquire a straw tint, the lower being darker, the colour gradually deepens and after a few weeks becomes deep red. The depth of colour is much less when contact with air is prevented. Most of the terpin hydrate is deposited in the first fortnight. The total produce does not often exceed one-third of the weight of the turpentine taken. When little or no more terpin is produced, the lower layer appears to consist of a mixture of nitric acid and alcohol saturated with terpin and containing a small proportion of the upper layer in solution; this floats when the mixture is diluted with water, while the terpin crystallizes out. The upper layer has a pleasant aromatic odour, decomposes on boiling, but in a current of steam most of it passes over, the distillate being nearly colourless while the residue is very dark red, thick, and heavier than water. The successive portions of distillate varied in specific gravity at 17° C. as follows:—

No. 1	0·896
No. 2	0·900
No. 3	0·910
No. 4	0·921

In odour, the last is similar to but more rank than the first, there is no resemblance either to that of terpinol or the original terpene.

In another experiment, after the terpin had been deposited, the acid layer (*a*) and oily layer (*b*) were separated.

A fresh quantity of turpentine was floated on the acid layer (*a*) and an average crop of crystals was obtained; the upper layer was again replaced by fresh turpentine from which also a large proportion of terpin was in due time produced.

The oily layer (*b*) was floated on a fresh mixture of acid and alcohol, but no crystals appeared for six weeks, and after that time, only a small quantity.

The results I have obtained agree, in the main, with Tilden's (*Journ. Chem. Soc.*, 1878), except that I find the use of a weaker acid necessary, and omit the subsequent additions of methylated spirit.

The theory given by that author accounting for the production of terpin by the intermediate formation of a compound of terpinol with ethyl nitrate,

$$C_{10}H_{16} + C_2H_5OH + NO_2OH = C_{10}H_{18}O \left\{ \begin{matrix} OC_2H_5 \\ NO_2 \end{matrix} \right.$$

$$C_{10}H_{18}O \left\{ \begin{matrix} OC_2H_5 \\ NO_2 \end{matrix} \right. + 2H_2O = C_{10}H_{18} \left\{ \begin{matrix} OH \\ OH \end{matrix} \right. + C_2H_5OH + NO_2OH$$

is satisfactory, except that it does not explain the fact that only one-third of the terpene is hydrated.

Crystallography of Terpin Hydrate.

The crystals which are first produced in the preparation of this substance are often extremely well formed, and if simply wiped, avoiding washing with water, the faces are remarkably brilliant. They consequently afford an excellent opportunity for the study of its crystalline form, which is a combination of the rhombic octahedron and prism in which the faces of the former are dominant; those of the latter are often much reduced but never disappear. Fig. 1 illustrates the average form, which,

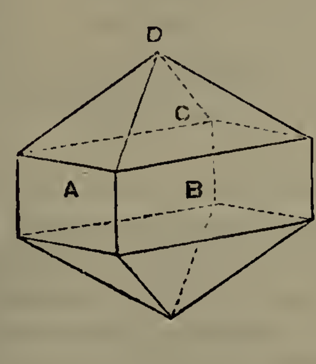

Fig. 1.

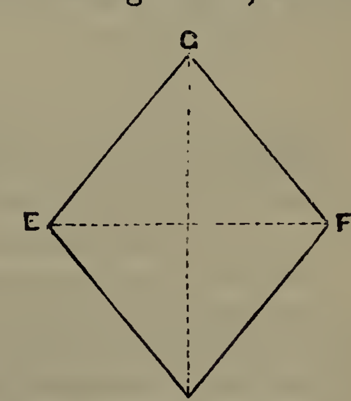

Fig. 2.

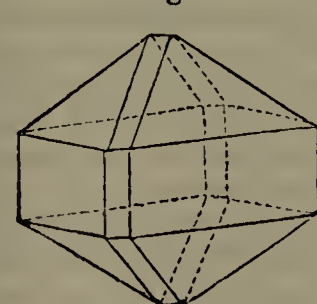

Fig. 3.

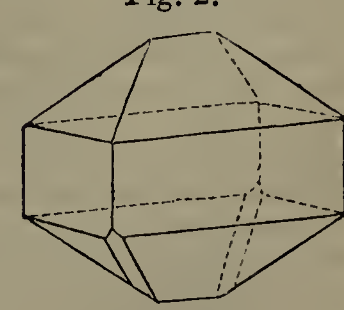

Fig. 4.

however, is not often completely developed; the prism faces are frequently much extended, producing a more or less elongated prism, while they are sometimes reduced to quite a narrow face, forming a nearly closed octahedron. Fig. 2 illustrates the horizontal section. Occasionally the macrodiagonal edge (G and H, Fig. 2) is replaced by a narrow face which is shown in Fig. 3, carried round the complete crystal. These faces are but slightly developed and in the crystal as first formed they are seen on the pyramid in a few cases and never on the prism. After recrystallization from alcohol, the macrodiagonal face may be observed on the prism, more frequently on the pyramid, and occasionally on both.

The most important modification of form to which the crystal is subject consists in decrements from one or more faces of the prism and pyramid; in fact nearly all are more or less modified in this way, the prism becoming more or less flattened, and the solid angle at the apex being reduced to a horizontal edge forming a dome instead of a pyramid. Fig. 4, which illustrates these changes and also the appearance of the macrodiagonal face on the lower side, may be taken as the typical form of terpin hydrate crystals. When produced from alcoholic solution, even slowly, the tendency is to form elongated prisms and needles, but the terminal pyramid is always evident. The brachydiagonal edge (E and F, Fig. 2) does not appear in any case replaced by a face.

The measurements of the opposite angles of prism and pyramid were found, as expected, identical; the macrodiagonal face was found inclined equally to the adjacent faces of the prism.

After a large number of measurements, three of the most perfect and brilliant crystals were selected for final examination with the reflecting goniometer. Five different observations of the solid angle at the apex gave a mean of 105° 6′; nine different observations of the inclination of the pyramid face to that of the prism gave a mean of 127° 33′; a slight error in excess is evident—

$$105° \; 6' + 2(127° \; 33') = 360° \; 12'$$

a closer approximation would therefore be 105° 2′ and 127° 29′. Numerous observations of the prism faces gave as the best results—

macrodiagonal angle E G F = 77° 45′
brachydiagonal angle G E H = 102° 15′

From these measurements the relative lengths of the axes are calculated—

E F :	G H :	vertical axis =
0·8007 :	1 :	0·4951

This result, however, does not quite agree with the parameters given by previous observers (*vide Phil. Mag.*, 1879, p. 132).

Maskeleyne	0·8082 : 1 : 0·4788
Arzruni	0·8072 : 1 : 0·4764

Specific Gravity of Terpin Hydrate.

This appears to vary slightly, the average being 1·09, relative to distilled water at 17·5° C.

Solubility of Terpin Hydrate.

At 20° C. it requires for solution 13 parts of alcohol, specific gravity, ·825; about 350 parts of distilled water; its solubility in alcohol is much increased by heat; boiling water dissolves about 3 per cent. It is slightly soluble in chloroform, carbon bisulphide, ether and benzol, scarcely in turpentine.

This substance well illustrates the conventional character of the term solubility, which I have before pointed out when referring to that of salicin (*Pharm. Journ.* [3], xii., p. 378). A simultaneous series of experiments was made on the solubility of terpin in alcohol and in water, all being maintained at a constant temperature of 20° C. for over forty-eight hours. One part of terpin dissolved in 11 volumes of alcohol with the aid of slight heat did not crystallize, while 1 in 13 without heat did not entirely dissolve, although repeatedly agitated. One part of terpin in 240 volumes of water dissolved by heat, gave a single tiny crystal at the end of forty-eight hours, while 1 in 300 without heat left a considerable amount undissolved. The solubility cannot be taken by the method of evaporation, because terpin is volatile at a dry heat much below 100° C.

The odour observed on heating terpin with lime suggested distillation of such a mixture. Terpin mixed with four or five parts of lime was slowly distilled over a column of lime heated to low redness. A liquid yellowish oil was obtained, having a very powerful aromatic camphoraceous odour, in some degree resembling that of yarrow and cajeput, and yet distinct from them. Sometimes much terpin distils apparently unchanged and solidifies in the condenser. I have not yet arrived at a process by which terpin can be completely converted into this oil, so as to obtain a sufficient quantity for complete examination. It seems, however, probable that terpin hydrate may be made to yield several aromatic oils by the action of dehydrating substances under suitable conditions.

The PRESIDENT said the first feeling on the part of most members on listening to this paper would be one of astonishment that so much science should be made to flow from a bottle of furniture polish; and the second would be that a great deal depended on who drew the cork. He was proud to think that in this instance it had been drawn by an old pupil of his own, and pharmacy should be proud to think that a gentleman engaged as an assistant behind a retail counter could find time and possess the ability to carry out an investigation of this kind. He would propose a vote of thanks to Mr. Parker, who he hoped would continue his researches.

A vote of thanks having been agreed to,

Mr. SHENSTONE said the most interesting point about this communication was the origin of the terpin in the bottle of furniture polish, which Mr. Parker seemed to think was a mixture of linseed oil, spirit of turpentine and butter of antimony. There was a general impression that nothing answered very well for making terpin hydrate excepting nitric acid diluted with alcohol, and now it seemed possible that further investigation might introduce a new body capable of producing terpin hydrate from turpentine, which would be interesting and important, as it might render the explanation of the reaction suggested by Dr. Tilden insufficient.

Professor TICHBORNE said it was his duty some years ago to prepare a considerable amount of terpin hydrate, when he discovered a body called colophonic hydrate, which in its properties bore a considerable resemblance to terpin hydrate, but it differed considerably in one important point, inasmuch as it gave a number of beautiful colour reactions with hydrochloric and sulphuric acid, which terpin hydrate did not. It was a product formed by oxidization from what was known as resin spirit, and there was no doubt a close relation between it and terpin hydrate. In preparing terpin hydrate his experience was that if it were crystallized from fairly strong alcohol, a mass of fine crystals was obtained, but if a solution of 1 part of water to 2 of ordinary spirits of wine were allowed to evaporate spontaneously very magnificent crystals were formed, sometimes approaching ½ inch in length.

Mr. GILES asked how Mr. Parker arrived at the conclusion that the furniture oil had been composed of the ingredients he had mentioned. Was it by analysis or by communication of the formula?

Mr. PARKER said he was unable to arrive at the exact formula from which the polish was made; it occurred in a pharmacy where it was not frequently in demand, being made sometimes from one formula and sometimes from another; the one containing turpentine and butter of antimony seemed to him the most likely one and he made some from that, but no terpin hydrate was formed. It seemed as if the formation of terpin hydrate required a peculiar condition in the mixture; whether a liquid isomer was formed he could not say, for the original sample which was sent out produced another crop of crystals within a month; whereas the specimen he made would not produce crystals under any conditions.

Mr. SHENSTONE asked if there was any possibility of the polish being made from a formula containing nitric acid.

Mr. Parker said it was very unlikely; the preparation of furniture oil with turpentine and butter of antimony was very common, but he did not think any nitric acid would be used knowingly. Professor Tichborne's remarks on colophonic hydrate were interesting, but to his mind the production of beautiful crystals of terpin hydrate seemed due not so much to the solvent as to the presence of other bodies with it. In the first purification of these crystals by means of methylated spirit, the presence of the other bodies was very evident, and in that case only did he obtain a similar crystal. When recrystallized, either from rectified or proof spirit, he found the crystals always exhibited a tendency to assume the form of long prisms or needles.

The next paper read was—

On a New Method of Making a Volumetric Solution for Determining the Hardness of Water.

BY C. R. C. TICHBORNE, F.I.C.,

Analyst, Co. Longford, etc.

It is rather curious to observe that in spite of our constant familiarity with the determination of the hardness in waters, we have never been able to improve, or modify, to any extent the original process of Dr. Clarke, invented nearly half a century ago. We may go even further, and state that we have never been able to throw doubt upon his original investigations and that they stand as he left them. Any so-called modifications are merely nominal, and have been made to suit the modern centesimal mode of expression. The most important proposals have been made in connection with the making of the soap solution and the standard calcium solution used for titration. A few of these modifications are, without doubt, improvements; but none of them touch in the slightest degree the principle of the process. Thus, in making the soap solution, Dr. Clarke used a soap made from animal fats (curd soap), and it has been respectively proposed to use a soft soap made from olive oil, lead soap (*emp. plumbi*), or a soda soap of olive oil (Castile soap). All these three last proposals are undoubtedly better than the original curd soap, as proposed by Dr. Clarke, owing to the very simple fact that the fatty acids in the last three mainly consist of oleic acid, and that the oleates are less prone to separate in cold weather than the corresponding fatty bodies found in the curd soap.

As regards standard hard waters, I had adopted for some time the well-known modification of dissolving an equivalent quantity of powdered selenite. This process leaves nothing to be desired as regards the construction of a calcium solution. It is simple and gives most accurate results, providing there are no crystals of celestine in the selenite,—an experienced geologist will instantly detect them by his eye.

Having premised thus far, it might be asked, Why seek to change, or improve upon the process? Experience shows that the most troublesome part of the method consists in making the soap solution. Soaps are too indefinite in composition to admit of making a reliable solution by merely weighing out a given quantity and dissolving it in a proper quantity of spirit. Assuming that a soap of a definite fatty acid could be always obtained, we find the amount of water to differ so considerably as to render a titration necessary; a titration too, which presents some considerable trouble.

My first idea was that if we took oleic acid and neutralized it with a standard solution of sodium hydrate, the latter base would represent the calcium salts, constituting hardness, equivalent for equivalent. I found, however, in practice that this is not quite so simple a matter as it would appear at first sight, but at the same time it is quite easy to construct a soap solution upon the basis of the soda hydrate consumed by the fatty acid.

The quantivalence of oleic acid may be, and has been, variously viewed. It is generally viewed as a monobasic acid. As acid salts, however, are known, it may with equal propriety be viewed as a bibasic acid; whilst, as will be seen further on, there is every reason to think that tetrabasic compounds of the alkalies exist.

Five cubic centimetres of commercial oleic acid were dissolved in 50 c.c. of spirit of wine, and 1 drop of a ·5 per cent. solution of phenol-phthalein added. A volumetric solution of soda was then run in until a pink indication was obtained. After repeating this experiment two or three times the reaction was found to be not only well defined, but very constant. If litmus were used, not only is it difficult to determine the point of saturation, owing to the gradual transition of colours, but owing to the permanent dissociation of a trace of the oleates when in solution (to which the litmus is amenable), the reagent is not suitable to the experiments detailed. The 5 c.c. of oleic acid exactly worked off at 15·5 of the normal solution of soda of the British Pharmacopœia, which represents 0·62 grams of sodium hydrate. Theory for the oleate having the formula $M'C_{18}H_{33}O_2$ would require 0·6 of hydrate of sodium, assuming the 5 c.c. of acid weigh 4·575 grams.

At this stage of the experiments a curious observation was made when water was substituted for the alcohol. The 15·5 of volumetric solution when added, as I have previously stated, gave a permanent liquid product of a faint pink tinge, showing that the point of neutrality had just been passed. A drop more of the volumetric solution developed a magenta colour, which was permanent as long as the solution was left at this point of saturation. A further equivalent of sodium hydrate was then run in (viz., 15·5 c.c.), when it gradually became colourless again, and at 7·75 c.c. began to pectize; the solution at this stage represented about the consistency of thick mucilage. When the full equivalent was present the solution became a solid jelly. The vessel in which it was obtained might be inverted with impunity. The pectized oleates seem to be permanent and definite compounds. From their behaviour when thrown into alcohol they appear to be hydrated compounds and are perfect colloids. If we push the action further, other compounds are formed which are much more soluble. There seems to be a wonderful analogy between silicic and oleic acid, and the technical application of silicates in soap-making appears to have been one of those chance discoveries which are in advance of scientific knowledge. As I intend to reserve this part of the subject for a separate communication, I have only to consider on the present occasion the practical bearings of these observations.

The measurers of the hardness in water are really the fatty acids, and it is almost immaterial whether we use the monobasic or dibasic salt above mentioned. In these remarks, we retain the old formula of oleic acid, but it is evident that the whole subject requires revision. We find by experiment that very little difference will be obtained, but that as the pectized salt seems to lather more freely, and as the solution seems more permanent I prefer it.* We, however, always depend upon the sharp reaction obtained on adding the soda until the pink solution is developed with phenol-phthalein. This point always represents the proportion of NaHO as equalling pure $C_{18}H_{34}O_2$.

The following is the process:—

As already mentioned, 5 c.c. of oleic acid are measured with a pipette and 50 c.c. spirit added to it in a beaker; 2 drops of phenol-phthalein solution are also added, and immediately a volumetric solution of soda $\left(\frac{NaHO}{1000} - \right)$ is run in until a pink indication is produced. This must

* This remark is not strictly true. I have found specimens of some oleic acids which do not work well, and do not readily pectize, and wherever there is any doubt about the results it is safer to merely add the exact proportion to neutralize the acid, as indicated by phenol-phthalein.

be done accurately, as the success of the process depends upon this measurement. If the gelatinous salt is required, another quantity of soda is then run in. The oleate of soda is then made up to the required measure by the addition of a mixture of equal parts of rectified spirit and distilled water. Each 15·5 c.c. of soda used in the first saturation equals 820 c.c. of volumetric solution of soap.

Thus— $$\frac{n \times 820}{15 \cdot 5} = x$$

n being the number of c.c. of soda solution which the oleic acid works off at, it is to be made up x. Such a solution makes a lather exactly on the original scale of Clarke, and it becomes unnecessary to titrate such a solution against a calcium solution, the soda solution being quite as definite and reliable as a calcium solution. Again, although different oleic acids might differ in purity, such a condition of things introduces no error, as the volumetric soap solution is made up on the saturating power of the acid employed, which alone determines the strength. Oleic acid obtained from the candle manufacturers, and a pure sample from Messrs. Hopkin and Williams, gave me exactly the same results in this respect, although they differed very much in their pectizing properties. The 15·5 c.c. of soda required to saturate 5 c.c. of acid always neutralized in my experiments; but I am not prepared to say that this would be generally the case, and it is difficult to make in different hands a pipette always delivering separately the same amount of an oily fluid like oleic acid, therefore I proceed on the above basis of calculation.

The above process gives a solution 32° c.c. of which when operating on 100 c.c. of water represent 16° of hardness per gallon by Clarke's scale.

The advantages claimed are that the soap solution may be made in five minutes,—requires no titration against a standard water,—and is more permanent than those made from ordinary soaps.

The PRESIDENT moved a vote of thanks to Professor Tichborne, which was carried unanimously. He said this method seemed a practical improvement inasmuch as it started with something quite definite, like soda, instead of something indefinite, like soap or commercial oleic acid. He would ask Professor Tichborne whether a solution made in that way really did keep better,—whether he had observed it for any length of time. It seemed natural for a soap solution when exposed to the air to split up, more or less rapidly, into an alkaline body and an acid oleate, the less soluble oleate being apparently more durable.

Mr. EKIN said he understood Professor Tichborne to say that when he added more alkali to what was a perfectly clear solution of soap he got a pectinized form. Was it not possible that the soap was insoluble in a solution of alkali, and that the pectinization was thus accounted for? The kind of soap he had found keep best was Pear's transparent; when dissolved in spirit it keep very satisfactorily. The method proposed for making a soap solution was perhaps about the most convenient, as it was a ready process that was always at hand. The great difficulty with Clarke's process had always been the trouble with the different kinds of soap.

Professor QUINLAN said he had often had occasion to make use of Clarke's test, and he could bear witness to the extreme trouble of making up the soap solution. This paper seemed to afford a method for readily making up a definite compound which would be very easy to use.

Mr. JACKSON asked if Professor Tichborne had used any other indicator than phenol phthalein, litmus, for instance, and compared results, to see if they were always the same.

Mr. NAYLOR said the method he adopted was to purify the commercial oleic acid by freezing, then to dissolve in that oleic acid some freshly precipitated oxide of lead, and decompose the lead compound in the usual way. He did not quite see why this oleate of soda should be more definite made as Professor Tichborne proposed than by any other method, provided the oleic acid were purified to begin with.

Professor TICHBORNE, in reply to the question put by the President, said there was no doubt that this solution did keep better than those of ordinary soaps. Even Castile soap, which was supposed to be very definite, sometimes contained a great mixture. He did not claim that this solution would keep perfectly; like all soap solutions, after being kept some time, there was a kind of silky crystalline appearance upon it, which it was impossible to avoid; but it was quite different to what occurred when a soap was used which contained a large proportion of stearic and palmitic acids. Sometimes there was a deposit in the bottle, which would prevent any reliable work being done. One of his reasons for thinking that the gelatinous body which pectized with the two equivalents of soda was a definite compound was based on the fact that if it were placed in a dialyser it acted very like a definite compound. He was not prepared at present to say that it was, but he thought this much more likely than that it was insoluble in caustic soda; because if another equivalent were added still more soluble compounds were obtained; the gelatinous appearance passed away, and by the addition of another equivalent of sodium a perfectly soluble compound was produced. The use of litmus as a test was not applicable; in the first place it was extremely difficult with such a thing as that to watch the reaction, the transition of litmus was so gradual. His experience of litmus was that it was about the worst indicator that could be used. He had observed with students, that what one called the point of neutrality with litmus was quite a different thing from what another did. The indication of litmus was a transition from the deep alkaline blue, through all the shades of violet to bright red with a strongly acid solution. Phenol phthalein was perfectly definite; take any oleic acid you liked, it was always sharp and there was not the slightest variation in the result. Another advantage was that with it a neutral solution was perfectly colourless, like water, but directly a minute quantity of acid was added it developed a strong magenta colour. Lastly, he did not claim that the oleate of soda made by this process possessed any peculiar properties, or was more definite than any other solution; he only put it forward as a convenient mode of manipulating the volumetric solution of oleate of soda, without having to go to the soap, which involved two processes, making the volumetric solution first with soap, and then regulating it.

The next paper read was—

NOTES ON BRAZILIAN DRUGS.

BY CHARLES SYMES.

The drugs which I desire to bring before the notice of this meeting are three in number, and, although practically unknown in this country, I trust they will not be found altogether devoid of interest. They have been received under the respective names of "Resin de Angico," "Almasça" and "Guassatunga." The two former are products of the district of Maranham in the north of Brazil (the locality from whence we obtain the finest copaiba balsam), the latter comes from the south and was obtained in the neighbourhood of Porto Alagre.

Resin de Angico.—This is not a resin but a gum, of a deep brownish-red colour, translucent, and breaking with a bright shining fracture. It occurs in pieces of from 1 to 3 ounces in weight, some of which have portions of bark attached to them. In the 'Formulario ou Gui Medica' of Chirnoviz, it is mentioned as the product of *Acacia Angico,* and is said to be good for chest complaints; the same tree yielding an astringent bark. Mr. Holmes has identified it with a specimen in the Museum of the Pharmaceutical Society, and has kindly furnished me with the small piece of bark which accompanies the specimen of gum. The pieces are very tough, but when broken up and dried at 212° for some hours it loses 12 per cent. of moisture and can then be readily reduced to fine powder. When added to twice its weight of water it forms a thick semisolid magma, and when this quantity of water is increased to eight times its weight, less than one-half dissolves, forming a reddish-brown mucilage with a slightly acid reaction; the remaining jelly-like mass becoming liquid on the addition of a little caustic alkali, thus resembling tragacanth more nearly than it does gum arabic. It dissolves in proof spirit almost as completely as it does in water. The aqueous solution is rendered turbid by the addition of rectified spirit in excess, also by solution of oxalate of ammonia; it is not affected, however, by solutions of perchloride of iron, borax or acetate of lead. As regards its medicinal properties the only remark which accompanied it was similar to that of Chirnoviz,—"usa-se nas molestias do peito," useful in chest complaints, which probably means that it is demulcent; but whether it possesses any special virtues in this respect, or whether it is in any way superior to the remedies of this kind already in use here, remains to be proved. A physician to one of the Liverpool hospitals has promised to determine this point.

Almasca.—This substance, received in sausage-shaped masses of about 12 inches in length and 2 to 3 inches in diameter and covered with dried leaves, is evidently a species of elemi, but it differs in appearance and in some of its characters from the elemi of commerce, from the Brazilian elemi of the Hanbury collection and also from that of Dr. Pereira at Bloomsbury Square. Except that it is more recent, and therefore much softer, it more nearly resembles the Brazilian elemi of Martin's collection, and Mr. Holmes is of opinion that it is produced by the same species, probably by *Icica heptophylla.* It comes from the same district as gum angico, but without any particulars of its use there. The term almasça indicates mastic, but from this it differs very materially. It is a soft grey looking resin, with whitish crystalline masses diffused more or less frequently through it, and possesses an aromatic, fragrant and somewhat penetrating odour. Chloroform, ether and absolute alcohol dissolve it without the application of heat; it also dissolves in boiling spirits of wine, specific gravity ·0838; but at ordinary temperatures this breaks it up into a thick milky looking liquid, dissolving only 65 per cent., the remaining portion corresponding in its various characters with the substance known as *amyrin.* This may be purified by solution in boiling rectified spirit, from which on cooling, it separates in white crystalline masses.

Flückiger and Hanbury examined Manila elemi and found it to contain 20 per cent. only of this substance. They also obtained by distillation as much as 10 per cent. of a volatile oil which, examined with Wild's polaristrobometer, was found to be strongly dextrogyrate; whilst a sample of oil of elemi examined by H. St.-Claire Deville was found to be strongly levogyrate. I have distilled a portion of this substance and have only obtained 7·3 per cent. of a colourless volatile oil, with an odour reminding one of fennel, and which corresponds with that of the 'Pharmacographia' in that it is soluble in bisulphide of carbon and gives a deep orange colour with strong sulphuric acid, but on careful examination I found it to be *optically inactive.*

Elemi is at present little used in medicine, but it seems to possess properties worth the attention of the medical profession and pharmacists.

Guassatunga.—On a recent vist to the south of Brazil, Mr. Joseph Hallewell found in use there a popular native remedy for snake-bite in the form of an alcoholic tincture of a golden yellow colour, put up in small bottles, with a label in Portuguese as follows:—"Para mordedeura de cobras e outros animaes veneno. Tomas-se uma gota em uma colher d'agua de 10 em 10 minutos de 2 ou de 4 em 4 horas conforme a gravidade de caso, nas criancas metade ou menos. Sobra as mordedura conserva-se panos embebidos em 4 colheres d'agua com 10 gotas." Thus in English,—"For the bites of snakes and other venomous reptiles. One drop to be taken in a spoonful of water every ten minutes for two or four hours according to the severity of the case, for children half or less. Mix 10 drops in 4 spoonfuls of water, in this soak a cloth and apply to the bite or wound."

Assuming this to be a remedy of some amount of activity, Mr. Hallewell procured a small quantity of casca de guassatunga, the bark from which this tincture is prepared. It is the produce of a tree inhabiting the borders of Uruguay and occurs in pieces of from 2 to 4 inches in length, from 1 to 2 inches in width and $\frac{1}{16}$ in thickness, hard and breaking with a short non-fibrous fracture. It is of a fawn colour with a greenish-brown tint diffused irregularly over it, paler on the outer than on the inner surface and possesses a slightly bitter taste.

Treated with ether it yields a bright green resinous substance; with alcohol a golden yellow tincture is obtained, and the marc infused in water yields a brown liquid which on evaporation produces a dark brown extract. Altogether this treatment removes 24 per cent. of its original weight. The tincture, treated with the usual reagents, gave characteristic indications of the presence of an alkaloid and I have, in fact, been able to separate a small quantity of such a body in a crystalline form but only sufficient for examination with the microscope. On the receipt of a further supply I hope by the aid of medical friends to determine more exactly its physiological action and also to make a further investigation of it chemically.

The President said it was obviously desirable in the interest of pharmacy that they should have early information respecting drugs likely to be imported, not merely such statements as could be obtained from price lists, but information concerning their chemical, physical, and botanical properties, such as Mr. Symes had given them in his paper and for which he was entitled to a vote of thanks.

A vote of thanks having been passed,

Mr. Atkins said he thought the line of procedure taken by Dr. Symes was well worth further consideration. If it was found that the natives of distant lands resorted to certain remedies, without any knowledge of the philosophy of their action, it was then very desirable to investigate the properties of those remedies scientifically. A large amount of work might have been already done, but it was in the rough and followed what might be called the rule of thumb. A short time ago he received from a friend, who had gone to the Congo, a plant which was said to have a very specific action as a styptic, and he intended to hand it over to another friend and have it examined. There was a goodly number of generally accepted remedies, which came to them originally only on report as being used for certain diseases by the natives of distant lands, and if the matter were pursued further the number might be considerably increased.

Mr. Groves asked if Dr. Symes had experimented with these drugs on any of the lower animals; but he presumed he would require a licence before operating even on a mouse. It appeared to him to be a great obstacle to science that a simple thing like this which Dr. Symes had been kind enough to bring forward could not be dilated on satisfactorily in consequence of the action of the anti-vivisectionists. A dose of this medicine could not be given to a mouse, although it might do the mouse good, in consequence of the existence of the Act of Parliament.

Mr. Groves, as senior Vice-President, then took the chair while the President read his paper entitled—

Half an Hour with a Few Sheets of the New Pharmacopœia of the United States of America.

BY PROFESSOR ATTFIELD, F.R.S.

In a letter, dated New York, August 4, 1882, sent to the writer, as President of the British Pharmaceutical Conference, by Professor P. W. Bedford, President of the American Pharmaceutical Association, the following paragraph occurs:—"I recently forwarded to you proof sheets from the corrected plates of the first ninety-six pages of the text of the forthcoming Pharmacopœia of the United States. I now have the pleasure of sending the succeeding forty-eight pages. These are all that are, as yet, in presentable condition. They will serve to show yourself and friends of the British Pharmaceutical Conference that it will be a work worthy of the labour bestowed upon it. It is the only copy that has gone outside our Committee."

By way of showing our honorary member our appreciation of his compliment, and in order to give British pharmacists some information respecting this new Pharmacopœia, the following descriptive remarks are offered.

In point of size of page this sixth decennial revision of the United States Pharmacopœia exceeds its predecessor. That was a foolscap octavo, this is a full octavo. The leading names of the preparations are given in larger, plainer, black letters, the names of the components of the formulas are also given in thick type, the quantity of each component now being printed not only in words, which, by the way, are in italics, but, in addition, in figures.

The former division into the two great classes of "Materia Medica" and "Preparations," the latter divided into over sixty sub-classes, is no longer maintained. The work is now, therefore, in uniformity with the one simple alphabetical arrangement of the British Pharmacopœia.

The Chemical Nomenclature.—Four or five years before the fifth decennial revision, that of 1870, was published, I very strongly advocated that system of chemical nomenclature under which names of salts of potash, soda, ammonia, baryta, lime, magnesia, etc., become names of salts of potassium, sodium, ammonium, barium, calcium, magnesium, etc. The system was adopted in the 1870 pharmacopœia (issued in 1872), "to place the work in accord with the progress of chemical science." In acknowledging my endeavours for its introduction, the President of the National Convention presented me with the first copy of the Pharmacopœia sent to this country. I may be pardoned for expressing my gratification at finding that the system is retained in this 1882 revision, showing that the nomenclature has been found to be practicable and serviceable in the medicine and pharmacy of a great English-speaking people.

Weights and Measures.—The Convention for the fifth revision (1870) resolved on the abandonment of measures of capacity, but the Revising Committee were alarmed at the amount of time, labour, and cost involved in the application of the resolution to the whole of the Pharmacopœia, and objected that the execution of such directions entailed the employment of an untried system. The old wine gallon and troy pound with their confusing divisions were, therefore, retained. These are now swept away, and "*parts*," by weight, substituted. Thus:—

Extractum Colocynthidis Compositum.

Compound Extract of Colocynth.

Extract of colocynth, *sixteen parts* . . .	16
Aloes, *fifty parts*	50
Cardamom, in No. 60 powder, *six parts* . .	6
Resin of scammony, in fine powder, *fourteen parts*	14
Soap, dried and in coarse powder, *fourteen parts*	14
Alcohol, *ten parts*	10

Then follow very full directions for preparation.

In cases in which some notice of volume as well as weight is required the metric decimal system is employed. Thus:—

Extractum Ergotæ Fluidum.

Fluid Extract of Ergot.

Ergot, recently ground and in No. 60 powder, *one hundred grammes*	100
Diluted hydrochloric acid, *six grammes* . .	6
Alcohol,	
Water, each, *a sufficient quantity*,	
To make one hundred cubic centimeters .	100

New Preparations.—The first seven pages of the Pharmacopœia (exclusive of prefatory matter, which has not yet come to hand) are almost wholly occupied with a new class of compounds termed Abstracts—Abstracts of aconite, belladonna, conium, digitalis, hyoscyamus, ignatia, jalap, nux vomica, podophyllum, senega, valerian. Thus:—

Abstractum Jalapæ.

Abstract of Jalap.

Jalap, in No. 40 powder, *two hundred parts* .	200
Sugar of milk, recently dried and in fine powder,	
Alcohol, each, *a sufficient quantity*,	
To make *one hundred parts*	100

Moisten the jalap with *one hundred* (100) *parts* of alcohol, and pack firmly in a cylindrical percolator; then add enough alcohol to saturate the powder, and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding alcohol, until the jalap is exhausted. Reserve the first *one hundred and seventy* (170) *parts* of the percolate, distil off the alcohol from the remainder, and mix the residue with the reserved portion. Place the mixture in an evaporating dish, and, having added *fifty* (50) *parts* of sugar of milk, cover it with a piece of thin muslin gauze, and set aside in a warm place where the temperature will not rise above 50° C. (122° F.), until the mixture is dry. Lastly, having added enough sugar of milk to make the mixture weigh *one hundred* (100) *parts*, reduce it to a fine, uniform powder.

Preserve the preparation in a well-stopped bottle.

These "abstracts" are, in short, alcoholic extracts, or, in other words, the dried residue of evaporated tinctures, mixed with sugar of milk and rubbed to powder, and of such a strength that one part represents two parts of the original root, leaf, etc. The exhaustion of the aconite is aided by tartaric acid, the hemlock by hydrochloric acid. For the ignatia and nux vomica the alcohol (having a strength of 91 per cent. by weight) is slightly diluted. Otherwise the directions for their preparation, respectively, are almost identical.

Other additions, to go no farther than the letter A, are acidum boricum, acidum hydrobromicum dilutum, acidum oleicum, acidum salicylicum, æther aceticus, aluminii hydras, ammonii phosphas, amyl nitris, amylum iodatum, apomorphinæ hydrochloras, auri et sodii chloridum.

Aconitia is omitted, atropina retained. The root only of aconite is employed. Alcohol amylicum is omitted. Aloe Socotrina is the only variety recognized. Both varieties of aralia are dismissed. Acidum muriaticum has become acidum hydrochloricum, aqua chlorinii is now aqua chlori, sulphurets are now sulphides.

The doses of drugs were not given in 1870; they are not given in the present Pharmacopœia.

Temperatures are now stated in Centigrade degrees, with the Fahrenheit equivalents in brackets.

Characters, tests, and descriptions generally are given much more fully than before. No chemical symbols were given in the last edition; chemical formulæ, both on the old and new systems, are now given as in the British Pharmacopœia, and the molecular weight is appended to each formula.

Remedies which have come into use during the past decade find due place. Thus a cursory glance at these one hundred and forty-four pages reveal cinchonidine sulphate, codeine, one simple elixir—of orange,—eucalyptus leaves, fluid extract of guarana, extract of malt, fluid extract of pilocarpus.

Critical remarks would, at present, be out of place, but Professor Bedford's statement would seem to be thoroughly well founded, namely, that much labour has been worthily bestowed on this sixth decennial revision of the Pharmacopœia of the United States of America.

The CHAIRMAN said that the hearty thanks of the meeting were due to Professor Bedford for his considerate courtesy in forwarding an early copy of an interesting portion of the new United States Pharmacopœia. The members were also very grateful to Professor Attfield for his paper thereon, though, as he said, they must wait until the work was published in its complete form before criticizing it. Then an evening or two might very profitably be devoted to its discussion. At present he could only say that this new Pharmacopœia seemed to be distinctly in advance of its predecessor.

Professor REDWOOD said the general feeling must be one of gratitude to the President for bringing this subject under the notice of the Conference. As had been already said, this was not the occasion to enter on anything like a critical notice of even what had been thus briefly brought under their notice; when the work came into their hands it would be very greatly appreciated no doubt, especially as a movement was now being made towards the production of a new edition of the British Pharmacopœia, and the opportunity of observing the results of the investigations made on the other side of the Atlantic, and the conclusions arrived at by the able pharmacists there, would be very valuable to those whose duty it would be to prepare a similar work for use in this country. One remark of a general character he might make, viz., that in this country, and especially amongst those who at present had the legal authority to prepare and issue the Pharmacopœia—the Medical Council—there was a far greater amount of conservatism than existed on the other side of the Atlantic; and he had no reason to anticipate that in the new edition of the British Pharmacopœia changes so considerable as those which appeared in the new edition of the American work would be introduced. One principle acted upon in this country was that it was not justifiable to introduce into the Pharmacopœia new preparations which had not been proved in medical practice. Such preparations as "abstracts," to which Professor Attfield had alluded, were an entirely new class, and the principle which had been hitherto acted upon by the Medical Council was that any such preparations ought to come into general use before they were introduced into the Pharmacopœia. There were certain changes alluded to which had been previously adopted, and there were others which he had not the slightest doubt would be adopted in any subsequent edition, such, for instance, as the nomenclature, which he believed was entirely approved of by the Committee of the Medical Council who had charge of the matter. With regard to the weights and measures, that was a point with reference to which he had no doubt some change would be made, possibly in the direction indicated in the American edition, which he himself advocated some years ago, when he worked it out and submitted it to the Pharmaceutical Society, ordering parts by weight. Whether that would be the method adopted he could not anticipate, but it seemed to him under existing circumstances by far the most rational mode of treating the subject. The adoption of a new system of weights and measures, new to medical men in this country and to those pharmacists whose studies had not been in the scientific line, would lead to a great deal of opposition if attempted hastily. In the present edition of the Pharmacopœia metric weights and measures were recognized where they could be applied in processes of volumetric testing, but even the Americans had hesitated to adopt the system entirely. On the whole he should say the plan they had adopted of having parts by weight was the one which would be most likely to meet with general approval. He had only had a hasty glance at these sheets, and did not know that there was anything else he could add. He was quite sure that when the complete work came into their hands it would be very fairly and liberally examined and whatever was thought to be really beneficial, and not too much of the character of untried novelties, would receive full and fair consideration.

The Conference then adjourned until the following morning.

(*To be continued.*)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

PRESIDENTIAL ADDRESS TO THE CHEMICAL SECTION.

BY PROFESSOR G. D. LIVEING, M.A., F.R.S., F.C.S.

If I were asked in what direction chemical science had of late been making the most important advances, I should reply that it was in the attempt to place the dynamics of chemistry on a satisfactory basis, to render an account of the various phenomena of chemical action on the same mechanical principles as are acknowledged to be true in other branches of physics. I cannot say that chemistry can yet be reckoned amongst what are called the exact sciences, that the result of bringing together given matters under given circumstances can yet be deduced in more than a few special cases by mere mathematical processes from mechanical principles, but that some noteworthy advances have in recent years been made, which seem to bring such a solution of chemical problems more nearly within our reach.

To show how large a gap in our ideas of chemical dynamics has been bridged over within the last quarter of a century, I will quote the words of one of the largest minded philosophers of his time, who was one of the earliest promoters of this Association, and its President in 1841: Whewell, in a new and much altered edition of his 'Philosophy of the Inductive Sciences,' published in 1858, says:—"Since Newton's time the use of the word *attraction*, as expressing the cause of the union of the chemical elements of bodies, has been familiarly continued, and has no doubt been accompanied in the minds of many persons with an obscure notion that chemical attraction is in some way a kind of mechanical attraction of the particles of bodies. Yet the doctrine that *chemical* 'attraction' and *mechanical* attraction are forces of the same kind has never, so far as I am aware, been worked out into a system of chemical theory; nor even applied with any distinctness as an explanation of any particular chemical phenomena. Any such attempt, indeed, could only tend to bring more clearly into view the entire inadequacy of such a mode of explanation. For the leading phenomena of chemistry are all of such a nature, that no mechanical combination can serve to express them without an immense accumulation of additional hypotheses." ('History of Scientific Ideas,' ii., p. 13.) And further on he says:—"We must consider the power which produces chemical combination as a peculiar principle, a special relation of the elements not rightly expressed in mathematical terms." (*Ib.*, p. 14).

The influence by which our ideas have gone round so as to be now the very opposite of those of the illustrious thinker whom I have just quoted, so that we should ridicule the thought of looking for an explanation of chemical action on any but mechanical principles, is undoubtedly the progress which has been made in other branches of molecular physics. The indestructibility of matter has long been a formula familiar to chemists, but that the conservation of energy should be as universally true, even in regard to chemical actions, has only in recent years been fully recognized. This is certainly no new principle, it was developed mathematically generations ago; but the realization that it is anything more than an abstraction, that it is the keynote of every rational explanation of physical phenomena, has been the foundation of recent progress in physical science; and if all energy be one, there can be but one code of dynamical laws which must apply to chemistry as well as to all other branches of physics. The development of the mechanical theory of heat, and of the molecular theories which have grown up in consequence of it, have done much to set our minds free from preconceived notions, and to induce us to build chemical theories on something more than unverified conjectures.

But how far can we say that mechanical principles are actually recognized as the true basis of rational chemistry? So far as I know no chemist denies that it is so, and yet how little do our text-books, even the most recent and the most highly reputed, show the predominance of this idea! How very small a portion of such books is taken up with it, how much seems utterly to ignore it or to be couched in language antagonistic to it! We still find chemical combinations described as if they were statical phenomena, and expressions used which imply that two perfectly elastic bodies can, by their mutual action alone, bring each other into fixed relative positions. We still find change of valency described as a suppression of "bonds of affinity," as if a suppression of forces were the usual course of nature, or as if it were possible that the same two forces, acting at the same place and in the same direction, should at one time neutralize one another, and at another time not neutralize one another. We still find saturated compounds spoken of as if the stability of a compound were independent of circumstances, and chemical combination no function of temperature and pressure. Beginners are sometimes helped by the invention of intermediate reactions in explanation of final results, without any reference to the dynamical conditions of the problem, without any consideration whether the fancied intermediate reactions imply a winding-up or a running-down of energy. In fact our long familiar chemical equations represent only the conservation of matter, and to keep always in mind the mechanical conditions of a reaction is as difficult to some of us as it is to think in a foreign language. Moreover, we still find in many of our text-books the old statical notion of chemical combination stereotyped in pictures of molecules. I do not, of course, mean to accuse the distinguished inventors of graphic formulæ of meaning to depict molecules, for I believe that they would agree with me in thinking that these diagrams do not any more nearly represent actual molecules than they represent the solar system; but unfortunately we cannot prevent beginners from regarding them as pictures, and moulding their ideas upon them. They present something easily grasped by the infant mind, and schoolmasters are fond of them, but only those who have each year to combat a fresh crop of misconceptions, and false mechanical notions engendered by them, can be aware how much they hinder, I will not say the advance, but the spread of real chemical science. If it be true that the illustrations of an artist like the late Hablot Browne give to our conceptions of the characters of a story a more definite and permanent, though perhaps a much modified form of what the author of the story intended to portray, it is equally true that the illustrations by which some, even great names amongst us, have tried to make us fancy that we had a true conception of some natural process, have become so fixed in our minds as to prevent our realizing the true meaning of nature.

What, then, is the progress which I think has been made in physical chemistry? In the first place, notwithstanding the slowness with which new ideas replace old familiar images, the molecular theories developed by Clausius, Clerk-Maxwell, and Boltzmann, and by Sir W. Thomson, have been long enough before the world to have greatly loosened the hold upon our minds of many old notions. The rigid, unbreakable, impenetrable atoms of the Epicurean philosophy, made familiar to us by Lucretius, always presented difficulties which were only perhaps exceeded by those of the elastic atmospheres with which modern philosophers fancied them to be surrounded; but now the vortex theory, whether we think it probable or not, at least gives us a standing ground for the assertion that the supposed impenetrability of matter, and the curious compound of nucleus and atmosphere which had been invented to account for elasticity, are not necessary assumptions.

The kinetic theory of gases has analysed for us the different motions of the molecules in a mass of matter, and has facilitated the conception of the part which heat plays in chemical action. Hence we have had of late several attempts to reduce to a form susceptible of mathematical calculation the problems of chemistry. Most of these attempts have proceeded on the well-known mechanical principle that the change of *vis viva* of a system, in passing from an initial to a final configuration, is independent of the intermediate stages through which it may have passed, provided the external conditions are unaltered; and on the principle of the dissipation of energy, that is to say, on the condition that the state of the system, if it be a stable one, must be such that the energy run down in reaching it is a maximum. These principles have been applied successfully to the solution of some particular cases of the equilibrium between a mixture of chemicals by Willard Gibbs, Berthelot, and others. By the first mentioned principle all consideration of the intermediate stages by which the final result is reached is avoided. Quite recently Lemoinne has attacked the same problem on another principle. His principle is that of an equilibrium of antagonistic reactions in a mixture of materials, a mobile equilibrium, such as we are now familar with, dependent on compensating effects; but he does not seem able to solve the problem in any great number of cases. In fact, the difficulty does not now lie so much in expressing mathematically the conditions of the problem, as in the defect of knowledge which depends upon experiment. And it is just in this that I think the outlook most hopeful. In some cases the patient work of weighing, measuring, and comparing, which is necessary to make our theoretic speculations of any substantial value, has been already done for us. The publication, three years since, of Berthelot's 'Essay on Chemical Mechanics,' has given us, in a collected form, a large quantity of data of the first importance, and now I am glad to say that the long labours of another worker in the same field, Thomsen of Copenhagen, are in course of publication in a handy form. I think these two investigators have done more than anyone else of late years towards making it possible to give chemistry the rank of an exact science. But besides the data which they have supplied to us, there are others which are yet wanting. For instance, almost every equation of chemical equilibrium involves an expression depending on the specific heat of the materials. At present we do not know enough of the law of specific heats to be able to give in most cases a probable value to these expressions, but these and other data of the kind do not seem out of our reach, and we may hope that the same ingenuity and patience which has gained for us so much firm ground in thermal chemistry will extend it to the uncertain spots where we have yet no solid foundation.

Further, the laws of dissociation, so ably investigated by Deville, have taught us that the force called chemical affinity, by which we suppose the atoms of unlike matters are held together in a compound molecule, follows precisely the same laws of the force as cohesion by which particles of a similar kind are united in molecules. We have long known that the molecules of sulphur vapour are broken up into simpler molecules by elevation of temperature and condense again when the temperature is reduced. Other elementary substances behave in a similar way. We have within the last two or three years learnt that iodine is in part dissociated by a high temperature from molecules consisting of two chemical atoms into molecules consisting of only one such atom, and the same is true of chlorine and bromine. That some such change must occur in iodine was inferred as long ago as 1864 by the younger Mitscherlich. He argued that iodine is a compound body from the fact that it shows two spectra, one similar in character to those of metallic oxides and the other similar to the spectra of metals, and from the analogy in the behaviour of iodine to a metallic oxide in giving the one spectrum at one temperature and the other at a higher temperature: "from this," he says, "it would follow that iodine at ordinary temperatures and iodine at the temperature of a hydrogen flame must be considered as two different compounds, because the spectrum of iodine formed at ordinary temperatures" (that is, the absorption spectrum of iodine vapour) "is different from that produced in a hydrogen flame." Also "that bromine, though it gives no flame spectrum, gives one spectrum by absorption and another by the electric spark, and must therefore in its ordinary state be regarded as a compound." Also that "the spectra formed by the flames of selenium, tellurium, and phosphorus, and those of sulphur and nitrogen given by feeble electric discharges, all have the character of the iodine flame spectrum, and these metalloids would therefore, if the above expressed supposition with regard to iodine be confirmed, also be compound bodies." (*Phil. Mag.*, 1864, p. 188.) Since the paper from which the foregoing extract is taken was published, not only the metalloids but many metals have been found to give complicated spectra at one temperature and much simpler spectra at higher temperatures. Such are the channelled spectra of sodium and potassium, first described by Roscoe and Schuster, the channelled spectra of silver, bismuth, and other metals described by Lockyer and Roberts, and the ultra-violet channelled spectrum of tin recently photographed by Dewar and myself. Mitscherlich's hypothesis gives us a rational explanation of such multiple spectra produced by the same substance, and it has been accepted, in one form or another, by all spectroscopists since he wrote. Nevertheless, the existence of multiple spectra cannot be taken as a proof of allotropic modification unless the possibility of a chemical combination be excluded. The channelled spectrum which magnesium gives in hydrogen was mistaken by more than one observer for that of some modification of the simple metal, until it was shown that magnesium in nitrogen or other gases does not give it if no hydrogen is present, and that its persistence in hydrogen at high temperatures depends, as does the permanence of chemical combinations, on the pressure of the gas. If, however, homogeneous molecules are dissociated by heat, so also are heterogeneous molecules, formed, as we say by chemical combination, split up by elevation of temperature, to unite again on cooling, or when the pressure is increased within certain limits. Nor is there any essential difference in character between a chemical compound and an element, beyond that of facility of decomposition. If we could not so easily resolve them into their constituents, and were to disregard the difference of their spectra, no one would suppose ammonia to be differently constituted from potassium, or cyanogen from chlorine. Indeed, chemists have long been in the habit of considering the union of two atoms in a molecule of ordinary hydrogen or chlorine as a species of chemical combination; but when we find that the combinations of particles of the same kind are as definite as those of particles of different kinds, and that they are both subject to precisely the same mechanical laws, we are hardly justified in regarding the forces by which they are produced as essentially different. To get rid of a gratuitous hypothesis in chemistry must be a great gain.

But it may be asked, Why stop here? Why may not the chemical elements be further broken up by still higher temperatures? *A priori* and from analogy such a supposition is extremely probable. The notion that there is but one elementary kind of matter is at least as old as Thales, and underlies Prout's hypothesis that the atomic weights of our elements are all multiples of that of hydrogen. This famous hypothesis has gone up and down in the scale of credibility many times during the present century. About seventeen years ago the publication of Stas' new determinations of combining weights, carried out on a scale never before attempted, and with all the refinements which the growth of our knowledge could suggest, was thought to have given it its deathblow. But a reaction has set in since that time. The periodic recurrence of the properties of elements with regular additions to the atomic weights, like octaves in a musical scale, put forcibly before us by Mendelejeff, makes it difficult not to think that there is a simple relation between the atomic weights, though there may be causes producing slight perturbations of such a relation. Quite recently a fresh revision of the combining weights has been made, on the other side of the Atlantic, by Professor F. W. Clarke. He has collected all the determinations made by different observers, and after rejecting such as from defective methods were untrustworthy, has applied to the remainder such corrections as newer experiences have suggested, and then deduced from the corrected numbers the most probable values by the methods of the theory of errors. Professor Clarke has done a piece of work of the highest utility, for which chemists must be grateful; nevertheless, he has not carried the revision so far as it might be carried. He has, to begin with, rightly separated the several sets of observations, and deduced the most probable number from each set by itself, but in combining the various sets for the final determination of the numbers adopted, he has treated the results obtained by different methods, as if they were a set of observations all presumably of equal value, so that the most probable numbers could be deduced by the method of least squares. He has not attempted any discussion of the different methods with a view to an estimate of the relative values of the results obtained by them, nor made any difference between the values of the figures deduced from operations on the large scale employed by Stas and those arrived at on the small scale of other observers. Any sort of handicapping of methods is no doubt a very difficult and delicate operation, and requires more than the judgment of an Admiral Rous, but without it the question whether the numbers adopted are the best obtainable will always be an open one. It is, however, a very noteworthy fact, that in almost every case the numbers deduced from Stas' experiments, taken by themselves, coincide very closely indeed with the most probable numbers derived by the method of least squares from the whole of the recorded estimates. On the whole, Professor Clarke concludes that Prout's hypothesis, as modified by Dumas, is still an open question, that is to say, his final numbers differ from whole multiples of a common unit by quantities which lie within the limits of errors of observation and experiment.

Let us turn again to the evidence afforded by our most powerful instrument for inspecting the inner constitution of matter, the spectroscope. A few years ago Mr. Lockyer supposed that the coincidence of rays emitted by different chemical elements, particularly when those rays were developed in the spark of a powerful induction coil and in the high temperatures of the sun and stars, gave evidence of a common element in the composition in the metals which produced the coincident rays. Such an argument could not be drawn from the coincidences unless they were exact, and the identity of the lines could only be tested by means of spectroscopes of great resolving power. By the use of the well-known Rutherford gratings, Young, in America, had found that most of the solar lines which had been ascribed to two metals were in reality double, and Dewar and I, working on the terrestrial elements in the electric arc, had found the actual coincidences to be very few indeed. These observations, even with Rutherford gratings, were delicate enough; but quite recently M. Fievez, of the Brussels Observatory, has brought to bear on this question, a spectroscope of unexampled power. By combining two of the Astronomer Royal's highly dispersive half prisms with a Rutherford grating of 17,296 lines to the inch, he has obtained a dispersion quadruple that of Thollon's combination of prisms. Bringing this to bear on the sun he has mapped the solar spectrum from a little below C. to somewhere above F., on a scale one-third greater than that of Vogel's map, and has not only confirmed the work of Young, Dewar, and myself, but has resolved some lines which were not divisible by such dispersive power as we had at command. This result cannot fail to shake our belief, if we have any, in the existence of any common constituent of the chemical elements; but it does not touch the evidence which the spectroscope affords us, that many of our elements, in the state in which we know them, must have a very complex molecular structure. I cannot illustrate this point better than by the spectra of two of our commonest elements, magnesium and iron. We have good reason to think the molecule of magnesium to be as simple as that of any chemical element, and we find its spectrum to be one of the simplest, consisting of a series of triplets which repeat each other in a regular way and are probably harmonically related, and of a comparatively small number of single lines, of which also some may be harmonics. The spectrum of iron, on the other hand, presents thousands of lines distributed irregularly through the whole length, not only of the visible, but of the ultra-violet region. Make what allowance you please for unknown harmonic relations and for lines which are not reversible and may not be directly due to vibrations of the molecules, we still have an immense number of vibrations, so that we can hardly conceive any single molecule to be capable of all of them, and are almost driven to ascribe them to a mixture of differing molecules, though we have as yet no independent evidence of this, and no satisfactory proof that any of this mixture are of the same kind as occur in other elements.

M. Fievez's combination is a great advance in resolving power, but Professor Rowland, of the John Hopkins University, promises us gratings not only exceeding Rutherford's both in dimensions and accuracy of ruling, but ruled upon curved surfaces, so as to dispense with the use of telescopes and avoid all variations in focussing the different orders of spectra. His instruments, if they come up to the promise he holds out, will enable us to solve many questions which are difficult to answer with our present appliances.

But to return to the chemical elements: the spectroscope has in the last few years revealed to us several new metals. I will not venture to say how many, for when several new metals more or less closely allied are discovered at the same time, the process of sifting out their differences is necessarily a slow one. We cannot tell yet whether any of them are to fill gaps in Mendelejeff's table, and so add strength to the conviction that there is a natural relation between the atomic weights and the chemical characters of our elementary substances, or whether they will add to the embarrassment in which we already find ourselves with regard to the relations of the cerium group of metals; whether we may welcome them as the supporters of order or deprecate their coming as authors of confusion. Granting that the chemical characters of an element are connected with its atomic weight, we have, however, no right to assume them to be dependent on that factor alone. Why may there not be elements which, while they differ as little in atomic weight as do nickel and cobalt, are, on the other hand, so similar to one another in all characters that their chemical separation is a matter of the greatest difficulty, and their difference only distinguishable by the spectroscope? The spectra may be thought to suggest so much, and how shall we decide the question? At any rate the complications of the spectroscopic problem can only be unravelled by the united efforts of the chemists and physicists, and by the exercise of extreme caution.

I cannot dismiss the subject of chemical dynamics without alluding to the ingenious theory by which the President of the Association has proposed to account for the conservation of solar energy. He supposes planetary space to be pervaded by an atmosphere which, except where it is condensed by the attraction of the sun and planets, is in a highly attenuated state. The sun and planets communicate some of their own motion of rotation to the atmosphere condensed about them, and he supposes that in this way an action like that of a blowing fan is set up, by which the equatorial part of the sun's atmosphere acquires such a velocity as to stream out to distances beyond the earth's orbit, while an equal quantity of gas is drawn in at the poles to maintain equilibrium. The gases thus driven to a distance in planetary space will, of course, be enormously expanded and highly attenuated, and in this state Dr. Siemens thinks that such of them as are compound may be decomposed by absorbing the solar radiation, and thus the kinetic energy of the sun's rays be converted into the potential energy of chemical separation. The separated elements, or partial compounds, will in the circulation produced by the fanlike action of the solar rotation be carried back to the polar regions of the sun as fuel to maintain his temperature by condensation and recombination. I will not discuss the mechanical part of this theory further than to remark that the fanlike action can only be carried on at the expense of the energy of the sun's rotation, which must, in consequence, be continually diminishing, and must in time become too slow to produce any sensible projection of the atmosphere into distant regions of planetary space. As to the chemical side of the theory, Dr. Siemens supposes the gases which pervade the planetary space to be not only of the same kind as the components of our own atmosphere, which on the kinetic theory of gases must diffuse through that space, but also such gases as are not found in our air, but are found occluded in meteorites which may be supposed to have acquired them in their previous wanderings. Amongst these he specially mentions hydrocarbons which form the self-luminous part of most comets. It is to these gases, together with aqueous vapour and carbonic acid, that he ascribes the principal part in the conservation of solar energy. That compound gases at the extremely low pressure of the planetary space are decomposed by solar radiation is not inconsistent with the laws of dissociation, for it is quite possible that some compounds may be decomposed at ordinary temperatures by mere reduction of pressure, and the radiation absorbed will be the more effective because it will directly affect the vibratory motion within the molecule, and may well produce chemical decomposition before it can, when the free path of the molecules is so much increased by the attenuation of the gas, assume the form of an increased temperature. Dr. Siemens, moreover, adduces a remarkable experiment in confirmation of this supposition. We know, too, the power which our atmosphere, and especially the water vapour in it, has of absorbing the infra-red rays, and that amongst the Fraunhofer lines some of the strongest groups are due to aqueous vapour; and the capital observation made by the spectroscopic observers at the last total eclipse, that the group of lines known as "B," which is one of those produced by aqueous vapour, is greatly strengthened when the sun's light passes by the edge of the moon and so through the lunar atmosphere, may be taken as a confirmation of the theory that gases like our atmosphere are diffused through space and concentrated about the planets. But if it be true that the compounds are decomposed by absorbing the sun's rays, we ought to find in our atmosphere the products of decomposition; we ought to find in it free hydrogen, carbonic oxide, and acetylene or some other hydrocarbons. The hydrogen, from its small specific gravity, would not be concentrated in the lower regions of our atmosphere in the same proportions as the denser gases, but carbonic oxide and hydrocarbons could not fail to be detected in the air if they formed any sensible proportion of the gases in the planetary space. That a large portion of solar radiation is intercepted before it reaches the earth is no doubt true, for there are not only the dark bands which are increased by our atmosphere and may reasonably be attributed to the action of like gases pervading planetary space, but there is a continuous absorption of the ultraviolet spectrum beyond the line U, and Cornu has found that this absorption is not sensibly affected by our atmosphere so that the substance, whatever it be that produces it, may be an agent in the process imagined by Dr. Siemens, but cannot be the means of restoring to the sun any portion of his radiant energy which reaches our distance from him.

Dr. Siemens explains the self-luminous character of comets by the theory that the streams of meteoric stones of which they are supposed to consist bring from stellar space hydrocarbon and other gases occluded within them, and that in consequence of the rise of temperature due to the frictional resistance of such a divided mass moving with enormous velocity, aided by attractive condensation, the occluded gases will be driven out and burnt, the flame giving rise to the original light emitted by the nucleus. Now the spectrum of most comets shows only the principal bands of a Bunsen burner, and is therefore adequately explained by the flame of gas containing hydrocarbons such as have been found in meteorites; but Dr. Huggins has observed in the spectrum of more than one comet, not only hydrocarbon, but cyanogen bands; and, although carbon and nitrogen combine readily in the electric arc, a coal-gas flame in air shows no trace of the spectrum of cyanogen, and it would certainly put some strain on our credulity if it were asserted that cyanogen was one of the gases brought ready-formed by meteorites from stellar space. Dewar and I have, however, recently shown that if nitrogen already in combination, as, for instance, ammonia, be brought into a hydrocarbon flame, cyanogen is produced in sufficient amount to give in a photograph (though not so as to be directly visible) the characteristic spectrum of cyanogen as it appears in the comet. It is therefore no longer necessary to make any other supposition to account for the cyanogen bands in the spectra of comets, than that ammonia, or some such compound of nitrogen, is present as well as hydrocarbons in a state of ignition.

Quite recently Dr. Huggins has observed that the principal comet of this year has a spectrum of an entirely different character, but he is not yet able to say to what elements or compounds it is probably due. The notion that comets may bring us news of distant parts of stellar space, towards which our system is driving, where the atmosphere is not like ours—oxygen and nitrogen—but hydrogen and hydrocarbons, may fascinate the fancy, but the laws of occlusion oblige us to think that the meteorites have not merely wandered through an attenuated atmosphere of hydrogen and hydrocarbons, but have cooled in a much denser atmosphere of those substances, which we can only conceive as concentrated by the presence of a star or some large aggregation of matter. They may, perchance, have come from some nebulous mass, for Draper and Huggins tell us that in the great nebula in Orion hydrogen is dense enough and hot enough to show some of its characteristic lines, besides the F line which is seen in other nebulæ, and is the last to disappear by reduction of density, No comet on visiting our system a second time can repeat the exclusion of its occluded gases unless its store has been replenished in the interval, and it will be interesting to see, when Halley's comet next returns, whether it shines only by reflected light or gives us, like so many others, the banded spectrum of hydrocarbons.

Parliamentary and Law Proceedings.

Poisoning by Laudanum.

An inquest was held by Mr. Barstow, at the Prince of Wales Hotel, Halifax, on John Bates, aged fifty-six, who died on Sunday noon from an overdose of laudanum, It appeared the man had suffered much from sleeplessness, and on Saturday he went to Mr. Bancroft, chemist. Barum Top, and asked for two ounces of laudanum. Mr. Bancroft questioned him why he wanted so large a quantity, and he replied that it was to mix with some other things for a cough. Mr. Bancroft cautioned him about the use of it, telling him what was the dose for a cough. The man retired to bed early, and, his family being unaware that he had bought the laudanum, let him lie in bed until well into Sunday forenoon before going to see him. He was then found unconscious and breathing heavily. Mr. Gascoigne, surgeon, was fetched, and he, suspecting narcotic poisoning, searched the room, and found a bottle containing about half an ounce of laudanum wrapped in a newspaper and hid among some dresses in a drawer.

A verdict was returned of "Death from an overdose of laudanum, but whether taken to procure sleep or to destroy life there was no evidence to show."—*Leeds Mercury.*

Alleged Death from Lead Poisoning.

An inquest was held on August 29, at the Keighley Cottage Hospital, before Mr. T. P. Brown, touching the death of William Wilson Riley, forty-two, who, it was alleged, had died from lead poisoning. Mr. George Burr, Clerk to the Local Board, watched the case on behalf of that body. There were several members of the board also present.

Sarah Riley, the widow, deposed that her husband died on Saturday, the 26th inst., after being confined to his bed for a short time. He had had pretty good health, except being troubled with sick headache. He was in the Kildwich railway accident, about seven years ago, which made him rather nervous, and he had never seemed to recover from it. Her husband suffered from lead poisoning about two years ago, and she herself had had an attack of it.

Dr. William Dobie deposed to having twice seen deceased during his late illness, and found him to be suffering from symptoms of lead poisoning. He had made a *post-mortem* examination, in the presence of Dr. Eddison, Leeds, Dr. Jack and Messrs. Chaffers, Holman and Roberts, of Keighley. There were no marks of external injury, and the body showed the usual marks apparent after death. There was no dropsy. The body was wasted, but not extremely so. The left wrist presented an appearance of what is known as a "dropped" wrist. The brain was a little paler than usual, but otherwise healthy. The lungs were quite healthy, though there was an old standing of pleura covering them. The bag of the heart was quite natural; the heart somewhat enlarged. The stomach was natural. The appearances of death were not inconsistent with death from lead poisoning. The "dropped" wrist and the constricted condition of the large bowel especially pointed in that direction, but he would not dogmatically like to say that that was the cause of death. The proof would not be complete until a chemical analysis was made of the viscera.

In reply to the Foreman, witness said he did not find sufficient disease to cause death except from lead poisoning. Deceased visited him about two years ago, and then he was suffering for lead poisoning, At that time he advised him to discontinue using the water.

A Juror asked if he had come across many cases of lead poisoning.

Witness said he had reported sixty-four cases to the Local Board twelve months ago

By Mr. Burr: Those cases extended over several years.

By the Foreman: The lead was dissolved from the pipes by the action of the water. It was his opinion but for lead poisoning the deceased would have lived an average life.

By Mr. Burr: If the deceased's symptoms had not been known to him he should have inferred after he had made the *post-mortem* examination that lead poisoning had been the cause of death. He was not aware that deceased had been in the Kildwick railway accident.

The Coroner: We want three things before this inquest can be concluded. The viscera will have to be analysed, and samples of water must be taken from the tap in deceased's house and another out of the main before it entered the service-pipe to his house.

The inquest was adjourned for a month to allow the Coroner's instructions to be carried out.—*Leeds Mercury.*

Obituary.

ROBERT HOWDEN.

We have to announce with deep regret the death of this well-known pharmacist. He expired at 78, Gracechurch Street, City, just before midnight, on Thursday, August 31. Up to the commencement of his illness, only a week before, he was engaged in the full activities of business, when he was seized with an acute form of inflammation, from which he never rallied.

Mr. Howden was born in the City of London, January 18, 1822, and left school when fourteen years old, from which time, as far as general education was concerned, he was self-taught. His first regular employment was in some chemical works connected with a gas company, and the ability he there displayed led to the idea of his entering upon the medical profession, as a surgeon. Surgery, however, was abandoned for pharmacy, and about the age of nineteen he went to Mr. Henry Lamplough, then at Islington, since more widely known as the inventor of the Pyretic Saline. It was to improve his practical knowledge, rather than to pass through an apprenticeship, that the duties of the place were undertaken.

Subsequently he became an assistant to Mr. William Hooper, of Russell Street, Covent Garden. From thence he went to Mr. Winstanley (now Messrs. Corbyn), in the Poultry; learned practical chemistry in the laboratory, and in his lesiure hours became an adept in water-colour painting. Afterwards he became an assistant to Mr. Bartlett Hooper, of London Bridge. Thus he acquired a thorough insight into business details and was prepared to commence upon his own account with every prospect of success which personal experience could bestow.

In the spring of 1859 Mr. Howden established himself in Gracechurch Street, having chosen a centre of operation which was particularly adapted to his characteristic energy. It was an old establishment, in a decayed condition whether regarded as premises or connection. Mr. Howden boldly ventured on a somewhat hazardous undertaking; for the existing state of things was neither promising, nor free from grave anxiety. The business was at a low ebb: and the rent out of proportion to the receipts. From the first year affairs began to brighten, and at the expiration of five years the returns were doubled. These details are mentioned because they may interest others engaged in similar pursuits, and may prove an encouragement to those who are exposed to the struggles incident to commercial life.

As soon as Mr. Howden had gained an assured position he devoted himself with ardour to parochial and educational interests. He became overseer of the parish, and churchwarden of All Hallows, Lombard Street, and busied himself with church improvements and Christmas decorations.

Nothing could exceed the interest he took in the prosperity and internal organization of the Bishopsgate Ward Schools. He was one of the examining board, and ably seconded the efforts of the Rev. William Rogers, in whose parish the schools were situated. It was in a great measure owing to his personal energy and active interference that these schools were placed upon their present satisfactory basis.

Charitable institutions, connected with education, had for him a special attraction, and thus his voluntary labours were increased by his constant attention to the concerns of the Merchant Seamen's Orphan Asylum, at Snaresbrook, Essex. For the sake of the children, he arranged and conducted holiday excursions, and was one of their frequent lecturers. Amongst these discourses, which were illustrated by enlarged drawings executed by himself, those on Bread, Milk and its Preparations, Flashing Signals, as used in Military Service, and Paper, were keenly appreciated by his young audience.

To the literature of pharmacy Mr. Howden's chief contributions were two papers, one on "Cod Liver Oil," descriptive of its preparation at Lofoden, with commercial details; and a second on the "Pharmacy of the United States." His second communication to the members of our Society was a *résumé* of his own observations in America. To his not abundant literary work must be added a letter in the *Times* paper, commenting on the state of the pollution of the Thames. In this notice he attributed the loss of many of the ill-fated passengers in the *Princess Alice* to death by asphyxia, rather than to death by drowning.

Mr. Howden took no prominent part in the politics of the Pharmaceutical Society, and he steadily refused to aspire to a seat in council. In 1844 he obtained first class certificates in chemistry and botany; and became a member and pharmaceutical chemist in 1859. His reason for not accepting office was, that he held no one should enjoy the honour who was not prepared to give full time to the duties consequent on the position.

It will be conceded that he left himself scanty leisure, and that little was absorbed by a formidable array of responsibilities as executor and trustee, undertaken on behalf of friends who had implicit confidence in his financial skill.

Mr. Howden cultivated as an art the gift of conversation, and made it bear as much on business as on domestic intercourse. This, while it rendered him delightful as a companion, distinctly contributed to his advantage in business.

He died aged sixty, leaving a large circle to lament his loss. It would be difficult to find a more active man; a kinder or more unselfish one, would be impossible.

Correspondence.

Genealogical.

Sir,—The "Friends" are a long-suffering class, who do not need defence, but in justice to Mr. Hart's "Historic Quaker" it may be noted that he did not originate the principles which Mr. Hart most justly censures. As schoolboys we all made the acquaintance of his progenitors in Horace's first epistle—

"O cives, cives, quærenda pecunia primum est;
Virtus post nummos."

And again,—

"Rem,
Si possis recte, si non quocunque modo rem."

The curious may trace their genealogy still further back. Would that they could only be found in the "hoary chronicles" of the past.

Ryde. Henry H. Pollard.

Communications, Letters, etc., have been received from Messrs. Brown, Crompton, Woodland, Powell, Attfield, Hooper, Branson, Rowell, Schmidt, Robinson, Shenstone, Baker, Ignoramus, Ariovistus, Antiseptic, Jacque, Ferri, T. E. R., H.

THE INTERNATIONAL ELECTRIC EXHIBITION.

(*Continued from page* 143.)

The last economic application of electricity for obtaining light it is intended to notice in these articles is the "secondary or storage battery." The introduction of this electrical apparatus into the electric lighting industry will, without doubt, be found sooner or later of the utmost consequence in providing a steady flow of electricity in the electrical mains that are to be laid in a short time in the streets of the metropolis and in those of numerous provincial towns. The discovery of the phenomena utilized in the storage battery appears to have been made in 1801, by Gautherot, who observed that the platinum wire electrodes that had been used in the electrolysis of salt water were capable of yielding a transient electrical current after being detached completely from the battery. This discovery, made a year after Nicholson and Carlisle's fruitful announcement of the electrolytic decomposition of water, is the foundation of the modern storage battery or accumulator. It clearly explained the cause of the diminishing electromotive force of a voltaic battery when working on short circuit, as it was recognized almost at once that this momentary secondary current was opposite in direction to the primary current. In the first voltaic cells made, this opposing electromotive force was found to be an evil of such magnitude as to reduce the electromotive force of the battery, after a few minutes' continuous working, by one-half the original sum. This opposing electromotive force was denominated polarization of the plates, and constant attempts were made to make up a cell which should be free from this grave inconvenience. Apparently the first to design a practically perfect "constant" battery was Professor Daniel, of King's College, whose world-renowned combination has never been surpassed for producing constant electromotive force on short circuit.

This evil of former times has of late given promise of being of almost as much importance to electricians as the generator of the primary current itself. Without dwelling further upon the historical part of this subject it may be assumed that all the recent experimenters are working on the lines laid down in the first instance by M. Gaston Planté in 1869. To that experimenter more than to any other is due the progress that has been made in this direction. M. Planté devoted some twenty years to the elucidation of polarization, employing different metals as electrodes and different liquids as electrolytes. As a result of his continued researches he ascertained "that the greatest effective polarization was produced when dilute sulphuric acid was electrolysed between electrodes of lead." The form of cell preferred by Planté is circular and contains two spirally rolled sheets of lead rendered mechanically discontinuous by interposed strips of guttapercha; the two plates are covered with dilute sulphuric acid. The method of forming the cell by the passage of a current through it must be conducted in a peculiar way, minutely detailed by Planté; and the process unfortunately requires a considerable time before the cell gets in the best possible condition. The process is given in full in Gordon's 'Treatise on Electricity and Magnetism,' and also by Mr. J. W. Swan in a lecture which will be found in vol. v., p. 122, of the *Transactions of the Newcastle-upon-Tyne Chemical Society*.

On passing a current through the dilute sulphuric acid and lead plates of the Planté cell the plate by which the current enters becomes coated with peroxide of lead and the plate by which the current leaves the cell becomes covered with spongy metallic lead occluding large quantities of hydrogen gas. When these plates are united by a wire a secondary current starts from the peroxide plate and passes through the wire to the plate covered with spongy lead. It is almost sufficiently accurate to regard the cell as a voltameter with oxidizable electrodes, or as a voltameter in which the products of the electrolysis of dilute sulphuric acid are collected in the solid form; hydrogen being occluded by spongy lead, and oxygen combined with lead as peroxide. On discharging the cell the hydrogen and oxygen recombine to form water, or in other words the peroxide of lead disappears and the cell practically again becomes two simple lead plates in dilute acid.

As the elements recombine electricity is produced, the amount of current yielded being mainly dependent on the amount of peroxide of lead reduced. Hence it follows that a secondary battery does not store electricity in the same manner that the Leyden jar stores a charge of static electricity, or as a gas-holder stores gas; the storage or secondary battery stores electrical energy in a somewhat analogous manner to that in which coal stores heat energy, that is to say, certain substances are present in suitable conditions for producing electricity in one case and heat in the other.

The electromotive force of a Planté cell is as much as 2·38 or 2·7 volts when fully formed, and "as the large area and close proximity of the plates diminishes the resistance of the liquid to a very small quantity, such cells are capable of furnishing a very powerful current for a few minutes, and their calorific power is considerable. M. Planté shows that there is a loss of 11 or 12 per cent. between charging and discharging, and that of the whole current absorbed by the cell 88 to 89 per cent. is given back by the cell. According to M. Géraldy, a Planté cell containing 1·445 kilogramme of lead can store 4·983 kilogrammetres of energy, being at the rate of 3·45 kilogrammetres per kilogramme, or 11·329 foot pounds per pound."

Messrs. Gladstone and Tribe have contributed some valuable papers to *Nature* (vol. xxv., pp. 221 and 461, also in vol. xxvi., p. 251), on the "Chemistry of the Planté and Faure Accumulators," which form the best addition to our knowledge of the matter that has been written. The authors took up the inquiry in the first instance in order to ascertain if any resemblance existed between the "copper-zinc couple" discovered by them and the negative plate of the Planté and Faure accumulators. The copper-zinc couple owes its activity to what is well known to electricians as "local action," this name being given to the chemical action resulting in the development of electricity which occurs when a circuit of two mechanically adherent different metals is placed in a solution having a chemical action on the one and less or none on the other. In the copper-zinc couple of Gladstone and Tribe sheet zinc receives a coating of finely divided metallic copper by immersion in a weak solution of sulphate of copper. On placing this couple in water, bubbles of hydrogen gas are given off, and oxide of zinc is formed and remains in the liquid as such. This method of obtaining nascent hydrogen in a neutral liquid has been found of great service in analytical chemistry, and in the hands of its discoverers has been very effective in the formation of certain difficultly prepared organic compounds. From these results with the copper-zinc couple it appeared nearly certain to Messrs. Gladstone and Tribe that the formed negative plate of the Planté accumulator, consisting of metallic lead and very closely adherent peroxide of lead immersed in dilute sulphuric acid, must give a large amount of local action, especially as the electromotive force of lead and peroxide of lead in dilute sulphuric acid is three times as much as it is with zinc and copper in the same liquid. As expected, a continual local action was found to take place, resulting in the attached peroxide of lead being completely converted into white sulphate of lead. This apparently wasteful action was found to be absolutely necessary for future practical storage purposes in this way: the sulphate of lead formed all suffers decomposition when the cell is charged next time into finely divided metallic lead; this finely divided lead becomes ultimately converted into peroxide of lead, and thus the storage capacity of the cell increases with each recharging. The authors found quantitatively that the amount of peroxide of lead formed increased at every charge up to at least the fifth time of recharging, beyond which the experiment does not appear to have been carried. Messrs. Gladstone and Tribe think it is more in accordance with the observed facts to regard the electrolysis in the cell as being the electrolysis of sulphuric acid rather than that of water rendered conducting by admixture of acid. They state that if water alone is used in the cell the hydrated protoxide of lead is formed instead of the peroxide, even if twenty-four Grove's cells are employed to charge one Planté cell; but the addition of a single drop of sulphuric acid to the water causes the immediate production of the puce-coloured peroxide to be made manifest. The authors give some ingenious and probable chemical equations for representing the chemistry of the charging of the cell. The first of the equations shows the formation of peroxide of lead by the electrolytic decomposition of sulphuric acid; the second equation takes account of the formation of peroxide of lead from the decomposition of previously formed sulphate of lead. These distinguished investigators think that it is not improbable that both these reactions may take place according to the varying density, or other circumstances of the current. They also say that the coating of peroxide interposes a great difficulty in the way of the further oxidation of the metallic lead, and that hence Planté needs the successive periods of repose, to admit by local action of the formation of lead sulphate, and the oxidation of the increasing amounts of finely divided lead. To save this waste of power and time Faure covers both plates with red lead, and converts this into spongy peroxide and spongy lead respectively by the current. When minium is placed in dilute sulphuric acid it suffers decomposition in the following manner:—

$$Pb_3O_4 + 2H_2SO_4 = PbO_2 + 2PbSO_4 + 2H_2O.$$

It was found that 18·1 per cent. of the red lead was converted into lead sulphate after one hundred and twenty minutes. The authors, in commenting on this, show how all the sulphuric acid might be taken up if this point were neglected, leaving in such an event water only in the cells. Serious injury might be done to cells if this should take place, as a phenomenon might occur like that noticed by the authors when studying the phenomena accompanying the electrolysis of water with oxidizable electrodes. In this investigation oxide of lead was found to form, which eventually became converted into grey metallic lead, and this, after twenty-two hours, stretched across from plate to plate, "forming a metallic connection," which was so much heated by the passage of the voltaic current that the liquid became warm. It is stated that this modified "lead tree" has sometimes been found in Faure's cells. It is shown that there is probably no advantage in continuing the charging after the oxygen has ceased to be absorbed freely.

Messrs. Gladstone and Tribe conclude on very satisfactory grounds that the chemical action of the discharge is essentially what is expressed by the following theoretical formula:—

$$PbO_2\ H_2SO_4\ H_2SO_4\ Pb = PbO\ H_2O\ H_2SO_4,$$

which becomes—

$$PbSO_4\ H_2O\ H_2O\ PbSO_4.$$

This reaction is, however, sometimes complicated by the formation of a small amount of peroxide of lead on the positive plate, which is believed to be due to the oxidation of sulphate.

Messrs. Gladstone and Tribe conclude from their researches that unless the peroxide of lead unacted upon is allowed to be very considerable the quantity of lead compound on the two sides ought to approach equality; also that care should be taken that sulphuric acid is in sufficient excess to allow of some of it in still remaining solution after all the available lead has been converted into sulphate. If it is removed and only water is present, an oxide or hydrate will be produced with probably some serious consequences to the cell.

(*To be continued.*)

A BISMUTHIC HAIR-DYE.*

BY A. NAQUET.

The author states that he was induced by a knowledge of the injurious properties of the many hair-dyes that are put forward as perfectly harmless to make the attempt to produce one that should be fairly entitled to that description. Whilst working upon the subject he protected the different steps by patents, in order to secure priority, but having attained what he considers to be a satisfactory result he has now abandoned his rights for the public benefit.

M. Naquet's experiments were made in the direction of compounding a metallic tincture that should have an innocuous metal for a basis instead of lead, and for this purpose he selected bismuth. The preparation which was the subject of his first patent consisted of two solutions that were mixed immediately before being used, and he describes the method of making it as follows.

It has long been known that a solution of bismuth is obtained in treating bismuthic hydrate with a solution of bitartrate of sodium; but it is not very easy to prepare and not more than a very small proportion of the bismuthic hydrate employed is ever dissolved. M. Naquet therefore sought an easy method of preparing the double tartrate of potassium (or sodium) and bismuthyl ($C_4H_4NaBiOO_6$). The bismuth is dissolved in the smallest possible quantity of nitric acid and to this is added

* Abstract from communication to the *Moniteur Scientifique*, [3], xii., 880.

an aqueous solution of tartaric acid (3 parts of acid to 5 of bismuth) and a large quantity of water; the whole is then thrown on a filter and the precipitate washed. The wash water contains some bismuth, which can be removed by precipitating with a sulphide, then redissolved in nitric acid and used in a subsequent operation. The well washed precipitate, whilst still moist, is dissolved in a boiling solution of sodic bitartrate (12 to 15 parts of bitartrate to 5 of bismuth), then filtered, diluted with water, alcohol and glycerine, and again filtered. Each litre should contain 150 c.c. of glycerine, 150 c.c. of alcohol and 600 c.c. of water. The proportion of bismuth present should be 2 grams of metal per 1000, and if the liquor contains more or less it should be brought to that strength. The paper through which this liquid is filtered will retain some bismuth, precipitated by the alcohol; this can be redissolved in nitric acid and again used.

The bismuthic solution alone does not dye, but mixed with sodium hyposulphite it soon deposits sulphide of bismuth which dyes the beard and hair. But as this mixture is quickly decomposed it must not be made until just as it is going to be used. This form of bismuthic hair-dye, therefore, requires to be sent out in two bottles, one containing the bismuthic solution, the other the solution of sodium hyposulphite (1 part of solution saturated in the cold diluted with 5 parts of water). When required for use these are mixed together in equal proportions.

The bismuthic product precipitated by tartaric acid and water can be dissolved by means of carbonate of potash, or by any of the caustic or carbonated alkalies, including ammonia, the liquid being after neutralized by a current of carbonic acid gas and filtered. But unfortunately this neutral product, or even one slightly alkaline, does not act as a dye when mixed with either hyposulphite of soda or flowers of sulphur. It can only be used by moistening the hair first with the bismuthic liquid, and then, after it has dried, with a solution of sulphydric acid or a sulphide.

This dye is said to have a progressive action, and to produce all the shades from a light flaxen to a deep chestnut colour, according to the number of applications made.

The second patent was taken out for a preparation that could be sent out in one bottle, M. Naquet while pursing his investigation having found that an ammoniacal solution of the tartrobismuthic product will keep indefinitely when mixed with solution of hyposulphite of soda, if the containing bottle be kept well closed. Such a mixture is said to make an admirable hair-dye, it decomposing and depositing sulphide of bismuth in proportion as it loses ammonia and is acted upon by carbonic acid in the atmosphere, The degree of concentration of the liquid is not of great importance, nor the quantity of ammonia. The following is the working formula given by M. Naquet:—

Dissolve 100 parts of bismuth in the smallest possible quantity of ordinary nitric acid (about 280 parts). To this liquor add a solution of 75 parts of tartaric acid in water and then a rather considerable quantity of water to ensure complete precipitation. The whole is then thrown upon a filter and the residue washed with water until the washings are no longer acid. The magma left on the filter is then put into a dish and solution of ammonia gradually stirred in until all is dissolved. The magma derived from 1½ kilograms of bismuth will require 0·8 or 0·9 litre of ammonia. To this liquor is added 75 parts of hyposulphite of soda in powder, and when the salt is dissolved the product is filtered and put into bottles. In this state it is ready for sending into commerce, but it is of advantage to add 1 or 2 per cent. of glycerine; no addition of alcohol is necessary. The liquid so prepared would contain about 5 per cent. of bismuth. It may be further diluted with water if desired.

The hair or beard when saturated with this liquid acquires after five or six hours a deep chestnut colour. Upon washing the hair this colour disappears, giving place to a delicate flaxen colour. By repeating the operation daily a stage is arrived at when, after passing through all the intermediate shades, the deep chestnut colour remains persistent.

CHINESE CAMPHOR.*

In China camphor is grossly adulterated with a glue obtained by boiling a rattan creeper, locally called T'êngtsai. This weed, growing luxuriantly in the interior of Formosa, from whence, as everyone is aware, all Chinese camphor is derived, is full of a glutinous matter which boiling water converts into a colourless glue. Mixing this with the pure camphor and a small percentage of water prevents evaporation, though naturally destroying the high quality of the article itself. Camphor so adulterated will keep, it is said, for a couple of months without loss; indeed, will bear the journey to Europe without suffering appreciable diminution. Experiments recently made have demonstrated the existence of two parts of glue to three of camphor in certain samples offered in the Tamsui market, rendering the article absolutely useless. Happily fire will readily detect the foreign body. Mr. Walter Lay, to whose admirable report upon the camphor trade in 1880 we are indebted for this information, adds:—"I have obtained a sample of the plant from which the glue is obtained, but cannot find out what its botanical name is; indeed, I have not succeeded even in obtaining the correct Chinese characters for it. It is called locally T'êngtsai, but it doubtless has a more distinctive appellation than that. It is not given in the 'Topography of Tamsui.' Mention is made in the Wahu Report for 1878 of a plant which yields a glutinous substance on being boiled in water, and which is used in the manufacture of paper. The name given to it at Wahu is Yang Kout'êng, and this possibly may be the name of the creeper used here for the adulteration of camphor."

Before the ruthless axe of the Chinese woodcutter the beautiful inland forests still adorned by the graceful *Laurus camphora* are fast disappearing. The aborigines inhabiting the interior fight desperately for the possession of their woods, but each year sees a fresh tract surrendered to their indomitable enemies. To illustrate the difficulty attending the collection of the prized wood, it may be mentioned, on the authority of the above-named gentleman, that between five and six hundred Chinese were killed two years ago in the petty warfare which prevailed with the savages. Sooner or later there must be a dearth of camphor. With their customary want of common prudence the conquering race are recklessly clearing the ground for tea cultivation, burning up the camphor wood in tea-firing operations, for which purpose it can seemingly be used with perfect safety, despite the pungent fumes given forth.

Very little of the camphor manufactured in Formosa is consumed by the Celestials, nearly all being shipped to foreign countries. On the other hand, they continue importing for their own use the more precious natural article secreted by the *Dryobalanops camphora* of Sumatra and Borneo. For these concrete masses, commonly known as Camphor Baroos, fancy prices are still paid,—31*s.* a pound was the import price at Ningpo last year. Of this fine camphor, it may be added, but a small quantity finds its way to Europe; the relative cheapness of the manufactured article driving it quite out of our markets, although it is well known the native manufacturers in Formosa place no special reliance on their own product, which, they say, possesses little or no virtue—very little nowadays, one may opine, if adulteration is carried on to the extent asserted.

* From a paper on the Chinese Materia Medica, by F. Newcome, in the *Medical Press and Circular*, August 2.

IMPURITIES IN GLYCERINE.*

M. Ferdinand Jean has studied and described in a very competent manner the adulterations and imperfections in the manufacture of glycerine. He states that oxide of lead, lime and butyric acid are the impurities most frequently met with in commercial glycerine, and that they accrue from bad manufacture or incomplete purification. Perfumers test glycerine with nitrate of silver, no sensible coloration resulting at the end of twenty-four hours if it be pure.

The chloroform test consists of mixing equal parts of chloroform and glycerine, stirring, and then leaving the mixture to settle. The mixture separates into two distinct layers, the upper one consisting of pure glycerine, the lower of chloroform and the glycerine impurities. If the glycerine is pure, the chloroform remains clear; if not, a greyish belt is observed at the point of separation.

If to glycerine, diluted with its own volume of distilled water, first a few drops of dilute sulphuric acid, and then a little alcohol be added, a white precipitate may be observed if the glycerine is impure. This will be due to the presence of lime or lead, the latter being indicated if the precipitate is blackened by sulphuretted hydrogen.

The presence of butyric acid is detected by mixing strong alcohol and sulphuric acid with the glycerine, and heating slightly, when the agreeable odour of butyric ether becomes manifest.

Formic and oxalic acids have also been found in glycerine; their detection is very important, especially in glycerine destined for pharmaceutical preparations. This may be effected by mixing equal parts of the impure glycerine and sulphuric acid, sp. gr. 1·83, when carbonic acid gas is given off.

To ascertain if both the above acids, or, if only one, which is present in the glycerine, M. Jean uses the following tests:—1. To a part of the glycerine alcohol of 40° is added, and a drop of sulphuric acid, and slight heat applied; the odour of formic ethyl (peach-flower smell) indicates the presence of formic acid. 2. To equal quantities of glycerine and water add 2 drops of a solution of chloride of calcium containing a little ammonia (free from carbonate); if oxalic acid be present a white precipitate of oxalate of lime will be formed.

Sugar, glucose, gum and dextrine are easily discovered by the following tests:—150 or 200 drops of distilled water are poured on the glycerine to be tested in a porcelain cup; 3 or 4 centigrammes of molybdate of ammonia and a drop of pure nitric acid are added, and the whole is then boiled for half a minute. If the glycerine contains sugar or dextrine a blue coloration is produced. If glycerine adulterated with cane-sugar be boiled with a few drops of strong sulphuric acid a black colour is produced, due to the carbonization of the sugar. Adulteration with glucose is detected by means of caustic soda, the mixture having a brown colour when boiled. To ascertain the quantity of sugar, dextrine or glucose in glycerine the following process may be employed:—5 grams of the impure glycerine are boiled in a small glass beaker with 5 c.c. of distilled water and a slight excess of alkaline solution of tartrate of potash and copper; the precipitate of protoxide of copper is redissolved by adding some hydrochloric acid. The solution is then made strongly ammoniacal, and poured into a solution of nitrate of silver. Metallic silver is immediately precipitated, which is separated by filtration. After washing it with warm ammoniacal water, it is calcined at a red heat, and the weight of the silver taken. As 100 of glucose = 509·6 of metallic silver, the weight of the glucose can be easily calculated. If cane-sugar or dextrine be present it is necessary previously to boil the glycerine for half an hour with acidulated water, in order to convert these matters into glucose.

The quantity of water contained in impure glycerine can be determined, when the density is known, by means of Vogel's formula.

* *Journ. de Pharm. d'Alsace-Lorraine*, ix., 136.

ARROWROOT MANUFACTURE IN QUEENSLAND.*

The machinery used for the manufacture of arrowroot is simple in the extreme, and is chiefly manufactured on the place, the shafts, pulleys and engine work being, of course, foundry made. The first process shown was the roots being tipped by two boys into a long trough, through the length of which a shaft slowly revolved, and by means of wooden projecting pegs the dirty roots were stirred up and so cleaned, there being a constant stream of water running through the trough. These revolving pegs have a screw pitch, so that the roots are gradually moved towards the far end of the trough, where they are caught up by a sort of bucket pump which elevates them some 12 feet and drops them regularly into a hopper. As they fall to the bottom of this they meet the grater, which is a drum of perforated galvanized iron driven at great velocity. A small stream of water pours into this all the time, and the roots are quickly grated up into a brown coloured pulp. This mass of fibre and pulp falls into a cylinder of perforated iron, about 9 feet long and 2 feet in diameter; through the length of this runs an axle on which are two beaters like the drum of a threshing machine; these smash up the fibrous pulp, exposing it to the action of the water, so as to enable all the starch and fine pulp to be washed out and squeezed through the perforations of the cylinder, while from the one end is discharged a constant stream of the dirty looking fibrous refuse. A stranger looking at the process at this stage would think it utterly impossible that the white arrowroot of commerce could be the result of such an unpromising material; however, water works wonders, and an abundance of pure, soft water is essential for the successful manufacture of arrowroot. The finer pulp, as squeezed through the perforations of this cylinder, is received in a precisely similar one below; here again the mass, now only pulp, is beat up; but the perforations around this second drum being very small, only the starch and dirty looking water passes through, the pulp being again discharged from the cloaca at the end. The stream of water and starch pouring from these cylinders is received in troughing, extending for 100 feet around the shed, and, as it runs along, the starch, being heavier than the water, all sinks to the bottom and the water runs away. So far the work goes on automatically, no one but the two boys throwing in the roots troubling themselves about it. But towards the end of the day the stream of water is stopped, and the arrowroot starch scraped up out of the trough, where it has accumulated in a layer some inches in thickness, and is placed in large vats or tubs, all ranged in regular rows. Before being put into these tubs it is passed through fine muslin sieves, and at the same time another stream of water is turned on. These fine sieves effectually clear it of any foreign matter, and it settles by the morning at the bottom of the vats, clean and white as snow. The water is drained from it, and the starch put into a centrifugal machine exactly similar to what is used for sugar; this soon forces out the surplus water, but perfect dryness is essential to its keeping qualities, so it is now carried to the drying room, which is some 60 feet long by 12 feet wide. Round the whole length of this runs a flue heated by a special furnace, and over this are shelves of galvanized wire netting; on this netting is placed calico, and on this is spread out the starch. In this hothouse the moisture is quickly evaporated, and the arrowroot becomes crisp and grain-like. On fine days it is spread out in the sun on similar wire stages. All operations are now finished, and the flour is stowed away in bins in the storehouse, and there made up into the packets usually seen in the shops. For this work-women are employed, and smart hands can earn as much at this employment as their husbands are doing at the rougher work of the mill.

* From the *Queenslander*. Reprinted from the *Weekly Drug News*, August 25, 1882.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 16, 1882.

OPIUM PRODUCTION IN CHINA.

In a volume of commercial reports by Her Majesty's Consuls in China, just issued, there is an unusual amount of space devoted to the subject of opium. As might be expected, the commercial and political aspects of the question occupy the most prominent positions in these reports, but intermixed there is some information upon the cultivation and consumption in China of native-grown opium which appears to be worth culling for these columns. Especially is this the case with the report of Mr. Consul Spence, who has recently spent four months in the province of Szechuan.

It appears that, notwithstanding the pretended opposition of the Chinese Government, the cultivation of the poppy is now carried on in every district of the province of Szechuan, in the south-west of China, except those on the west frontier, but most extensively in the districts of Chungking Fu and Kweichow Fu. Opium is a winter crop, and some of the districts are said to appear at that time of the year like vast poppy fields. For this reason the crop is becoming a great favourite with the farmers, as it does not interfere with rice, the staple food of the people, for when it is planted in paddy lands, as is often the case, it is gathered in time to allow rice or some other crop to follow. Moreover, the conditions under which the tenant farmers hold their land have also hitherto had a similar tendency, as the rent usually consists of a proportion of the summer crop. Landowners are now, however, becoming alive to the importance of the winter crop of opium and are commencing to stipulate for the payment of a proportion of it also. There seems to be some difference of opinion as to the remunerativeness of opium cultivation. Baron Richthofen, writing ten years ago, estimated the yield of opium at 200 ounces per acre; but Mr. Baber, a subsequent observer, has estimated it at double that quantity. Mr. Consul Spence's figures approximate more closely to the latter, he giving an average of 350 ounces per acre. Probably the difference is attributable to the fact that the cultivation is now more carefully carried on and the land well manured. Every part of the poppy plant has a market value: the capsules are sold for use in medicine; oil is expressed from the seeds; the oil cake and leaves are used for manure; and the stalks are burnt for potash. Taking all these sources of revenue into account, opium, as compared with wheat, is estimated to yield a crop of double the value.

A few years since in Szechuan the poppy was grown only on hill slopes of an inferior soil; but now it is cultivated everywhere, and the country people are agreed that it is most profitably cultivated on good ground with liberal manuring. This agrees with experience in India, where it is found to be best grown on rich soil near villages where manure can be easily obtained. According to Mr. Consul Spence the method of cultivation now followed in Szechuan is extremely simple. As soon as the summer crop is reaped the land is ploughed and cleaned, roots and weeds are piled in heaps and burned and the ashes strewed over the ground, and the land is liberally treated to dressings of night soil. The seeds are sown in December in drills $1\frac{1}{2}$ foot apart, the white poppy being by far the most commonly cultivated in the low grounds, though the red and purple varieties are also grown. In the following month, when the plants are a few inches high, the rows are thinned and earthed up so as to leave a passage between each, after which the plants are left to themselves, with the exception that the earth is occasionally stirred and is kept clear of weeds. In March or April, according to the situation, the poppy blooms, and as the capsules form and fill fresh dressings of liquid manure are made. In April and May the capsules are slit and the juice extracted. The total amount of opium produced annually in South-west China, chiefly in the provinces of Szechuan and Yunnan, is estimated at upwards of thirteen thousand tons, or more than twice the whole Indian import into China.

The principal part of the opium exported from the province of Szechuan is carried along mountain paths, on the backs of coolies, to Shashih, and passes from thence into the regular trade channels over the east and south of China; the more convenient mode of transit along the Yang-tsze river is avoided because of the heavy dues. The opium thus becomes available to the poorer classes who cannot afford the high-priced Indian drug. But its cheapness is alleged to be in some degree due to adulteration with oil, glue and other substances, although when pure it is said to be almost as good as Indian opium.

Some statements by Mr. Consul Spence as to the extent to which opium smoking is practised in Western China, and the consequent effects, are sufficiently astonishing. He says that the impression one gets in a Szechuan city or village is that everyone smokes; there it is no question of fractions of 1 per cent., but of 30, 40, or even 60 per cent. of the whole male adult population, besides a large number of women. In the city of Chungking, for instance, where there is a population of 130,000, there are 1230 opium shops, with a daily consumption of 12,000 ounces of opium. In country hamlets and villages, also, almost every second house in the main streets is an opium shop. In some rural districts the people smear the lips of their idols with the drug and at funerals burn paper imitations of pipes of opium, so that the dead may enjoy in the next world the solace they loved in this. Sometimes as many as five "drawings" are smoked from the same opium. The leavings of the rich smoker are mixed with the opium sold to the poor; the refuse of the poor is re-smoked by some more destitute; and even the unsmokable dregs are drunk in tea by labourers, sailors and others who have not time to knock off work for a smoke. But notwithstanding this abandonment to opium-smoking, and the fact that extreme excess in this as in other cases brings its punishment, the Szechuan people are described as being stout and able-bodied, and their general health and well-being remarkable, as well as their capacity for work and endurance of hardship. Mr. Spence sums up by saying that were Indian opium the fatal scourge it is sometimes asserted to be, there ought to be found in the west of China, where ten times more opium is smoked that elsewhere, a debased, debilitated and impoverished population. But he holds that the reverse is the case, and that the people are both in body and estate amongst the most prosperous in China, and he considers that unless it can be proved that Indian opium contains some noxious principle which does not exist in the Szechuan drug the hypothesis as to the poisonous effects of opium-smoking is open to grave doubt. But it is worthy of remark that Indian opium is almost unknown throughout this vast district.

THE MANUFACTURE OF CHEMICALS IN GREAT BRITAIN.

If Lord Beaconsfield's dictum be correct, that the prosperity of the trade in chemicals is correlative with the prosperity of the country, there exist signs in the north of England that might be construed as indicative of the decadence of Great Britain. In a special note which appeared in the *Times* a few days since, attention is called to the depression which has now for several years existed in the chemical industries carried on in the Tyne district. The importance of this condition of things will be manifest when it is stated that even now it is estimated that over eight thousand men are directly employed in the chemical works of the Tyne district alone, whilst the value of the total annual production of the chemical trades in the north of England has varied in recent years from two to four million pounds sterling, of which the value of the soda crystals has exceeded three hundred thousand pounds. The depression and consequent enhanced competition have resulted in a remarkable fall in prices, so that it is asserted that for some years past the cost of production of such articles as soda crystals and bleaching powder has been in excess of the selling prices, and serious losses have been incurred. This state of things is attributable to more than one cause, but no doubt began with the reaction from the enormous overproduction that some few years ago was fostered in the district. Another cause no doubt has been the introduction of new processes, especially in the manufacture of soda, which have been found more conveniently applicable in other localities than in the Tyne district. Thus Mr. Allhusen pointed out in a subsequent letter to the *Times* that Solvay's process can be employed to greatest advantage where brine is attainable, as in Cheshire and South Durham, and that under such conditions soda can be profitably produced by this process even at the present low prices. But there is undoubtedly another cause at work which is not noticed in either of these communications. A few years since Great Britain practically manufactured alkali for the world. But in recent years an ever-increasing number of manufactories have been brought into operation in other countries, especially in Germany and Austria, which successfully compete with this country, at least for the home manufacture. It is satisfactory to learn, however, that there are indications of improvement in the trade even in the Tyne district, as prices are tending upwards, although it may be some time before the prices of chemicals may allow of the manufacture being carried on there profitably. In the event of the salt deposit discovered recently in South Durham becoming available for working in the Tyne district it would probably accelerate the improvement.

EXEMPTION FROM JURY SERVICE.

In accordance with the provisions of the Juries Act lists of persons qualified and liable to serve on juries in England and Wales are now being exhibited on the doors of all places of religious worship in the various parishes, and will remain until Sunday next, the 17th inst. We would, therefore, remind those of our readers who are entitled to exemption under the statute as "pharmaceutical chemists" that if they wish to ensure that exemption it is desirable that they examine the lists relating to their respective parishes to see whether their names have been improperly included. In the event of a pharmaceutical chemist finding that his name has been inserted n the list he may claim to have it expunged on the day of appeal, and to support his application may obtain a certificate of registration from the Registrar. But if he fail to make the claim at that time, he will not be entitled to exemption as long as his name remains on the jury list.

AUTOGRAPH PRESCRIPTIONS.

We have great pleasure in calling attention to the letter of Mr. W. N. Allen, on p. 239, in which he asks for assistance in making a collection of autograph prescriptions for the use of the Irish Board of Examiners. The collection is being prepared under the auspices of the Council of the Pharmaceutical Society of Ireland, and we shall be glad to learn that the request for prescriptions is responded to so liberally that there is not only enough for the purposes of the examiners, but some left that may be made available for the use of students, as, thanks to the exertions of Mr. Joseph Ince, is the case in this country.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, September 6, in the College of Physicians, Kildare Street, Dublin, at 3 o'clock.

The Vice-President, Dr. Aquilla Smith, presided.

The other members of the Council present were:—Messrs. Allen, Brunker, Dr. Collins, Messrs. Doran, Grindley, Hodgson, Holmes, Sir George Owens, Messrs. Simpson, Wells, and Dr. Montgomery.

Mr. Hugh Fennell, the Registrar, read the minutes of the last meeting, which were confirmed.

The Registrar read a letter from Mr. James Carse, of Belfast, complaining of the decision which the Council had arrived at with respect to his case and stating that he would take an action against them unless they complied with certain requests which he made in his letter.

The Chairman: His request is limited to a very small thing, namely, allowing him one year.

Mr. Hodgson: I think the simple way would be to refer the letter to the Law Committee and let them deal with it as they think best.

Mr. Holmes: Is there not a threat in the letter against a member of the Council?

The Chairman: It does not appear to be a case for the Law Committee. It is a case for the Council to decide on. He says he has taken advice and will bring an action.

Mr. Allen: I think we should take no notice whatever of his threats.

Mr. Brunker: I move that the letter be marked "read." The Council have spent two whole meetings on his case and a majority have declared their opinion; I do not see any ground for re-opening the matter.

Mr. Holmes seconded the motion of Mr. Brunker, which was put and carried.

The Registrar was directed to inform Mr. Carse of the decision arrived at.

A letter was received from Mr. Thomas R. Lester, of Cork, presenting some prescriptions for the use of the Examiner in Pharmacy.

On the motion of Dr. Collins, seconded by Mr. Doran, a vote of thanks was passed to Mr. Lester.

The Registrar read a correspondence arising out of a letter written by Mr. Alexander Chapman, L.P.S.I., of Belfast, in reference to the acceptance of certificates for compounding by the Royal University of Ireland. Mr. Chapman wrote to the Secretaries of the Royal University, Drs. Meredith and Dunne, on the subject and received from them a letter, dated July 21, 1882, stating that "A certificate signed by a licensed apothecary, attached to a recognized hospital, would be accepted by the University." The Registrar wrote to Mr. Chapman asking for an explanation of the word "certificate," and received from him a reply, dated July 31, stating that "The Royal University required a certificate of having compounded for three months."

The Chairman: We are not to interpret what are the powers of the Royal University. If Mr. Chapman's question were, "Will the certificate of a licentiate of the Pharmaceutical Society be received by the Royal University," we should try to answer it; but having regard to the way in which the questions are put in the letters it appears to be a matter between Mr. Chapman and the Royal University.

Mr. Brunker: But is it not of importance to secure the interests of our licentiates?

Sir George Owens: You can raise the question by asking the Royal University whether they will accept the certificates of our licentiates.

Mr. Brunker: Would it not be advisable for us to place ourselves in communication with the Secretaries of the Royal University in order to ascertain if the certificates of our licentiates will be accepted, the Royal University having adopted the course of requiring from all licentiates in medicine a certificate in practical pharmacy?

Sir George Owens: I think the chances are that they will accept it.

Dr. Collins: All the bodies, the College of Physicians and the College of Surgeons included, require certificates in pharmacy.

Mr. Brunker: The Royal University have gone further, I believe, than any other body. They require a more extended knowledge and experience of pharmacy than other licensing bodies.

Dr. Collins: Should we recommend Mr. Chapman to write to the Secretaries of the Royal University asking if his certificate will be accepted, and in the event of the reply being that it would not, to communicate with us?

Mr. Grindley: Why should we not write to the Secretaries of the Royal University on the subject?

Mr. Brunker moved:—

> "That the Registrar be directed to address to the Secretaries of the Royal University of Ireland a query relative to the nature of the certificates in practical pharmacy required by the Council of that body, and to request that certificates signed by duly qualified licentiates of the Pharmaceutical Society of Ireland should be accepted by them."

Mr. Grindley seconded the resolution, which was unanimously agreed to.

A letter was received from Dr. Kaye, Q.C., Assistant Under-Secretary to the Lord Lieutenant, conveying his Excellency's approval of the election of Mr. Charles Evans as Examiner in Pharmacy.

The next subject on the paper was the recommendations of the Pharmacy Act Amendment Committee.

Mr. Allen said at the last meeting the consideration of those recommendations was postponed, on the understanding that they would not be taken up at the present meeting, the Belfast members of the Council having stated that they would not be able to attend it. In justice to those gentlemen it would not be fair to take up the consideration of those recommendations now. He (Mr. Allen) had called on the President and consulted him about the matter, and by his directions he had written to Mr. Pring, Mr. Payne, and Dr. Whittaker to say that the recommendations would not be considered that day.

Mr. Grindley said he could bear out what Mr. Allen had stated, as to the understanding with the Belfast members on the subject.

Mr. Holmes suggested that the recommendations should be taken into consideration at the annual meeting of the Society, which would be held on the 2nd of October.

Mr. Hodgson was of a similar opinion. He observed that there was an attempt in the recommendations to reintroduce the word "apprentice," to which he had a strong objection. He had understood that the principle of apprenticeship was exploded, as far as the Pharmaceutical Society was concerned. It was enough to require two years' practical pharmacy from a man without tying him down by the word "apprentice," whether he were forty years of age or only sixteen. These were considerations that ought to be brought before a meeting of the Society at large.

The Chairman: Then it would be necessary to send out copies of the recommendations beforehand to all the members.

Dr. Montgomery: I do not think it would be possible to enter into these questions at the annual meeting.

Mr. Wells: Can they be brought before the general meeting without having been first brought before the Council?

The Chairman: I should say not, until the Council have first voted on them.

Mr. Wells: These matters have not been voted upon by the Council yet.

Dr. Montgomery said he did not see what the general meeting had to do with these questions. It was the Council who were entrusted with the duty of deciding on them. Propositions might be made from the general meeting, which the Council could not accept, and then they would be in collision with the Society generally. The consideration of the recommendations ought to be adjourned until the next meeting of the Council.

The Chairman: I do not think any inconvenience can arise from adjourning the consideration of these recommendations until the next meeting of the Council. When a Pharmacy Bill is introduced it will be time enough for the members of the Society generally to express their opinions.

Dr. Montgomery: Is it essential that the general body should approve of the action of the Council?

The Chairman: No.

Dr. Montgomery: Or can we make laws without their approval?

Mr. Brunker: It is not a proposal to make laws. These are only recommendations for the amendment of the law. I take it that the Society in general by voting for members of the Council have delegated their authority to the Council, and except in the way of being consulted on important matters have no weight all.

The Chairman: The Council would have power to make suggestions on the occasion of the introduction of a bill, without going to a general meeting.

Mr. Brunker: As public affairs are going at present I do not think there is much chance of our getting amendments in the Pharmacy Act until next year.

Mr. Allen moved—

"That the consideration of the recommendations of the Pharmacy Act Amendment Committee be postponed to the meeting of the Council on October 4, next.

Dr. Montgomery seconded the motion, which was unanimously agreed to.

Some financial business having been disposed of, the Council adjourned.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 215.)

Wednesday, August 23.

The President took the chair at half-past ten, and the first paper read was—

On Some Reactions of Arsenic.

BY W. A. H. NAYLOR AND J. O. BRAITHWAITE.

Three years ago one of us devoted some attention to the action of certain reducing agents on arsenic acid and as a result devised and published a method for the volumetric estimation of this body based upon its reduction by hydriodic acid. First in order among the substances tentatively employed at that time was oxalic acid, which was thought not to have been previously studied in this connection. The result of the experimental inquiry was so far disappointing as to induce the belief that it could not readily be applied to the purpose of reducing arsenic compounds. Subsequently the discovery was made that not only had oxalic acid been tried in this capacity, but that in the hands of the experimenter it had proved a complete success. An account of this interesting observation is given by the author, M. Patrouillard, in the *Répert. de Pharmacie*, iii., 582, an abstract of which may be found in the *Pharmaceutical Journal* for November 27, 1875. His preference for oxalic acid over the reducing agents commonly employed, as sulphurous acid and alkaline hyposulphites, is founded on its solubility and the comparative ease with which it can be obtained in a state of purity. This discovery of Patrouillard received additional importance and credible acceptance when a place was assigned it in a standard text-book of chemistry. In regard to it, the manual referred to has the following statement:—"Arsenic acid is easily reduced to arsenious by the action of reducing agents such as sulphurous or oxalic acid

$(H_3AsO_4 + H_2C_2O_4 = H_3AsO_3 + H_2O + 2\,CO_2)$."

These latter opinions contrasted too strongly with the one first quoted to encourage the hope that on mature reflection some ground of agreement would be found. It was therefore resolved when opportunity offered to repeat the old experiments, extend them if necessary, and perform others on the lines laid down by Patrouillard. This we have done conjointly and have pleasure in now submitting the results. Here we would remark that while the author in his communication supplies but little data regarding the mode of testing his reduced compound, he is commendably explicit in his narration of the process intended to effect the desired reduction.

His instructions may be usefully reproduced:—

"10 à 15 grammes du sel à essayer sont dissous dans l'eau distillée, 50 grammes environ; on y ajoute 50 centigrammes d'acide oxalique crystallisé et l'on entretient la dissolution pendant à peu près cinq minutes à la température de l'ebullition; on filtre si cela est nécessaire et lorsque la liqueur est un peu refroidie on l'acidifie assez fortment par l'acide sulfurique. Dans cette liqueur acidulée on fait passer un courant de gaz hydrogène sulphuré. . . . Si le sel essayé contient au moins 2 pour 100 d'arséniate de potasse, par exemple, le précipité jaune floconneux de trisulfure d'arsenic se formera immédiatement."

The following experiments may be cited in illustration of our mode of working:—

Experiment 1.—·25 gram of arsenic oxide dissolved in 50 c.c. of water was boiled for half an hour with ·5 gram of oxalic acid.

Experiment 2 was identical with No. 1, except that the proportion of oxalic acid to arsenic oxide was doubled, and the boiling continued for two hours.

Experiment 3.—Fifteen grams of sodium nitrate containing 2 per cent. of added arsenic oxide were dissolved in 50 c.c. of water. ·5 gram of oxalic acid was introduced and the solution boiled for half an hour. On examining the respective solutions for traces of arsenious acid, negative results were alone obtained. The tests applied in searching for evidences of reduction may be briefly described. The solution was carefully neutralized with ammonia, barium nitrate added to complete precipitation, and filtered. The filtrate was boiled with sufficient sodium carbonate to convert the barium arsenite into a soluble salt, and withdraw from solution the excess of barium reagent. It was then filtered, the filtrate evaporated to a low bulk and divided into three portions. To one was added a little caustic soda, followed by the cautious addition of a weak solution of mercuric chloride. The first drop coloured the liquid permanently yellow. The nature of this reaction will be dealt with presently; for the moment it may be regarded as indicative of the absence of any arsenite. To another portion was applied the copper test in a modified form. In what this modification consists will be described shortly; suffice it to say that no cuprous oxide was formed and therefore inferentially no reduction of the arsenic oxide had taken place. To the third portion, after acidifying with sulphuric acid, a weak solution of potassium permanganate was added. A pink tint was at once imparted to the liquid, which did not become discharged on shaking. Advantage was also taken of the extreme delicacy of iodine as a test for arsenious acid, it being only necessary to substitute the corresponding bicarbonate for the monocarbonate of the alkali employed in effecting the decomposition of the barium arsenite. By its use, too, no appreciable reduction was obtained. As a demonstration that these tests are adequate to the detection of small quantities of arsenious acid, in respect of the conditions under which they were applied, it may be stated that satisfactory indications of the presence of this substance were afforded by each, when to one of the experimental solutions not more than 4 milligrams of arsenious oxide were added.

Failing to procure any evidence of a reduction, the original experiments were repeated, and another class of reagents applied. These afforded abundant proof of the existence of arsenate. Having removed the oxalic radical and obtained the arsenic compound in the form of an alkaline salt the respective solutions were separately examined. When neutralized they gave a chocolate coloured precipitate with nitrate of silver. With excess of ammonia and magnesium mixture a cloud was instantly produced, followed by a copious crystalline deposit on standing. And when acidified with hydrochloric acid, iodine was rapidly liberated on the addition of a 20 per cent. solution of hydriodic acid.

Experiment 4.—This differed from the preceding ones in that the boiling was conducted in sealed tubes, ebullition being maintained for from five to ten minutes. One tube was opened beneath the surface of clear baryta water, but no tangible proof of its containing carbon dioxide was obtained. Nor did the enclosed liquid respond to the before mentioned tests for arsenious acid.

Experiment 5.—One gram of oxalic acid and ·2 gram of arsenic oxide were dissolved in 50 c.c. of water, and introduced into a small flask carrying a delivery tube depressed beneath the surface of mercury. Having replaced the small volume of air in the flask with hydrogen, a tube containing baryta water and mercury was drawn over the end of the exit tube. The contents of the flask were then vigorously boiled. At the end of ten minutes the baryta water was distinctly opalescent, which was proved to be due to a little oxalate carried over with the steam. No barium carbonate was produced.

Experiment 6.—This consisted in dissolving ·200 gram of arsenic oxide and ·500 gram of oxalic acid in 50 c.c. of water and boiling for half an hour. The oxalic acid was then determined gravimetrically, when it gave the equivalent of ·624 gram of calcium sulphate. A second experiment conducted simultaneously and in precisely the same manner, but omitting the arsenic oxide, gave the equivalent of ·622 gram of calcium sulphate. We conclude, therefore, that under these conditions the oxalic acid suffers no decomposition.

Experiment 7.—Fifty c.c. of a 2 per cent solution of oxalic acid containing ·2 gram of arsenic oxide was boiled for half an hour, and, when cool, strongly acidified with sulphuric acid. Through the solution was transmitted sulphuretted hydrogen. No yellow sulphide made its appearance for the first five minutes, in ten minutes a distinct precipitate had fallen, and it was not until the gas had passed through continuously for four hours that decomposition could be declared complete. The sulphide was collected, dried, digested repeatedly in carbon bisulphide and filtered. The filtrate left, on evaporation, ·006 gram of sulphur.

The pure sulphide was examined in regard to its degree of sulphuration, and was found to exist mainly in the penta-condition. Hence we infer the absence of any indirect action between the sulphuretted hydrogen and the acids by which the arsenic might become reduced. It was now thought that we had arrived at that stage of our inquiry when we might legitimately discontinue our experiments and accept the conclusion to which they unmistakably pointed. We therefore express the opinion that oxalic acid exerts no reducing action under the conditions described by Patrouillard and ourselves.

Passing from this subject we proceed to give an account of our method of employing the copper test. It is based upon the fact of the solubility of cupric arsenate in the double tartrate of potassium and sodium. It is indeed a modified Fehling solution. The copper solution, as ordinarily prepared, cannot be substituted for it on account of the large quantity of double tartrate present which seriously interferes with its delicacy as a test. It should contain but little more double tartrate and caustic soda than would enable it to withstand boiling when diluted with twice its volume of water. Our formula for such a solution has the following proportions:—

Cupric sulphate recrystallized. . .	·200 gram
Water to measure	50 c.c.

Dissolve:—

Tartarated soda, crystallized . . .	·500 gram
Caustic soda	5·00 grams
Water to measure	50 c.c.

Dissolve.

The two solutions are kept separate, and mixed in equal proportions when required for use. The convenience of this mode of employing the copper test is best realized when search has to be made for traces of arsenite accompanied by much arsenate. By this simple modification the arsenate is held in solution, and the inconvenience of filtering a strongly alkaline liquid, or patiently waiting until the insoluble copper compound has subsided, is obviated. Moreover, in our hands it has conduced to accuracy, from the readiness with which the amount of copper desired to be taken may be apportioned. As affording some idea of its capability it may be mentioned that with 1 milligram of arsenious mixed with 2 decigrams of arsenic acid it will give on boiling a decided reduction. Its delicacy is, however, materially impaired by the presence of certain organic acids, as oxalic, citric, acetic, and tartaric. Sulphates and nitrates do not interfere, nor do chlorides, unless present in quantities proportionately large.

As a matter of scientific interest several attempts were made to apply the test volumetrically, but in every case a point was reached at which the copper solution refused to be reduced by the arsenic. Solutions containing various strengths of copper were employed, but not one could be made to yield, in a series of experiments, accordant results. At present, therefore, we are not able to offer an opinion upon its applicability to this purpose.

We now return to consider more fully a reaction which has received from us only a passing notice. We refer to the decomposition which takes place between arsenious acid and mercuric salts. In manuals of chemistry we are informed that when the action takes place between mercuric nitrate and an alkaline arsenite, mercuric arsenite is formed, and that this compound in contact with caustic alkali gives reduced metal. If to these facts be added the two observations of the solubility of this compound in excess of alkaline arsenite and in nitric acid, the most has been said that appears to be known about it. The fact that we have taken advantage of this decomposition by employing it qualitatively as a test for arsenious acid has already been referred to, the only difference being our substitution of the chloride for the nitrate. Here it may be permitted us to offer some remarks on the test itself. When mercuric chloride is added to a solution of arsenious acid only moderately alkaline, the solution remains clear, and upon standing becomes opalescent to a degree dependant on the amount of arsenic present. If, however, the solution be rendered strongly alkaline with caustic soda or potash and then a weak solution of mercuric chloride be added, the mercuric oxide at first produced quickly disappears, leaving as before a clear solution, which rapidly becomes cloudy and if set aside gives a greyish deposit of metallic mercury. Again, if the solution be not only strongly alkaline, but boiling, the liquid will assume a dark colour the instant the mercuric chloride is added. Assuming, for the moment, that the arsenic exists entirely in the higher state of oxidation, the mercuric oxide produced by the first drop of mercuric chloride will colour the solution permanently yellow. Before endeavouring to extend the usefulness of this test by attempts at making it quantitative it was necessary to satisfy ourselves on two points. These were the nature of the steel grey deposit and the condition in which the arsenic existed at the end of the reaction. That the deposit of reduced metal was free from corresponding oxides was verified by its insolubility on prolonged digestion in a 5 per cent. solution of hydrocyanic acid. That as a result of the action of the mercuric chloride, the arsenious had been wholly converted into arsenic acid, was indirectly proved by its failing to afford any evidence of an arsenite, and directly by the marked manner in which it responded to the tests for arsenates. From a knowledge of these facts we were enabled successfully to apply our test to the volumetric estimation of arsenious acid. For this purpose standard solutions of mercuric chloride and alkaline arsenite were prepared of strengths corresponding respectively to 13·55 grams of mercuric chloride and 4·95 grams of arsenic trioxide per litre. The mode of application consisted in delivering the mercuric solution from a burette into a measured volume of the arsenic solution previously heated to the boiling point, and rendered strongly alkaline with caustic soda. When the mercuric oxide ceased to disappear and from its presence imparted a permanently yellow tint to the liquid, the reading of the burette was taken. Operating in this way we learnt that the reaction took place between 1 molecule of arsenic trioxide and 2 molecules of mercuric chloride. After a little reflection the following equation in two stages was constructed to account for the facts thus far acquired:—

$$As_2O_3 + 2HgCl_2 + 4KHO = 2Hg''HAsO_3 + 4KCl + H_2O.$$

representing first stage of the reaction.

$$2Hg.HAs.O_3 + 6KHO = Hg_2 + 2K_3AsO_4 + 4H_2.O$$

representing final reaction.

Or as one equation

$$As_2O_3 + 2HgCl_2 + 10KHO = Hg_2 + 4KCl + 2K_3AsO_4 + 5H_2O.$$

Confirmatory evidence of the correctness of this equation was supplied by weighing the reduced mercury, and by determining the amount of arsenic acid produced in the reaction. Taking ·015 gram of arsenious acid, the mean of two experiments gave ·097 gram of metallic mercury, theory requiring ·098 gram. From the same weight of arsenious acid was obtained as the mean of two results a quantity of the double magnesium and ammonium arsenate equivalent to ·059 of arsenic pentoxide, theory requiring ·057 gram. Although so far as is known to us no molecular formula has been assigned to mercuric arsenite we consider that in representing it as $HgHAsO_3$ we are acting in harmony with the results of our experiments. The isolation of this body in a state of purity is a task requiring the observance of certain conditions with which at present we confess ourselves but imperfectly acquainted. For instance, if mercuric nitrate be employed as the precipitant, the product is invariably contaminated with mercuric oxynitrate. If in place of the nitrate the chloride be used, followed by the addition of alcohol, a precipitate falls consisting solely of calomel.

We conclude this paper by giving a series of experiments intended to afford an idea of the degree of accuracy of which our volumetric method is capable.

As_2O_3 taken.	As_2O_3 found.
·051 gram.	·052 grams.
·081 „	·080 „
·061 „	·062 „
·071 „	·070 „
·092 „	·093 „
·076 „	·077 „
·086 „	·087 „
·097 „	·098 „

Equally good results may be obtained in presence of much chloride, sulphate, carbonate, or bicarbonate, but phosphates prohibit its use.

The PRESIDENT proposed a vote of thanks to the authors of the paper, which was carried unanimously. He said this was a paper of considerable importance, and perhaps the most important point was the investigation into the conditions under which arsenic acid and other arsenates were reduced to arsenious acid and other arsenites, for no analyst examining the contents of a stomach, or a piece of wall paper, or anything else, would dare to say that arsenicum was absent until he had not only examined it in the ordinary way by the usual tests for arsenicum but had taken the precaution of adding some reducing agent, in order that arsenates might be reduced to arsenites, and so the possibility of missing arsenic be removed. Probably most who had employed these tests had used sulphurous acid for reducing the arsenates, but M. Patrouillard had stated so distinctly that oxalic acid would do as well, that, inasmuch as oxalic acid was always at hand, whereas sulphurous acid had usually to be prepared, it was not astonishing that many experimenters had gladly accepted the statement, perhaps a little hastily, and used oxalic instead of sulphurous acid. Having a great respect for the French investigator he confessed he had accepted his statement and recommended his students to use oxalic acid, but the denial by Messrs. Naylor and Braithwaite of this reaction was as distinct as M. Patrouillard's assertion, and, therefore, attempted reduction by oxalic acid should perhaps be discontinued until the matter was further investigated. He hoped M. Patrouillard would take notice of this paper, and clear the matter up. He said that after heating with oxalic acid, adding sulphuric acid, and passing sulphuretted hydrogen through the fluid there was an immediate precipitation of dry sulphide of arsenicum, and it would be remarked that he used the word "immediate." The authors of this paper, having done exactly what M. Patrouillard directed, got no precipitate for five minutes, then a cloudiness, and so on, and the precipitation was not complete for several hours. This was not only questioning an inference, it was denying a stated fact, and he hoped M. Patrouillard would make further experiments in order that this important question might be definitively set at rest.

Mr. MARTINDALE said there was a pharmaceutical preparation indirectly connected with the subject of the paper, which he should like to mention, because it had not given him much satisfaction. It was liquor sodæ arseniatis. The preparation, according to the Pharmacopœia, was never satisfactory, and he should be glad to know if Mr. Naylor had ever volumetrically estimated it by any of the reducing agents, such as he had suggested. He had tried to estimate it by means of the volumetric solution of nitrate of silver, without getting good results: it threw down chocolate-coloured arseniate of silver, but it was difficult to estimate when the decomposition was complete, and he had hoped from Mr. Naylor's previous paper that something might be done by the use of the volumetric solution of iodine. The formula in the Pharmacopœia which directed the arseniate of soda to be dried up to a certain degree never gave him very satisfactory results, and he understood from some medical practitioners that they obtained very varying results from the medicine as dispensed by different chemists. If some volumetric test could be given for it, it would be a great help to its being prepared of one uniform strength.

Mr. KINGZETT asked if the authors had used oxalic and sulphuric acids in conjunction, which he understood was the process of the French chemist. If sulphuretted hydrogen were used at the same time it would afford an increased facility for reduction taking place, because there would then be something which would combine with the arsenic at the moment of reduction.

Mr. BRANSON said he found the volumetric method with uranium nitrate or acetate very convenient for the estimation of arsenates, using potassium ferrocyanide as an indicator.

Mr. NAYLOR said he had never found any difficulty in preparing the liquor sodæ arseniatis, unless the temperature had been allowed to rise a little too high, when there was a danger of the arsenate becoming reduced to arsenite; of course if a very high temperature were used it would become reduced very considerably. As to Mr. Martindale's further question, it had been partly answered by Mr. Branson. If a volumetric method were desired uranium acetate might be employed, or the method suggested some time ago by hydriodic acid, provided sufficient hydrochloric acid were used at the same time, otherwise there would not be an equivalent quantity of iodine liberated. With regard to Mr. Kingzett's question, he could only say that they followed M. Patrouillard's directions exactly. The arsenic acid was boiled, and when slightly cooled the sulphuric acid was added.

The next paper read was on—

Some Results of the Action of the Digestive Ferments upon Drugs.

BY GEORGE BROWNEN, F.C.S.

I purpose in this paper to call the attention of this Conference to some of the results of the action of solutions of the digestive ferments upon medicinal substances.

Preparations containing the gastric and pancreatic ferments have recently become famous as dietetic auxiliaries; I need not therefore, occupy time with references to peptonized foods or drinks or even give a detailed account of their discovery and development.

In 1836, Schwann applied the term pepsin to an albumen-dissolving product obtained from the gastric juice, and subsequent investigations seem to show that the gastric juice contains more than one distinct ferment, or that this ferment may be modified by the process of extraction, so as to assume new or lose some of its original properties.

This is also true of the ferment or ferments of the pancreas. Bourchardat, in 1845, and Claude Bernard, a few years later, discovered or described some of the properties of the pancreatic secretion. In 1862, Danilewsky asserted the existence of three special ferments in the pancreatic juice, and since that time von Wittich, Kuhne and others have extracted and examined the ferments and applied them to dietetic purposes.

But there is a field of research outside the range of the peptonized foods, which merits the attention of the pharmacist and the physiologist. It is this, What are the possible modifications which drugs may undergo in contact with the digestive secretions, and will an examination of such results be of service in the preparation, combination or preservation of crude material so as to secure the best physiological results?

Solutions of the gastric ferment were obtained from the stomach of the pig, by means of dilute glycerine and also with acidulated water and alcohol. Pancreatic solutions were also obtained from the pancreas of the pig, by means of glycerine and a feebly alkaline, as well as an acidulated dilute alcohol. The first series of experiments were made with these solutions and crude drugs; the second with definite principles.

An infusion of rhubarb, ½ ounce to the pint of water, was prepared and as soon as the infusion had cooled to 50° C., some of the acid solution of pepsin was added and the temperature maintained by means of the incubator for two hours; 47 per cent. of the rhubarb was thus rendered soluble. The mixture was then neutralized by sodium carbonate, the alkaline solution of pancreatin added, and the temperature sustained for two hours longer. The insoluble portion was then found to consist of cellulose and earthy salts, retaining a small quantity of colouring matter. The 240 grains of rhubarb left an insoluble residue of 96 grains.

Infusion of calumba prepared with boiling water and passed through the same processes of digestion, gave somewhat similar results. The spongy cellulose was associated with a trace of berberia; 500 grains of calumba left an insoluble residue of 172 grains.

Cinchona and opium, upon the other hand, behaved somewhat differently; the gummy and extractive matters were dissolved and retained in solution, but a considerable portion of the alkaloids was left in the insoluble marc. Cinchona was about half soluble (48 per cent.) and opium about two-thirds, or 68 per cent. Quinine and morphia could be detected in the respective solutions and were also readily found and extracted from the insoluble residues. The cinchona tannin was destroyed in the digestive process and failed to precipitate gelatine, but this peculiarity will be noticed when we come to the action upon definite substances.

The possibility of the digestive ferments attacking gum acacia was deemed of some importance, in consequence of gum being used in a test demonstrating the acidification of fat by the emulsive ferment of the pancreas. Strong solutions of white gum arabic were therefore prepared and submitted in the incubator to the action of the gastric and pancreatic solutions. The feebly acid solution containing the gastric ferment remained clear even after several hours' digestion. A slight change, however, had occurred in the mixture, as a portion removed, neutralized with soda and boiled with Fehling's sugar test, showed a slight reduction to cuprous oxide, whereas a portion of the original solution undigested, but kept at the same temperature and under similar conditions, was not affected by the glucose test.

The mucilage digested with the alkaline pancreatin solution soon became cloudy, and ultimately a white precipitate was formed. The mixture seemed less viscid than that containing the gastric ferment, and a portion of the solution gave the violet reaction of peptone. The precipitate was found to consist of calcium carbonate, with a considerable quantity of the diastastic ferment carried down by the precipitated chalk. This precipitate, carefully washed, was found to possess strong amylolytic but no proteolytic or emulsifactive power.

I should, therefore, think that the arabin of gum acacia remained unaffected by the processes, and that the peptonizing change was wrought upon some slight impurity of gum, possibly containing nitrogen; this point, however, is reserved for further investigation.

Closely allied in physical character to gum, and holding an intermediate place between foods and medicines, are the mucilages obtained from Irish and Iceland moss. On Irish moss the alkaline extract of the pancreas seemed to exert very little action. The proteolytic ferment of the pancreas extracted with acids soon destroyed the viscidity of the mucilage, and divided the jelly into soluble and insoluble portions. These results were also obtained by the digestion of chondrus jelly with solution of pepsin; the products resembled and perhaps were identical with parapectin and pectic acid.

Cetraria, or Iceland moss, behaved somewhat differently. A jelly of this substance retained its colour, but became flocculent when acted upon by the gastric ferment. On the other hand, the pancreatized jelly retained more of its viscidity, became deeper coloured, and gave a deposit of yellowish-white flakes. These flakes under the microscope were found to consist of non-crystalline masses (pectic acid?).

The digestives were found to produce or accelerate the pectic fermentation by some experiments upon the pectin of the turnip.

I must now leave the consideration of this part of my subject and call your attention to the action of the ferments upon more definite substances. The acidulated extract of the gastric juice decomposed a watery solution of salicin very slowly and imperfectly; saliretin was formed, but it was associated with undecomposed salicin. On the other hand, the pancreatic ferment split up the salicin into saligenin and glucose, and the saligenin separated by solution in ether and subsequent crystallization was obtained in the form of white laminæ or scales.

A well-washed sample of jalapin remained intact after digestion with the pepsin solution, but pancreatic digestion withdrew a copper-reducing substance from the jalapin.

Santonin was unaffected by gastric and pancreatic solutions.

A solution of tannin treated with the acid pepsin solution became turbid, but the turbidity disappeared when a little more hydrochloric acid was added to the mixture. The results of several hours' digestion were, however, negative, but the pancreatic ferment, upon the other hand, rendered the tannic acid incapable of precipitating gelatine or isinglass, because of the transformation into gallic acid.

These are a few of the results obtained by digesting drugs with extracts from the digestive organs; they throw open a wide field for the pharmacist, and one deeply interesting to the physiologist.

The digestive process seems to consist of the hydration or splitting up of insolubles, and, as far as my observation has gone, the microzymous or bacteroidal fermentation need not occur until the primary digestion is in an advanced stage. For instance, in the digestion of the proteids, albumen and fibrin, I have noticed occasionally a point when the solution or hydration of these substances by the acidulated pancreatic secretion passes into the formation of leucin and tyrosin. I refer to the acidulated pancreatic solution, as the researches of Dr. Roberts and others upon the amylolytic power of a neutral or feebly alkaline pancreatic extract have seemed to throw into the shade the proteolytic power of acidified pancreatic juice, which, although incapable of transforming starch paste into sugar and dextrine, yet still possesses the power of dissolving fibrine or albumen, and ultimately splitting them up into leucin, tyrosin, and an organic acid. This is not the result of the putrid fermentation of albuminous bodies, as in this latter case the formation of ammonia renders the reaction alkaline instead of acidulous.

The emulsive ferment as well as the proteolytic in action produces acidity, although in the emulsification of fat the acidity is generally very slight and insufficient by itself to account for the minute subdivision of large proportions of fat. In the digestion of proteids the acidulous body is glutamic acid, and I think it may also occur in the emulsification of fats, as I have often sought for fatty acid and glycerine as separate bodies in emulsified fats; but I have always failed in my attempts to obtain any proportionate quantity which would justify me in ascribing emulsification of fat to their formation and presence.

The PRESIDENT proposed a vote of thanks to Mr. Brownen, which was carried unanimously. He said the results which Mr. Brownen had described were extremely important, and they must all hope that he would continue to work on this very large field of investigation. Ferments or septics, on the one hand, and antiferments or antiseptics, on the other, were now largely administered to human beings, while very little indeed was known of their action or the extent to which they retarded action when thus introduced into the system.

Mr. BENGER said the members of the Conference were much indebted to Mr. Brownen for having initiated this very original line of investigation on the action of the digestive ferments. His results were sufficiently interesting to warrant them in hoping that they would get something still more definite in future. The paper would, however, have possessed additional value had it given a few comparative results. Taking, for instance an infusion of rhubarb. Mr. Brownen said that, after digesting rhubarb with an acidulated pepsine solution and then with an alkalized pancreatic solution, there was nothing left but 96 grains of cellulose and earthy salts out of 240. It would be interesting to know if, had the rhubarb been digested with water only, or with acidulated water and then with an alkaline solution in succession, any different result would have been obtained. If he had tried that experiment perhaps he would state the result. The same with reference to the calumba: of course there would in this case be an action of the pancreatic ferments on the starchy matter, as Mr. Brownen prepared the infusion with hot water instead of cold as the Pharmacopœia directed. Another statement he should like to make a remark on, was:—That an acidulated pancreatic solution had no amylolytic action, but only proteolytic. That was quite contrary to his experience. He had always found a slightly acid solution both amylolytic and proteolytic, quite as much so as a neutral or alkaline solution. In Dr. Roberts's process for the peptonization of milk, carbonate of soda was ordered to be added, not with a view of increasing the action of the pancreatic ferments, but to prevent the precipitation of metacaseine, should the patient boil up the milk before the completion of the digestive process, which he was generally directed to do. If it were rendered alkaline no precipitation took place.

Mr. KINGZETT said the same thing had occurred to him, in listening to this interesting paper, as had been mentioned by Mr. Benger. For instance, taking salicin: if it were boiled with a dilute acidulated solution the compounds mentioned by Mr. Brownen would be obtained, viz., glucose and saligenin. It would be important to know how far the action observed was due to the ferments themselves, as distinguished from the alkali or acid severally employed. So far as regarded the splitting up of albuminous substances, the results mentioned were in agreement with those formerly worked out by Schützenberger, who had proved conclusively that albumen, when subjected to the action of hydration by ferments, or hydrolysis by baryta water or dilute sulphuric acid and so on, was split up into the two lesser molecules, hemiprotein and hemialbumen, one soluble and the other insoluble, though the insoluble part becomes soluble on further hydrolysis. On continuing the process these subsidiary molecules are further split up, yielding more ultimate products, including some of those mentioned by Mr. Brownen, viz., glutamic acid, aspartic acid, tyrosin and leucin, etc., which substances were always formed as ultimate products of the hydrolysis of albuminoids induced by chemical agencies or bacteroidal life.

Mr. PLOWMAN said everyone must feel that in experiments of this kind the exact condition of things could never be obtained artificially in the laboratory, such as occurred in the human body, in which a mysterious factor, "vital action" or "vital force," exerted its influence. He maintained, however, that as far as possible they ought to imitate the conditions which existed in the human body. As an instance of the importance of this, he remembered a most interesting paper being read by Professor Redwood at an evening meeting of the Society, in which he showed that when so-called "dialysed iron" was poured into ordinary water the iron was entirely precipitated, and that when that precipitate was dissolved in hydrochloric acid a solution was obtained which would not dialyse. If the idea were entertained that absorption of medicines was simply, or even mainly, owing to diffusion, this experiment seemed to show that dialysed iron would be worthless as a medicine; but it had been proved by medical men by actual observation that anæmic patients taking dialysed iron had had their condition considerably improved. As to the conditions which Mr. Brownen observed, the first thing that attracted his attention was that he performed these experiments at a temperature of 50° C., which of course was never reached in the human frame. At such a temperature as that any dilute acid solution would have a tendency to break up such bodies as salicin, independently of fermentative action. Another thing to be remembered in experimenting with pancreatic juice was this: the biliary secretion and the pancreatic secretion were discharged into the intestinal canal at a common orifice, and it was by no means determined what were the exact functions which the biliary secretion and the pancreatic secretion respectively fulfilled in the process of digestion. He should be glad to see some experiments performed in which the biliary was mixed with the pancreatic secretion, so as to ascertain the actual effect of the two secretions together. Mr. Brownen prepared an alkaline solution of the pancreatic secretion and also a dilute alcoholic solution, but he did not say which he used in these experiments; he should be glad to know which was used, or if both, if similar results were obtained. With regard to the violet reaction of peptone mentioned by Mr. Brownen, Mr. Plowman said there was a special product obtained by the action of the pancreatic secretion on proteids, which gave a violet reaction with chlorine; and there was the common reaction of peptones, which was obtained by adding cupric sulphate and an excess of caustic potash. When a very small quantity of sulphate of copper was added, a red coloration was produced, but with an excess of the sulphate a violet colour was produced. He should be glad to know which reaction Mr. Brownen referred to. Because he got this violet reaction, Mr. Brownen supposed that there was some nitrogenous impurity in the gum which produced it, but as a matter of fact pancreatic juice contained albumen in some considerable quantity and an intrinsic digestion of itself went on immediately after it was secreted, by which peptones were produced, so that the pancreatic juice of any age would itself give the peptone reaction. With regard to the action of the acidified solution, he would remark that as a matter of fact large quantities of undigested starch pass from the stomach into the duodenum, not being converted into glucose or dextrine by the saliva. There was no doubt further, that the contents of the stomach were not immediately neutralized by the biliary and pancreatic secretion, and, therefore, it would be useful and economical for the ferments in the pancreas to be capable of acting on starch, while the contents of the intestinal canal were still slightly acid. Further, it was proved that the actual body existing in the perfectly fresh and still warm pancreas had very little proteolytic action, and to that hypothetical body existing in the pancreas the term zymogen had been given. On keeping the pancreas for some time that zymogen was split up into the proteolytic ferments and that change was also brought about very readily by dilute acids.

The President said there was one point mentioned by Mr. Plowman which it would be out of order for the Conference to discuss, and that was the question of vital force. On any other portion of this interesting subject he should be glad to hear further discussion.

Mr. Groves suggested that when Mr. Brownen continued his experiments, he should try the action of these ferments on each other. It was often the practice to give the pancreatic ferment and the peptic at the same time, but he thought it not unlikely that they might digest and so destroy each other. As Mr. Plowman had remarked, in the economy of nature they were added successively, first ths saliva, then the gastric juice, then the pancreatine and then the bile.

Mr. Atkins said that, bearing in mind the President's caution, he had only one remark to make and that had no reference to the moral question or the one which was open to discussion. It was simply this, that in all these experiments it must not be forgotten that there was a vital force, though they could not go into the question of its origin or nature.

The President said they must not even have any discussion whether there was or was not such a force.

Mr. Atkins said he remembered that some years ago in America, some very interesting experiments illustrative of the processes and results of digestion were made on an Indian who had had a portion of his chest shot away; those experiments were conducted in the stomach and outside it, by the same agents, and wonderfully different results were obtained. Another familiar illustration of the same thing was, that if you wanted to make sea water, you might ascertain by analysis the ingredients of sea water and add them to fresh water, but you did not get the same result. In nature's laboratory there was something or other which made all the difference between artifical sea water and natural. One very interesting point in connection with this paper was as to the development of bacteroidal life. He understood that if the result of the processes of digestion were acid rather than alkaline, that development did not take place. This was an extraordinary fact, which was one rather for medical men than pharmacists to consider, but it was very interesting, and if it at all lay in the direction of Mr. Brownen's future experiments, he hoped he would pay some attention to it. If in the process of digestion there was an acid result, it was followed by an immediate extinction of that form of life which otherwise, perhaps in a few minutes, would be very largely developed.

Dr. Symes said he had made a note to ask the same question as Mr. Benger had put, because it struck him that the amount of residue was such as might be expected if the infusion had remained without the addition of the ferments. He should like to say, too, that this was rather a difficult investigation, inasmuch as, leaving out the vital force, these things were given, not to people in health, but to those who were sick, and consequently the results were not the same if one were experimenting on a healthy person. It was desirable, also, to follow as closely as possible the mechanical conditions which surrounded the use of these medicines. He remembered the case of the dialysed iron referred to by Mr. Plowman; on that occasion Professor Redwood had mixed the dialysed iron with peptone and had allowed it to digest for two hours in a glass bottle before attempting to dialyse it, and he pointed out then that he was not following the process of nature, under which a person began to digest the dialysed iron immediately it was mixed with the ferment, and the surrounding tissue was not a glass bottle, but the stomach, from which a certain amount of diffusion took place. All these points required consideration in prosecuting this study; he thought, too, that more satisfactory results might be obtained if the investigation were carried on, using diastase, than the animal ferments.

Mr. Kingzett said the discussion ought not to close without reminding Mr. Atkins that the biliary secretion was not acid but alkaline.

Mr. Symons asked if Mr. Brownen had tried the action of these ferments on starchy matters.

Mr. Brownen, in reply to the question put by Mr. Benger, said that at the same time that the experiments were made in the incubator they were also conducted on both acid and alkaline solutions of rhubarb, so as to control the tests. This would also apply to the remarks of Mr. Kingzett, because although he found that at the end of the time there was a small quantity of salicin split up by a temperature not exceeding 50° C., yet the greater portion of the salicin remained unaltered; he therefore presumed that the secretions had to do with the change which had occurred in the solutions he was then testing. A feeble acid solution was unquestionably amylolytic, but the amylolytic ferment acted more powerfully in an alkaline or neutral solution than the feebly acid solution; and if the acidity exceeded 2 per cent. it was almost completely neutralized or destroyed. Whether it could be reproduced again remained to be decided by further experiment. The temperature of 50° C. was adopted because it was the one at which he found the gastric and pancreatic ferments acted most rapidly without decomposition, though it ran very near that point. He therefore adopted that temperature, and never exceeded it, but many of his experiments were made at a much lower temperature, that of the human body, about 98° F. He used the higher temperature in order to obtain the maximum result of salicin, which he found was slowly decomposed even by the gastric ferment as well as by the pancreatic, and he wanted to get, within a reasonable time, the maximum amount of work from those ferments. The solutions used were a mixture of alcohol and water rendered slightly alkaline in one instance for pancreatine, and then rendered distinctly acid in the other case, so as to obtain an acidulated solution; the amount of alcohol and water being the same in each case. The glycerine experiment was made in order to see what the action would be without either alkali or acid. He used also, working in the laboratory of Messrs. Savory and Moore, their acid elixir and the neutral essence, testing them side by side with these other solutions, but he had not mentioned this in the paper, as he wished to avoid all trade reference. The violet reaction he obtained was with the copper solution, and not with chlorine. He tested the solution of gum, because in the lectures which Dr. Gamgee gave at the Royal Institution, he laid great stress on an emulsion of almond oil perfectly sweet, and the action upon it of a feebly alkaline pancreatic extract, which in a very short time became distinctly acid. He wanted to find out whether that acid was derived from the gum or from the oil, and he found that it was not derived from the gum, but from a small portion of the oil going into the acidulous state; but there was this other substance which he supposed was a constituent of gum, not perhaps an impurity, but an invariable constituent of the best white gum, acted upon, although the arabin was not acted upon by these secretions. Although these ferments seemed to act, one in an acidulous condition, and the other best on starch in an alkaline condition, yet they seemed as they passed the duodenum to become rather alkaline than acid. Some extracts of food he had obtained in different degrees of digestion, and also in some experiments in which he had tried to simulate the digestive processes (*minus* the vital force, which was objected to), had led him to the conclusion that the bacteroidal fermentation need not occur in any of the conditions necessary for digestion. In fact, there seemed to be a point in the digestion of the proteids analogous to the transformation of alcohol into acetic acid. These bacteroidal forms set up putrid fermentation which would invariably tend towards alkalinity rather than acidity. On raw starches he found very little action; that was why he boiled the infusion of calumba, contrary to the ordinary Pharmacopœia directions. He supposed the compilers of the Pharmacopœia wished to get rid of the starch, but in his experiment he wished to obtain the maximum action on cooked substances.

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The next paper read was entitled—

Remarks on the Root of Aconitum Napellus and other Species.

BY E. M. HOLMES, F.L.S.

Although aconite has been used in medicine for at least a hundred years and is recognized as one of the most powerful of medicinal agents, its internal use is not quite so general in this country as its properties might lead us to expect. Perhaps this is owing to variation in strength of the official preparations and to the known danger of using too large a dose. How far this variability is due to a non-recognition in the Pharmacopœia of well-known facts, may be open to question, but it appears certain that the requirements of that book might be complied with, and yet that preparations very variable in strength might be the result. That such is the case is proved by the statements made by Mr. Cleaver concerning extract of aconite (*Pharmaceutical Journal*, [3], xii., 722) and by the recent experiments made with the alkaloid, which have shown that one commercial sample may be seventy times stronger than another.

The Pharmacopœia describes aconite root thus:—

The dried root of *Aconitum Napellus*, L. (*Pharmaceutical Journal*, [1], xv., 449). The root may be "imported from Germany or cultivated in Britain and collected in the winter or early spring, before the leaves have appeared."

In the first place the figure of the root referred to is totally inadequate to distinguish the root of *A. Napellus* from that of other less poisonous species, the variation in form being very great, according to the age and position of the root. In the second place the root imported from Germany is collected by peasants who, as a rule, are not possessed of botanical knowledge, and is sold without any guarantee that it is collected in winter or early spring; indeed it is difficult to understand how the root of *A. Napellus* could be found before, or distinguished after, the leaves have appeared. Thirdly, the root is not cultivated as a crop in this country, because it could not compete in price with the German drug.

Under these circumstances it is easy to understand why the alkaloid of commerce varies in strength and why the preparations are also liable to a similar fault. It is also obvious that even the most careful chemical investigations of the commercial root must be founded on an unreliable basis, and that the results obtained by chemical analysis must in consequence be to a certain extent devoid of scientific value.

It becomes extremely important, therefore, that so powerful an agent should receive at the hand of the pharmacist far more attention than has hitherto been accorded to it, and that every means should be used to provide the medical profession with preparations of aconite as nearly as possible of uniform strength and perfectly reliable. This is the more desirable since aconite is now being used in the treatment of inflammation of the lungs, in puerperal and other fevers, and in acute cases in which prompt and reliable action is of the utmost consequence. The chief difficulty in making such a preparation is in obtaining the typical variety of the right species. De Candolle describes twenty-nine varieties of the official species, *Aconitum Napellus*, but whether all these forms, which possess the same specific botanical characters in common, have the same chemical constituents, and whether, like isomorphic crystals and isomeric bodies in general, they have a different physiological action, is very difficult to ascertain, seeing that it is by no means easy to identify them for the following reasons:—First, because a complete series of the members of the genus is hardly to be found for reference in any botanical garden or museum; secondly, because the varieties sold by florists are not always carefully named; and thirdly, because they cannot be procured in sufficient quantity for purposes of chemical investigation.

Moreover, botanists are not agreed as to the forms which should be placed under each species. Steudel enumerates about eighty which have been grouped under *A. Napellus* by different botanists. The aconites are so closely allied, and the varieties run so much into one another, like the willows, brambles, roses, mints, and cinchonas, that even De Candolle has placed the same plant under two varieties. Professor Maximowicz, who has paid considerable attention to the species occurring in Japan, remarks in a recent letter,—"The genus *Aconitum* is, botanically speaking, a most difficult one, not one characteristic holding its own from species to species. It is a matter of personal opinion, whether you accept a dozen species in all, while another thinks to separate thrice the number. I have observed them in Mandshuria and Japan very assiduously and have despaired of finding well defined species, for there will arise intermediate forms between such as in most cases are thoroughly different. One would think these were numerous hybrids, but they are as freely seed-bearing as the various hybrid aquilegias used to be."

Although it is almost impossible to define accurately in botanical terms the different aconites, it seemed to me worthy of inquiry whether those available for pharmaceutical purposes might not be characterized sufficiently for all practical purposes. It is well known that the Japanese peppermint plant, although botanically it offers no character to separate it from *Mentha sativa*, is readily distinguishable by taste, and it is, therefore, natural to suppose that the different forms of aconite might be distinguished to a certain extent in the same way. Experimenting in this direction I found that the roots of several species of aconite did not cause a tingling sensation when chewed, and that this was the case not merely with the Asiatic species, *Aconitum uncinatum*, *heterophyllum* and *palmatum*, but that also several plants which present the specific characters of *A. Napellus*, although easily distinguishable from it by habit, present the same peculiarity. Of these I may mention that forms which were supplied to me under the names of *A. Napellus*, var. *pyramidale* and *paniculatum*, etc., did not cause tingling when chewed, while others, such as *Stoerckeanum* and *albiflorum*, produced a slight, and others again, such as *A. autumnale*, a very powerful tingling sensation. Here a difficulty is met with in the fact that the plants are not always correctly named, either in botanical gardens or in the collections of florists, from labels becoming displaced. But all of the aconites in which this variation occurs, so far as I have observed, flower later than the typical *A. Napellus*, so that if the Pharmacopœia added to its description "the root obtained from plants flowering in May and June," and erased the words "imported from Germany," one cause of the unequal quality of the root would be removed. This is all the more important, since I have determined by direct inquiry that some florists would supply to a grower the plant flowering in May and June, and others would supply any variety of *A. Napellus* that happened to be in stock, no difference in the properties of the varieties being known to them. The only way to secure aconite of good and uniform quality appears to be to limit the official drug to home-grown aconite flowering in May and June and gathered when the plant is in flower. In this way there can be no mistake about the species, and the leaves collected at the same time could be used for making extract. Even if the root were thus not gathered in its most active condition, it would at all events have the advantage of uniformity of strength, which is of much more importance.

The aconite has the property of developing roots instead of leafbuds in the axils of the lower leaves, provided that these are covered with soil. Whether this property has been conferred on the plant with the view of enabling it to approach nearer to the surface when, as must often happen in its native mountains, the plant becomes almost buried by the fall of *débris*, or the earth washed away from the root by floods, or to propagate the species when not under favourable conditions for producing seed, it could at all events be turned to account in cultivation, since by earthing up the stems a larger yield of roots would probably be ensured.

In testing aconite root by taste it must be remembered that the tingling sensation is often not developed for ten minutes and lasts for two or three hours, so that half a day must be allowed to elapse before tasting a second sample, to prevent the chance of confounding the effect of one root with that of the next.

In conclusion, aconite is very easy of cultivation, and considering the small quantity used there is no reason why any chemist who has a small piece of garden should not grow his own aconite root.

The President, in proposing a vote of thanks to Mr. Holmes, which was carried unanimously, said his suggestions with regard to drugs were always acceptable, and these now given would doubtless have full consideration.

The next paper read was on—

Ammoniated Extract of Ergot and a Process for its Preparation.

BY A. W. GERRARD, F.C.S.

For ten years or more I have known a preparation bearing the above name; how long before this it had been in use or to whom it owes its origin, I can give no information.

My earliest practical acquaintance with this extract dates some five years back, about which time I was asked by one of the then obstetric assistants to University College Hospital to prepare some for him, as he wished to try it, having seen it used successfully in a general practice. In the absence of any published or private formula to guide me it was left to my discretion to follow such a process as I thought best suited for the object in view.

I premised at starting my experiments, that the preparation to have any good right to the name it bears should have ammonia employed in some form or other as the solvent of the extractive matters of the ergot, and not that the ammonia be merely added after an aqueous extract had been made. For this purpose the solvents that appeared most available and worthy of trial were aromatic spirit of ammonia, and solution of ammonia.

From a first consideration of the requirements of the case it seemed easy to frame a process that ought to give a satisfactory result, but practice proved the contrary. No difficulty was experienced in producing an active therapeutic agent, but a good deal of trouble had to be taken before an elegant or presentable pharmaceutical preparation resulted.

Experiments with Aromatic Spirit of Ammonia as the Solvent.

First experiment.—Ten ounces of well-crushed ergot was moistened quickly with the spirit and packed in an air-tight percolator, more of the spirit was added till 10 ounces was reached. Percolation proceeded very slowly, in twenty-four hours less than 1 ounce of percolate had passed; displacement was now resorted to by means of water, but the process went on so slowly that after four days only 5 ounces of percolate was obtained, meantime the displacing column of water had become strongly alkaline from the diffusion into it of the ammonia. The experiment was stopped.

Second experiment.—The same quantity of ergot was employed, but it was packed looser in the percolator, and 20 ounces of the aromatic spirit poured over it in several portions; percolation was still slow, but more rapid than in the first experiment; 9 ounces of percolate was obtained, very high coloured and rich in extractive; on attempting to displace the remainder of the spirit the same difficulty arose as in experiment No. 1.

If the second experiment had been successful I intended to have followed a process of repercolation, but the difficulty of displacement, and consequent waste of material, made it evident that the process would not answer. Therefore no further experiments were undertaken with this solvent.

Experiments with Ammonia Water as the Solvent.

First experiment.—Ten ounces of crushed ergot was treated with 50 ounces of water to which 1 per cent. of strong solution of ammonia had been added; on contact of the ergot and ammonia a marked deepening of colour to a purple was observable, this being the usual reaction of alkalies upon the colouring matter of ergot; at the same time an almost immediate softening of the drug is apparent, it being evident that water in the presence of the alkali rapidly penetrates its tissues. This action as compared with that of water alone is very marked, and although it produces a rapid removal of the extractive, it exercises an influence detrimental to percolation; the ergot swelling and softening so much as to assume a half colloid state, unsuited for the filtration of the solvent. Under these conditions the exhaustion of the ergot was so slow as to make it evident that the ammonia was present in excess and a weaker solution should be tried.

Second experiment.—The same process was repeated as in the last experiment, using a $\frac{1}{2}$ per cent. solution of strong liquor ammoniæ. Here the action was similar to that described in the last experiment, but much less in degree, and not enough to prevent percolation proceeding in a satisfactory manner. Thus the exhaustion of the ergot by means of an ammoniacal solvent was accomplished, and after a few further experiments the following formula was formed:—

Formula for Ammoniacal Extract of Ergot.

Take 10 parts of crushed ergot, macerate it for eight or ten hours with frequent stirring in 50 parts of cold water, containing ½ per cent. of strong solution of ammonia; then throw it upon a flannel strainer, and allow it to filter. Wash the ergot from time to time with more ammoniacal water, till sufficiently exhausted. The filtrate, which is somewhat turbid, is evaporated to 5 parts, any scum or fat rising to the surface being carefully removed. The extract when cool is treated with an equal volume of aromatic spirit of ammonia, and the product set aside until subsidence is complete; the clear portion is then decanted and the residue filtered through felt or flannel, washing the deposit with a little more spirit, so as to bring the volume of the extract to 10, 1 part fluid thus containing the soluble matter of 1 part solid of ergot.

In appearance this extract is much darker in colour than the ordinary form, the odour is mainly ammoniacal, and the average specific gravity 1000.

A sample I have kept for nearly a year does not appear to have undergone any change. The dose is the same as the ordinary liquid extract.

In studying the above process it may strike some observers as somewhat curious to use ammonia as a solvent, and then to dissipate it by evaporation, but it must be remembered that the ammonia is not eliminated until its work has been accomplished, and what therapeutic action it might have exerted is compensated for by the addition of the aromatic spirit.

In the process of manufacture, whilst evaporation is proceeding, it will be noticed that not only albumen and colouring matter separate but a considerable quantity of oil. The presence of this oil is accounted for by the formation of a soap between the ammonia and ergot fat during maceration, the soap remaining in solution whilst cold, but being decomposed by heat.

This extract, as regards its therapeutic value, has had a thorough trial in the obstetric department of University College Hospital, and has given general satisfaction, Dr. John Williams, one of the obstetric physicians, having requested it to be substituted for the ordinary extract in such mixtures as contain ergot.

To enter into a discussion as to why ammonia improves or increases the action of this drug is scarcely within the domain of pharmacy, and published therapeutic memoranda on this point are wanting. From inquiries I have made, it appears, as the result of numerous observations, that the ammonia developes a rapid action of the drug by acting as a nervine stimulant, which action is very useful during that period when the patient has to undergo that painful and trying ordeal for which ergot is so extensively employed. To this must be added the great solvent power of the ammonia, which ensures a most complete exhaustion of the active principles of the drug.

The President proposed a vote of thanks to Mr. Gerrard, which was carried. He said he was glad to find that Mr. Gerrard had had the courage to publish his failures as well as his successes, as such a course rendered a paper far more useful to future investigators. Their knowledge of the shoals of the sea of pharmacy, as well as of its depths, could not be too thorough.

Mr. Stuart asked whether it was not possible, with so small an amount of ammonia, that the whole of it might form a soap with the oil, and hence be neutralized, and whether an equally good result would not be obtained from a simple aqueous extract. He understood this was a superior preparation to that of the British Pharmacopœia, and he believed that in many quarters amongst medical men the British Pharmacopœia formula had for obstetric purposes fallen into discredit. If this ammonia process were a good one it would be a distinct gain to pharmacy and to the medical profession. In the United States Pharmacopœia since 1860 an acid extract of ergot had been used. Dr. Squibb was one of the originators of the process which included the maceration of the ergot with dilute alcohol in which there was a little acetic acid. He noticed in the report which the President read as to the proof sheets of the new Pharmacopœia that that acid was now exchanged for hydrochloric acid, but the Committee still adhered to the acid preparation, and in his experience, having made from the original formula large quantities of the preparation of ergot, that was immensely superior to the British Pharmacopœia process. It was a curious thing that apparently both an alkaline and an acid preparation should produce good results, but the chemistry of ergot was, notwithstanding all the investigation which had taken place, still in an undecided state.

The President remarked that in the formula of the United States Pharmacopœia now being issued, not only was hydrochloric acid substituted for acetic acid, but the glycerine formerly used was omitted.

Mr. Stuart thought from his experience that that would be an improvement.

Dr. Symes said all these investigations tended to show that water was really capable of extracting the active principle of ergot. He thought it had scarcely ever been questioned that the formula of the British Pharmacopœia really worked admirably. He did not understand Mr. Gerrard to claim that this was a superior preparation, but what he found was that certain ammoniated preparations were put forward by certain houses as being the original, the only genuine, and all that kind of thing; that they varied considerably in appearance from very pale sherry to a dark blackish colour; that he with many others had been rather surprised that all should be the original and the best, and had, therefore, investigated the subject. They were much indebted to him for so doing. He certainly thought in using the small quantity of ammonia that he did it was quite possible that a soap was formd, but that would only have the effect of removing a certain amount of oil from the ergot, and enable the water to act more freely than it otherwise would do; he would probably have alkaline soap acting on the ergot.

Mr. Martindale said he had been asked to make an ammoniated preparation of ergot for a medical practitioner, who told him that he had some which was much more active than he had ever been supplied with according to the British Pharmacopœia. That was eight or nine years ago, and since that he had continued to make a very satisfactory preparation. He could quite corroborate what Mr. Gerrard said that ammonia either in an aqueous or somewhat mixed aqueous and alcoholic solution had a powerful action in abstracting the active properties of ergot, making a strong dark brown solution immediately, but he thought Mr. Gerrard's process was a little too complicated. He did not adopt anything like so complicated a process; he used about equal parts of spirit and water mixed with one-eighth of solution of ammonia, which he percolated through the ergot in fine powder. The first product was set aside, the latter product evaporated to a certain small bulk, and then mixed with the other. He thought it was better to use an ammoniacal preparation of this kind rather than the one made with sal volatile as given in the new London Hospital Pharmacopœia. There the ergot was treated first with sal volatile, and after percolation to a certain extent the first product was set aside and the marc treated with so much water heated up to 160° F., so that it proceeded somewhat on the lines of the British Pharmacopœia process; this second product on evaporation was added to the percolated portion. There was no question that ammonia was a very powerful solvent, much greater than simple water, of the active properties of ergot. He had made a preparation according to the American Pharmacopœia, and the acetic acid solution there had undoubtedly a similar action to the ammonia in the process now described. He certainly did not think the British Pharmacopœia process was a good one; it never yielded really good results in his hands.

Mr. PARKER thought that in the present state of knowledge of the chemistry of ergot they were working somewhat in the dark in devising formulæ for its preparations. It was not known upon what exact constituent the activity of ergot depended, and therefore, they could not work out a process based on their knowledge of its chemistry. That being the case, before drawing any conclusions as to whether simply an aqueous, an acid, or an alkaline extract was best, they should start with a certainty as to the quality of the drug operated upon. Many drugs, ergot and cantharides especially, varied very much in quality according to the manner in which they were collected and stored. A good sample of ergot after being kept some time, unless very carefully kept, might be entirely deteriorated; therefore, the first thing to do would be to prove the activity of a sample of ergot; then from the same sample prepare an aqueous, an acid and an alkaline extract, and have them submitted to a comparative therapeutical examination.

Mr. GREENISH said he felt very much indebted to Mr. Gerrard for bringing this subject before the Conference, and if the amended preparation of ergot was not medicinally more active, which he was disposed to question, at least, the paper possessed considerable interest from the fact that this had hitherto been regarded as a secret preparation. He was not at all prepared to accept the statement that this preparation was better than that of the British Pharmacopœia. He recollected that Blumberg, who had paid great attention to ergot, had stated distinctly that water was quite sufficient to extract the active principles. Now, if a man like that, who had paid perhaps greater attention than anyone else to ergot and to the isolation of its active principles, had arrived at that conclusion, he thought they were justified in adopting it. Professor Dragendorff, who had also paid great attention to the subject, found that water was quite sufficient to extract the active principles. He should like to have heard from Mr. Gerrard the results of some more comparative trials by medical men of the two preparations, and he suggested that in experimenting upon ergot he should extract the fat from it previous to applying any menstruum.

Mr. HAMPSON said they were all much obliged to Mr. Gerrard for the formula he had given, because they wanted one to satisfy the demands of their medical friends, but he very much doubted if it were really any improvement on the former preparations. He could speak from direct knowledge of the efficacy of the British Pharmacopœia preparation in an institution with which he was acquainted, where that preparation, well prepared, was used and was always satisfactory.

Mr. MARTINDALE said no doubt water in itself was a good solvent, but the disadvantage was so much of it was required; the amended preparation could be prepared with very much less bulk and without having to evaporate it down for such a length of time.

Mr. PLOWMAN said there was one more point in connection with ergot which must be borne in mind; in the British Pharmacopœia process the oil was extracted with ether and rejected. Now, it was not proved by any means that that oil was inert, and so late as 1881 a paper was published in which amongst other things it was said to "constringe the blood vessels," and it was possible that a hydrochloric solution might extract the principle which was by the British Pharmacopœia process taken out by the ether and rejected. In Mr. Gerrard's process, in which a scum was formed which was skimmed off, some of the active principles might be withdrawn. He should like to know whether that had been rejected definitely without any experiment being tried to ascertain if it possessed any activity.

Mr. SCHACHT thought this question had been answered very elaborately within the last few years by a French authority. Two memoirs of considerable detail had been published by two different medical authorities about the various properties and powers of the different principles of ergot. In the one he remembered perfectly well that very considerable remedial power was attributed to this oily constituent of ergot, whilst a later writer on the subject contradicted almost word for word the opinions expressed by the previous chemist on that point. He thought Mr. Parker was right in his caution about elaborating processes too carefully until they had more knowledge about the chemistry of ergot and the therapeutical value of the particular ingredients capable of being separated from it. He might also venture to remind the meeting how carefully the late Mr. Stoddart had at one time worked, not only on this subject, but on the ergots of grasses generally, and then he found that even such principles as he was able to detect generally in them varied according to the time at which they were gathered. Many other points of interest had still to be cleared up before they could attach too much value to any particular suggestion with regard to these preparations.

Professor QUINLAN said it was a constant habit with medical men, particularly in obstetric practice, when using ergot to add to it a small quantity of ammonia. It was a well-known fact, which anyone could prove for himself, that ergot had the power of diminishing the tension in the capillary blood vessels, whilst ammonia had the contrary effect; therefore, a little quantity of ammonia was found to have a useful corrective effect in the exhibition of large doses of ergot.

Mr. GERRARD said it would be an answer to many inquirers if he stated at once that he did not claim for this preparation any activity beyond that of the liquid extract of the British Pharmacopœia. But the addition of ammonia appeared in some way to assist the activity or improve the action of the ergot. Those who used it gave it the preference, and every observation went to confirm this fact. Professor Quinlan had also corroborated that the addition of ammonia to a preparation of ergot, whether prepared first by simple aqueous extraction, or by ammoniacal extraction, did improve its action, probably by the fact that it was simply an adjunct and a stimulant. Mr. Stuart had referred to the use of acidulated water as a solvent for ergot preparations. He had no doubt that acidulated water was as good a solvent as water itself, or ammoniacal water, but it was a much slower solvent; by adding acid to water containing any albuminous principles, the passage of the water through the tissue was retarded. But the addition of alkali, on the contrary, caused a rapid penetration of those tissues, and that was just what took place here. It might be, too, that ammonia acted in some way to eliminate them and make them more soluble. It might be that it formed a combination with what had been called the active principle of ergot, sclerotic acid, although he did not himself look upon that as a definite substance. Mr. Martindale's process was similar to the one he had tried of using aromatic spirits of ammonia as a solvent, but practically he found that exceedingly difficult to work; he could not obtain a good process, there was considerable waste. The process of displacement was not practicable; there would take place a diffusion of the ammonia into the water used for displacement, and thus there was a loss, not only of ammonia but of the solvent and some of the ergot principles. There was this to be said, that if it could be carried out successfully in such a preparation there would be present not only the soluble extractive matter of the ergot, but also the ergot fats in the form of ammoniacal soap, and if those ergot fats did play any part in the action of the drug it would be an advantage, though according to the experiments mentioned by Mr. Schacht that appeared to be doubtful.

The next paper read was on—

TUMEFACTION AS AN AID IN THE IDENTIFICATION OF THE VARIETIES OF MARANTA AND OTHER STARCHES.

BY W. H. SYMONS, F.R.M.S., F.C.S.

It has been shown by different investigators that Bermuda, Natal and St. Vincent arrowroots require for their tumefaction water of varying temperature.

Since these starches are probably identical in chemical composition, it follows that this behaviour must be due to some physical cause, most likely the greater or lesser density of the integuments. Seeing this, I was led to infer that any reagent which affects starch in the same way as hot water ought also to yield comparatively the same results.

Several reagents were accordingly tried. The caustic alkalies being found the most powerful and uniform in their action were chosen for further experiments. Solutions varying from 0·5 to 1·5 per cent. of chemically pure caustic soda were prepared, and 1 c.c. of each strength solution placed in a small vessel; to every vessel was added ·1 gram of the starch to be examined. The mixtures were well stirred at intervals for ten minutes, after which they were examined under the microscope.

The following precautions were observed. The starches compared were examined side by side. The alkaline solutions were of known strength, freshly prepared, exposed as little as possible to the air, and on no account allowed to evaporate when mixed with the starch. A constant proportion of starch and solution was used, it having been ascertained that if a small quantity of the solution burst any of the granules a larger quantity would burst all.

From these numerous precautions it may be thought that this process is much more tedious than merely placing starch in water of a known temperature; but in practice it is not so, quite as much care being necessary in the latter case as in the former, and a larger quantity of starch is required.

The results are tabulated to show the strength of the solutions, which respectively tumefied, 1st, a few granules; 2nd, the majority of the granules; and 3rd, all the granules. The numerals in the left-hand columns show the order which the starches would take, if arranged according to size. A table showing tumefaction by heat is also given.

Tumefaction by Caustic Soda.

Order of size.	Starch.	A few swollen.	Majority swollen.	All swollen.
2	Potato	·6	·7	·8
8	Oat	·6	·8	1·0
4	Natal	·7	·8	1·0
1	Tous-les-mois	·7	·9	1·0
5	Wheat	·7	·9	1·0
4	Bermuda	·8	9·	1·1
3	Sago	·8	·9	1·1
6	Maize	·8	1·0	1·1
7	Cassava	·8	1·0	1·1
4	St. Vincent	·9	1·0	1·2
9	Rice	1·0	1·1	1·3
		Per cent. solution.	Per cent. solution.	Percent. solution.

Tumefaction by Heat.

Order of size.	Starch.	A few swollen.	Majority swollen.	All swollen.
2	Potato	55° C.	60° C.	65° C.
7	Cassava	58° C.	63° C.	68° C.
4	Natal	58° C.	65° C.	70° C.
5	Wheat	60° C.	65° C.	70° C.
1	Tous-les-mois	65° C.	68° C.	72° C.
4	Bermuda	62° C.	69° C.	73° C.
3	Sago	64° C.	68° C.	74° C.
6	Maize	65° C.	70° C.	77° C.
8	Oat	65° C.	70° C.	77° C.
4	St. Vincent	66° C.	73° C.	77° C.
9	Rice	70° C.	75° C.	80° C.

With the exception of the oat and cassava starches, the starches in both lists will be seen to be arranged in nearly the same order. The oat starch under the microscope appears clean, but with the caustic soda it forms a yellow paste, indicative of gluten, which does not interfere with the action of the alkali, but does with that of hot water.

In a paper published in the first number of the present volume of the *Pharmaceutical Journal*, I pointed out the striking relation which exists between the temperatures under which the starch grew and its tumefying point. "The higher that temperature, the higher the point of tumefaction," but I said "cassava and oat starch are exceptions." However, using the alkaline method of tumefaction these starches are also seen to bear this relation. The reason why oat starch does this has been given above, but why cassava starch should behave differently to hot water and the alkali I do not know; it was tried repeatedly with both reagents and always with the same result.

Instances are on record of analysts having certified pure maranta and other starches as adulterated, where, subsequently, more competent microscopists have proved the starches assailed to be genuine, although not until the accused retailer had suffered considerable annoyance and been put to great expense to defend his case. This, I think, proves that, in some instances, it needs more time to practise the microscopical identification of the starches than the analyst is able to devote to that branch of his studies. Therefore any chemical test which comes to the aid of the microscope in such cases must prove useful. The tumefaction of starch by the above process needs no special practice, yet affords additional data, and hence may, I trust, fulfil the condition mentioned above.

The PRESIDENT, in proposing a vote of thanks to Mr. Symons, said he had put a new method into the hands of workers in pure science and applied science, and one by which they might confirm the results obtained by other methods. He was sure, for this last addition to his work on the starches, the Conference would accord him a vote of thanks.

Mr. GREENISH could not allow this paper to pass without one or two observations. They were much indebted to Mr. Symons for giving them any assistance in determining the kind of starch they were examining, in addition to the microscope. Starch was almost universally diffused in nature, but in using the microscope for determining its presence, they found it very often where they did not expect to find it, and where really it had no business to be, whilst in other cases, when a particular kind of starch ought to be present, some other was detected. Starches being so widely distributed, any means by which they could be determined should be welcomed by pharmacists. Mr. Symons had confirmed some investigations of his own with regard to Bermuda, St. Vincent, and Natal arrowroot. Several years ago some maranta grown in Natal was pronounced by many public analysts to be potato starch, and it presented a considerable resemblance to it, but a good microscopist could determine the difference. There was, however, a great difference between maranta grown in Natal, and that in Bermuda or St. Vincent. The reason of this he could not explain, but such was the case. He was not sure that this method would be of very much service without the microscope, on which he should prefer to rely, and in the examination of starch he thought it was desirable to use one particular power, and adhere to that power for all starches. The relative sizes of the starch grains were of great importance, and these could best be determined by an educated eye, using one particular power. He also found that if the medium in which the starch is examined be coloured, it assisted the observer, and in addition to the microscope, the polarizer might be used to advantage.

Mr. SYMONS said he did not put forward this method as superseding the microscope, but by this means it was quite possible to distinguish between Natal arrowroot and potato starch. If Natal arrowroot were mixed with ten times its weight of ·8 solution of caustic soda, it would only be partially tumefied; if it were potato starch, it would tumefy completely. It took a 1 per cent. solution to tumefy Natal arrowroot to the same extent.

(*To be continued.*)

Review.

THE PHARMACOPŒIA OF THE LONDON HOSPITAL. Compiled under the Directions of a Committee appointed by the London Hospital Medical Council. London: J. and A. Churchill. 1882.

From the preface of a volume bearing the above title recently put into our hands by Messrs. Churchill and Co., we learn that the previous edition of the Pharmacopœia of the London Hospital has become exhausted, and that the present work is intended not only to keep abreast of the times, but also to form a useful guide to students in the art of prescribing.

The objects of a pharmacopœia are, first, to define the materia medica, and, secondly, to give formulæ for the various preparations from that materia medica. In this book the first of these objects has scarcely been fulfilled, for with the exception of certain chemicals from the British Pharmacopœia, to which "B.P." is attached, as a general rule no definition whatever is given of the various drugs. Rhubarb is described as rhei rad. simply—any rhubarb, English or foreign, may be used. For pepsine no mode of preparation is given, even the animal from which it is to be procured is not identified. Ergotine is mentioned, but it is particularized no further, although the mode of preparation has a great influence upon the strength of the product. We are glad to see that many new and recently introduced preparations of undoubted merit, such as sclerotic and hydrobromic acids, curare, gelsemium, thymol, homatropine, chrysophanic acid, pancreatin, etc., are included; but we miss an old and well-tried friend like cinchona calisaya, which is conspicuous by its absence, and even a liquid of such general utility as aq. dest. finds no place here. Although a form for ext. quebracho liq. is given, quebracho does not appear in the materia medica.

The formulæ are, however, as important, perhaps more important, than crude drugs, and here there is much to praise and a good deal to condemn. Hydrobromic acid is made by Fothergill's process, not the best either for purity of product or economy of preparation. The strength would be better stated in HBr rather than in Br. The formula for hypodermic injections, iodized cotton, extract of malt, etc., are good and well devised. The syrups are more properly glyceroles, and we can find no mode of preparing the "freshly precipitated" hypophosphites therein required.

The propriety of making all emulsions with tincture of quillaia is open to question, as is also the process for making ammoniated extract of ergot. The latter is anything but economical. The detection too of oil of theobroma with olive oil in a suppository basis is unnecessary.

The formulæ for children call for no special remark. The appendix contains directions for estimating urea and sugar in urine, for making staining solution, and a very complete list of poisons with their antidotes. The Latin abbreviations, the list of which includes many antiquated and obsolete forms, might have been left to 'Selecta e Prescriptis.' The work is completed by a list of metric weights and equivalents and a table of doses.

Although making a distinct advance on previous pharmacopœias, we cannot but wish that more care had been bestowed on the materia medica, and that the formulæ had been more fully revised. In a future edition we hope that this will be carried out.

Notes and Queries.

[733]. COLOURED CARBOYS.—In reply to J. R. Hill, I have been informed that coloured carboys were first introduced by the old alchemists, as a symbol that they were employed in the transmutation of the baser metals into gold.

The hieroglyphics were the same as those employed by the ancient astrologers to represent the planets. For instance:—

Gold (Sol) was represented by a circle ☉, indicating perfection and density.

Silver (Luna) by a semicircle ☾, because thought to be half gold.

Mercury represented by ☿, thought to consist of gold, silver and acrimony.

Copper, ♀, gold with acridity.

Iron, ♂, gold with acridity, dedicated to Mars the god of war.

Tin (Jupiter) ♃, half silver, half acridity.

Lead (Saturn) ♄, considered the oldest metal known, capable of destroying all others, resembling the father of the gods, Saturn, said to have devoured his own children.

FREDERICK DAVIS.

[737]. EXT. CINCHONÆ LIQUIDUM.—In reply to "737," the "divergent results" obtained by your correspondent with different samples of the above doubtless arise from each manufacturer using different samples of bark. The supply of yellow bark described in the B.P. as that of *Cinchona Calisaya* (Weddell), collected in Bolivia and Southern Peru, has certainly not met the demand for years, and therefore, in the absence of any official B.P. addenda, manufacturers may fairly lay claim to use their own judgment in making ext. cinchonæ liq., B.P., from bark of any hybrid or variety of *Cinchona Calisaya* which may happen to contain 2 per cent. of quinia. Some varieties of Indian bark contain more than the above percentage and yield at the same time more extractive matter to percolation. By using equal parts of Bolivian and Indian bark a very good sample of ext. cinchon. liq. may be produced, having a slightly higher specific gravity than that described in the B.P. At present dispensers are to a great extent in the hands of manufacturers for a supply of good liquid extract, but there are respectable wholesale drug houses who can be relied on to supply it.

SPECIFIC GRAVITY.

[738]. LINIMENTUM AMMONIÆ.—It is well known that the linimentum ammoniæ, B.P., becomes thick and lumpy after being kept for a short time. It may be of interest to your readers to know that this may be prevented by the addition of a small quantity (about 1 drachm to ℥iv) of spirits of wine. A. H. DOBSON.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

AUTOGRAPH PRESCRIPTIONS FOR IRELAND.

Sir,—The Council of the Pharmaceutical Society of Ireland having recently passed a resolution, proposed by me, authorizing a collection of autograph prescriptions to be formed for the use of the examiner in pharmacy, I am desirous to have the collection, as varied as possible, placed in books similar to those in use at the Bloomsbury Square examinations.

With this view, if any of your readers should be willing to contribute towards the above object, by sending original prescriptions to the undersigned, the favour will be alike esteemed and gratefully acknowledged by

48, *Henry Street, Dublin.* WILLIAM N. ALLEN.

LEECHES.

Sir,—A reference to pages 8 and 64 of the General Index to the Journal will show your correspondents that the subject of the "keeping of leeches" has received a fair share of attention. As, however, the Journals may not be at hand I may repeat the result of my experience, which has now extended over several years.

The best form of aquarium, at any rate the most economical, is the ordinary inverted bell or propagating glass, on a stand and with any suitable covering. At the bottom there should be a layer of mud 3 or 4 inches deep, procured from the bottom of a clear pond or ditch. Over this should be some well washed gravel. By far the most satisfactory plant to grow is the *Vallisneria spiralis*, as, if well rooted and not exposed to too much light, it thrives well, propagates, and keeps the water perpetually sweet. Otherwise the ordinary weeds from any pond will answer the purpose, only as they will not stand the "*forcing*" incidental to their changed circumstances they will require to be occasionally renewed.

Adopting this plan, we have kept from 20 to 30 leeches at a time, with rarely any loss. The water at present in the aquarium has not been changed for eighteen months, and before that it was not changed for six years, a quart or so only being now and again added to replace loss by evaporation.

The green on the side of the glass is a low form (conferva) of vegetable growth, which, though sometimes unsightly, aids in preserving the water. It may be prevented by putting the aquarium in a more shaded place. It should be remembered that submerged water plants do not require much light.

To those who care to see it, there is in a pond in a brickfield off Platt's Lane, Hampstead, the most luxuriant growth of *Anacharis* I have ever seen. The bottom is covered with plants from 12 to 18 inches high.

Has Mr. Hart any water snails in his aquarium? If so, the ova deposited on the side are more likely to be those of *Planorbis* or *Limnea*.

Slack's 'Marvels of Pond Life' is a book that will greatly aid the study of the microscopic forms of aquatic life, both animal and vegetable.

33, *Norfolk Terrace, W.* A. P. BAKER.

Sir,—In reply to "Aquam" I beg to state that the water in my aquarium was changed on June 30 last, and is now perfectly clear and free from smell, the evaporation of water having been reduced to a little over ½ inch from usual height in aquarium. The vegetation is very trifling, and I might state scarcely perceptible, neither have I noticed it much at any time.

Devonport. J. A. LAMBLE.

THE "NEW" STYPTIC.

Sir,—The paper read at the meeting of the British Pharmaceutical Conference, relating to the virtues of the plaintain, will undoubtedly be interesting to a great many. Why, however, it should be termed a "new" styptic I am rather at a loss to understand. Individually I have used it for many years as a hæmostatic in alveolar hæmorrhage, and consider it analogous to arnica and hamamelis in its action, though perhaps no better, if as good as the latter. In cases of odontalgia there is perhaps no better remedy. Applied after the Swiss method, *i.e.*, by tearing the fibres from the leaves and inserting into the ear of side aching, in cases benefited the fibres become black; if no relief is obtained they remain green. The ratio of cure is about seven-tenths of the whole number of cases. Its therapeutical value in erysipelatous inflammations, dysenteric discharges, lacerated and incised wounds, sphacelus, and as an antidote for ivy poisoning, it is decidedly of the first order. In point of fact it is one of the good old remedies, despised perhaps on account of its simplicity and discarded. The "new" sedative "pulsatilla" will likewise prove of much therapeutic value when more generally exhibited. It is very amusing to hear of these so-called "new remedies," lately discovered, and when we attempt to find out their "pedigree" to discover that Pliny, Hippocrates, and even Hahnemann prescribed them.

Exeter. JOSEPH ABBOTT.

MR. CYRUS BUOTT.

"The world is wide, these things are small,
They may be nothing, but they are all."

Sir,—Will you permit me to acknowledge the donations I have received since January last in aid of poor old Mr. Buott? It is with sincere regret I have to state that the fund is quite exhausted. I have not, however, withheld the weekly sum which for some time I have been enabled to give Mr. Buott and his daughter, who so devotedly attends on him, for I have hoped that I might continue to receive adequate additions to the fund.

In one sense I most reluctantly repeat my appeal, yet I am persuaded there are many who knew Mr. Buott when he was not an unimportant factor in pharmaceutical politics, who will not allow him to end his days in a state of unrelieved poverty. With this assurance I again make known his wants, and plead on his behalf. He is very old and feeble, but the care and kindness we may give will help to bring rays of brightness and comfort into his sick chamber.

205, *St. John Street Road, E.C.* ROBERT HAMPSON.

	£	s.	d.
Alfred Bishop, London	2	2	0
Alfred Frank, Ramsgate	0	5	0
Thomas Randall, Wareham	1	10	0
Professor Attfield, London	1	1	0
E., Staffordshire	0	5	0
Robert J. Elliott, Liverpool	1	1	0
Kay Brothers, Stockport	1	1	0
A few Chemists' Assistants at 225, Oxford Street, W.	1	10	0
James Woodcock, Birkenhead	1	1	0
"Anonymous," Sheffield	0	15	0
J. R. Wooster, Turnham Green	2	0	0
C. B. Miller, Blackheath	0	12	6
Thomas Pullan, Bradford	0	10	0
J. Wellington, Fowey	0	5	0
James R. Young, Edinburgh	1	0	0
G. N. T., Ventnor	1	0	0
S. T. Baxter, Florence	0	10	0
A. C. Wootton, London	1	1	0
"Two Bolton Friends"	0	13	0
Richard Reynolds, Leeds	0	10	0
"A few Bolton Friends"	0	10	0
William Blain, Bolton	0	13	0
Benjamin Whitrow, Tunbridge Wells	1	0	0
Robert Hampson, London	1	6	0

W. Johnston.—(1) Lavtera. (2) *Symphytum asperrimum.* (3) *Polygonum aviculare.*

W. Miller.—(1) *Hypericum androsæmum.* (3) *Malva moschata.* (6) *Cotyledon Umbilicus.* Nos. 2, 4 and 5 are named correctly. The subscription becomes payable on the 1st of January in each year.

M. P. S.—Such carelessness is no doubt very blameable, but there does not appear to have been any evidence that the fault lay with a chemist and druggist. The acid might have been put into the bottle by your customer.

Lubberly Lout.—Such behaviour is unusual with tinct. opii; the sample of opium must have been exceptional.

Wopper.—Reduce the extract on a warm slab to about one-half its weight; then make up the weight, or perhaps a little more, with pulv. glycyrrhizæ.

C. S.—The ointment when freshly prepared is without colour; but it changes if kept, or if made with rancid lard. It is possible that in the first instance the ointment may have been prepared with benzoated lard which by keeping had acquired rancidity.

T. P. B.—*Phallus impudicus.*

Minor.—It is illegal for a person who is not registered as a pharmaceutical chemist to assume the title of "pharmacist," or to exhibit any name, title or sign implying that he is so registered.

Jacque.—The two terms are synonymous.

Ferri.—Such a practice would be illegal.

Antiseptic.—The "boroglyceride" is prepared by heating boracic acid and glycerine together at a high temperature (see vol. xii., 883 and 992). Full details will be found in the specification of the patent, No. 1332, 25th March, 1881.

Ariovistus.—The initials imply fellowship of the Institute of Chemistry, the Secretary to which is Mr. C. E. Groves, Somerset House Terrace, W.C.

F. A. B.—Apply for information to the Secretaries of the respective Societies.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Woodland, Shenstone, Long, Thresh, Jackson, Marks, Tichborne, Viking, Chemicus, H., W. H. B.

THE INTERNATIONAL ELECTRIC EXHIBITION.

(*Concluded from page 222.*)

Among the modifications of Planté's important discovery that have been made there is probably none of them so well known as regards the name as the modification by Camille Faure, of Paris. As will be gathered from preceding statements, the Faure cell consists of two lead plates covered in the first instance by red lead. This coating being in a very loosely attached condition it is necessary to support it by wrappings of felt, and thus constituted it will be seen that M. Faure's modifications of Planté's great work are of a very simple character. It must, however, be admitted that Faure's combination possesses merit. According to M. Géraldy the Faure cell can store 3·28 kilogrammètres per kilogram, or 10·79 foot pounds per pound of lead. The most comprehensive comparison of the two accumulators that has yet appeared is due to Professor Silvanus Thompson, of University College, Bristol, who, in a paper read before the Society of Arts, has presented such a complete *résumé* of the whole subject of "Storage of Electricity" as to make that paper of the utmost value to anyone seeking definite information on this interesting and important subject. The comparison of the Planté and Faure accumulators is so compact, and yet comprehensive, that it is advisable to quote it direct:—

"No very reliable comparisons between the accumulators of Planté and those of Faure, or of De Méritens, have yet been made. Seeing that in each of these, when completely formed, the materials are the same—namely, lead and peroxide of lead immersed in dilute sulphuric acid—the maximum electromotive force must be eventually the same in each. The resistance of a cell is simply a question of size and shape. The relative strength of current actually furnished by these cells should therefore merely vary with their dimensions. The presence, however, of the felt, and its coatings of red lead, introduces resistance into the Faure cell, and as some recent determinations of M. Achard show, a Planté cell will heat a greater length of platinum wire, and do its work three times as quickly as a Faure cell, whose surface is of the same amount. One would also expect *à priori* that the layers of peroxide, formed upon the electrode by the working of the current itself, should be more regular, and yield currents with greater regularity, than the artificial and more rapidly-formed layers made by painting red lead upon the surface. On the other hand, M. Faure points out that taking cells of equal size, a larger proportion of the weight in his cell consists of the working substance, the weight of red lead placed in his cells being, for equal amounts of surface, about twenty-six times as much as the weight of peroxide produced by a "formation" during two years on the plates of a Planté cell of equal size. If this be so, it would imply that, though its resistance might be greater, and its rate of working slower than the Planté cell, the Faure cell would accumulate twenty-six times as much energy in an equal space. These figures require yet to be confirmed, and they are hardly borne out by the statistics of M. Regnier. Still less do they justify the extravagant pretensions that have been ignorantly set up on behalf of the enormous powers of the Faure cell—pretensions which have been angrily combated, though it is well to note that neither M. Planté nor M. Faure have taken part in this unpleasant recrimination. The Faure cell will do what the Planté cell will not, take in a greater charge, because it has a greater thickness of the working material, and it gives up its charge less rapidly. The Planté cell will do what the Faure cell of equal weight or surface cannot do, namely, produce rapid discharges in currents of greater volume; a property invaluable for the purpose of some of the applications already named."

The applications that had been previously mentioned were the application of the Planté cell for the operation of cautery, M. Trouve's surgical appliances including very small incandescent lamps to illuminate the cavities of the body—operation upon the larynx is given as an example—and dentists' appliances for destroying the nerves in hollow teeth; also, M. Achard's brake for railway trains, and M. Trouve's application of accumulators for propelling a tricycle up to a speed of 10 miles an hour are fully detailed. Amongst other applications especially deserving of notice are those describing the possibility of obtaining a powerful arc light for a few minutes from twenty cells, which time would be sufficient for some class experiments and for private spectroscopic work, also for photographic work, thus obviating the labour and expense of setting up fifty Grove cells. Further applications of accumulators appeared in *Nature* on June 2, 1881, in an article on "Electric Storage," by Professor Silvanus Thompson in the following words:—

"The uses for such secondary batteries may be of three kinds:—1. They may serve as portable supplies of electricity to be left and called for to recharge when exhausted. 2. They may serve to accumulate supplies of electricity from dynamo-electric machines, and store them until required for furnishing electric light or motive power on a small scale. 3. They may serve as equalizers of electric currents in a system in which the supply is liable to fluctuations. Suppose, for example, a dynamo-electric machine is employed to produce electric light. Any least thing which alters the speed of the machine, even for an instant, makes the light flicker and change in intensity; while the breakage of the engine-strap would at once cause total darkness. But if a secondary battery of suitable dimensions and power were inserted across the circuit between the dynamo-machine and the lamp, the inequalities of the current would be greatly modified. When the light was not in use, the battery would store up the current. If the engine failed, the battery would at once put forth its power. It is probably in this direction that the secondary battery will find no unimportant field of usefulness."

Other forms of accumulator have been devised by M. De Meritens, Swan, Sutton, Sellon and Volckmar, and some few others.

The De Meritens accumulator is a modification of Planté's form. The lead plates are made to overlap each other after the manner of venetian blind laths, the whole being secured to a stout outer framework of lead. This arrangement gives a greater effective surface in the space. The plates require forming as in Planté's cells.

The Swan accumulator is a modification of the Planté cell also. In this design, the surface of the lead plates is increased by forming lead foil into frillings, the interstices being filled with electolytically deposited lead.

The Sutton cell is a departure from all the preceding forms; it was fully described in this Journal, in the "Month" ([3] xii., 625). A great wonder connected with this form of accumulator is that it is entirely untrammelled by patent rights, a sufficiently astounding thing in these days. The cell appears to have given satisfaction to several amateurs who have constructed it.

No authorized description of the Sellon-Volckmar accumulator has yet been published, but from what little has been in print it would appear to be a decided improvement on the Faure cell, following closely in principle on that of Swan, whose patents have indeed been purchased by Mr. Sellon in order to save any future complications in the matter.

It may be mentioned here, that Mr. W. Symons, F.C.S., a well-known member of the pharmaceutical body, has published, in the pages of the *English Mechanic*, a description of an accumulator which would seem to be a useful and tolerably simple cell to construct. The acting materials are lead plates prepared by covering (on one side apparently) with red lead, the plates being immersed in an acidulated solution of sulphate of copper. If this article should induce any readers to attempt the construction of these fascinating and instructive electolytic apparatus, perhaps a few practical remarks on charging may be useful. As the electromotive force of a Planté, or Faure, or almost any other form of accumulator, may be taken as over two volts, it follows that the charging current must have an electromotive force greater than this, otherwise, the cell cannot be charged to its full power. This will necessitate the employment of two Grove's or Bunsen's cells or three Daniel's to one accumulator. If more than one accumulator is to be charged, the two or three primary cells can still be used if the secondary cells or accumulators are connected in multiple arc during the charging. As to when the charging is finished, this might be told by a galvanometer in circuit, or, perhaps, just as well by watching for escape of free oxygen at the peroxide plate. Too great an electromotive force should be avoided in charging the cells, as, although the charging is quicker, a great waste of current takes place in the form of local heat.

An important point is to have sufficient current density in charging, as the maximum polarization will not be attained unless there is sufficient current at every point of the area of the plates. According to Professor Silvanus Thompson it should not be less than 50 milliampères per square centimetre of surface in the cell. This would be found by ascertaining the current in the circuit in ampères, and dividing the total area of the plates in centimetres by the current found in the circuit.

According to the same authority there is a decided gain in forming a Planté cell by scratching the leaden surfaces.

This article forms the conclusion of this series of papers. At the commencement it was intended to describe the principal contents of the Crystal Palace Exhibition. It, however, appeared desirable to give a much more detailed description of the chief dynamo machines and lamps than would have been possible if the Exhibition had been noticed in the usual manner, which can only be done with advantage when readers are expert in the subject-matter of the descriptions; in this instance it was thought that the articles would be of greater utility if the reverse was assumed.

SOLUTION OF ACETATE OF ALUMINIUM.

The preparation of this valuable antiseptic, which is much used in continental hospitals, has heretofore often given annoyance by its tendency to deposit insoluble sediments, or by its readiness to gelatinize. It is owing to the labours of Professor Poleck, of Breslau, that the cause of this trouble has been ascertained and a process been devised which removes the drawback.

Professor Poleck confirms the previous statement of Walter Crum, that, on bringing together acetate of lead and sulphate of aluminium, there will be obtained as products, sulphate of lead, basic aluminium acetate, and free acetic acid. This latter was found to effect the change of the basic acetate into the insoluble modification, and it was therefore necessary to remove or neutralize it. This was accomplished by the following process, in which the sulphate of aluminium is assumed to contain 95 per cent. of the true salt, the remainder being the usual impurities found in the commercial article.

300 parts of sulphate of aluminium are dissolved in 800 parts of water, and the solution mixed with 360 parts of diluted (Germ. Pharm.) acetic acid (spec. grav. 1·041).

130 parts of precipitated carbonate of calcium are mixed with 200 parts of water, and the mixture gradually added, under stirring, to the former. The whole is allowed to stand for twenty-four hours at the ordinary temperature, being stirred occasionally; afterwards it is strained, the precipitate pressed without washing, the liquid allowed to settle, and finally filtered.

The filtered liquid has the specific gravity 1·0457. It will amount to about 1275 parts. It is clear, colourless, and has only a faintly acetous odour. On the addition of 2 per cent. of sulphate of potassium, and heating on the water-bath, it becomes gelatinous; on slow cooling, it becomes clear and liquid again after a short time.

The products of two different preparations by the above method had the following composition, showing that it is quite uniform:—

	I.	II.
Acetate of aluminium $Al_2(C_2H_3O_2)_4.H_2O$ . . .	7·76 per cent.	7·69 per cent.
Alumina, Al_2O_3	0·47 „	0·23 „
Calcium sulphate, $CaSO_4$	0·41 „	0·33 „
Spec. grav.	1·0457	1·0455

Dr. Vulpius, of Heidelberg, communicates his experience in following the above process. He states that it offers no difficulty at all, provided very capacious and shallow vessels are used, since the introduction even of small quantities of carbonate of calcium causes an energetic effervescence, particularly when working on the large scale. After the reaction is completed, the product appears to consist of an enormous quantity of precipitated sulphate of calcium with a very small amount of supernatant liquid, and, at first sight, it would seem as if the process were defective, since it might be supposed to be difficult to separate any useful quantity of liquid from the precipitate. This is a deceptive appearance, however; for, although but a small quantity of liquid runs off, at first, from the strainer, it is only necessary to slightly press the latter in order to effect a rapid disengagement of the liquid and a contraction in bulk of the precipitate. If the strainer is subjected to the action of a moderate press, the precipitate dwindles down to an insignificant amount. Dr. Vulpius proposes, in preparing large quantities of the solution, to use centrifugal machines for the separation of the precipitate from the liquid.

After the liquid has been allowed to stand for a short time, it filters clear and rapidly, and does not become turbid on standing.

Three kilograms of sulphate of aluminium, 3·6 kilos. of dil. acetic acid (spec. grav. 1·041) and 1·3 kilos. of carbonate of calcium, with the prescribed quantity of water, yield, in a round figure, 13 kilos. of solution of acetate of aluminium, containing 7½ to 8 per cent. of two-third basic acetate of aluminium [$Al_2(C_2H_3O_2)_4.H_2O$].—*New Remedies*. After *Arch. der Pharm.*

THE CHINESE DRUGGIST IN NEW YORK.*

BY FRED. HOHENTHAL.

The Chinese drug store here, the only one this side of San Francisco, was established by "Kwong Lung Jin," in 1878, and he is doing a flourishing business among his

* From the Eleventh Annual Report of the Alumni Association of the College of Pharmacy of the City of New York, 1882.

people now. The proprietor is a stout Chinaman, about thirty-five to forty-five years of age, very intelligent, revered by his countrymen, but not so well versed in English as his assistant, who is about ten years younger. I experienced much trouble on my first visit in assuring him that I was not a customs officer ferreting out his opium trade, but on seeing my readiness to buy little trifles, he immediately installed me in his good graces, and invited me to dine with him.

The store is a small apartment, about 20 by 30 feet, with sleeping rooms, kitchen, parlour, etc., in the rear. There were shelves all around covered with bottles and jars, and the top shelf mounted by many paper packages, cabalistically marked, and containing roots and herbs in great variety. In a small case behind the counter were the few mineral drugs, and a good many little trifles not belonging strictly to pharmacy, such as porcelain jars, pencils, scallops, beads, rings, etc. There were also some animal drugs, of which I will speak of later on.

Pendent from the ceiling were bunches of herbs and dried meat. On the floor, under the shelves, were articles of food, such as barrels of rice, flour, dried fish, etc. There were also about forty drawers behind the counter for the most used drugs, those in packages being very seldom used. Large jars were filled with different pleasant-tasting fruits, not used as medicines, and smaller glass jars with the various medicinal fruits, of which there was a large number, the chief uses of which seemed to be in the cure of consumption, a disease the Mongols seemed to be peculiarly liable to, judging from the fact that about 10 per cent. of their medicines are for its cure.

They have no liquid medicines whatever; they simply sell the drugs, extolling their virtues, and the purchaser or patient prepares them with boiling water in the form of infusion or decoction and sometimes extract, unless he has not the conveniences therefor at home, when the apothecary will do it for him. As an accommodation for his customers, the doctor keeps a pot of hot tea on the counter; anyone wishing to drink takes a cup from a basin of water near by, fills it, drinks, and replaces the cup without saying a word. A peculiarly constructed tobacco pipe, on the principle of the Turkish narghileh, is also on the counter, but only for the use of intimate friends. The tobacco they use is very fine and of peculiar flavour. Their tobacco pipes, the common kind, are made of a rod of bamboo strung with the kernels of a peculiar scented nut, and furnished with a bowl of metal about $\frac{1}{2}$ inch in diameter and $\frac{1}{2}$ inch deep, and an ivory mouth-piece. The pipe is perfectly straight and 2 feet long; they vary in price, from 2 dollars 50 cents to 7 dollars, according to age; those which have been already smoked for some time sell for more money than new ones.

Their balances are on the plan of the steelyard, the small ones with a bar of ivory, from which is suspended a brass pan and a moveable brass weight; one in my possession is 12 inches long and has over 125 marks for telling the weight, which ranges from 2 ounces downwards to 2 or 3 grains, very accurately. They have these balances of all sizes, and use them with great dexterity.

Their camels' hair pencils are about 10 inches long, of bamboo, into one end of which the brush is inserted, and it is fitted with a cover also of bamboo, the whole stem being curiously carved with their strange devices, and these cuts filled out with blue colouring.

Their writing materials are the pencil above described, an iron or porcelain plate, 6 by 8 inches, with a receptacle for water. They dip a piece of Indian ink in the water, rub it on the plate, and rub the pencil in this mixture and write from above downwards.

They have some very pleasant fruits: one of these, the "gua," is about the size of a walnut, and consists of a kernel as large as a hazel-nut, surrounded by edible fleshy pulp, and the whole enveloped in a hard, brown, brittle shell.

Among the familiar drugs I found Spanish saffron, safflower, musk, litharge, metallic mercury, ginger, ginseng, oil of peppermint.

I found also Russian castor and American castor, and what was claimed to be from the bear.

Also, fine Chinese isinglass, in one piece just the size and shape of an ordinary flounder, and which he wanted to sell me for two dollars. He called it by a name that resembled "Guiteau."

I found also several narcotic herbs resembling belladonna, hyoscyamus, stramonium, also a root resembling glycyrrhiza, only much larger in diameter than that is usually found. It is called "Gum Cho" and is used for chewing on account of its sweet taste.

Among the most notable goods was a substance in small lumps of yellow colour, and called "Nau Wau." It occurs, in lumps about the size of a walnut, in the stomachs of cows. The doctor said that it is found only in one cow in a hundred. It is used to apply to a sore foot in the form of paste, and is used only by the aristocracy.

There was a peculiar bark called "Os Chong," remarkable for the silky fibres it shows on breaking it in any direction; it is used in the form of a decoction for weakness of the heart. The price is ten dollars a pound. There were also dried lizards, which are to be boiled and eaten. There were disinfecting fumigators, strips of bamboo about one foot long, and as thick as a hair-pin, which were covered on the upper half with a fragrant mass, which glowed for two hours when once lit, perfuming the rooms very pleasantly. They were called "Sau Hong."

STUDIES ON THE ALKALOIDS.

BY DR. W. KOENIGS.*

ANNOTATED BY M. DE BECHI.

(*Continued from page* 128.)

Part II.—Chinoline and Lepidine.

Chinoline was discovered by Gerhardt in 1842.† By treating quinine with caustic potash and a little water, he obtained, with evolution of hydrogen, an oxygenated base $C_{18}H_{22}N_2O_2$, which he named quinoleine. By treating cinchonine‡ in the same manner, he found that the quinoleine obtained contained no oxygen. It is now known, through the researches of Butlerow and Wischnegradsky,§ that quinine gives an oxygenated base, $C_{10}H_9NO$, quinolidine, whilst cinchonine gives chinoline, C_9H_7N. The actual formula of chinoline has been settled by Laurent,|| from some recent analyses of Gerhardt.

In his researches on the bases of coal-tar, Hofmann¶ studied, besides kyanol or aniline, the leucol of Runge, and proved its identity with the chinoline of Gerhardt; these two bases giving with chromic acid the same characteristic yellow precipitate. According to Hofmann, the oil of coal-tar, which he used in his researches contained $\frac{2}{3}$ per cent. of leucol and $\frac{1}{3}$ per cent. of aniline. Later, the identity of leucol with chinoline was called into question by Gr. Williams** who, in studying the decomposition of cinchonine by potash, discovered two superior homologues of chinoline, lepidine, $C_{10}H_9N$, and cryptidine, $C_{11}H_{11}N$;

* 'Studien über die Alkaloide.' By Dr. W. Koenigs. Munich: F. Straub, 1880. With annotations and additions referring to recent researches by M. de Bechi. Translated from the *Moniteur Scientifique*. The additions are included within brackets.

† *Annalen*, vol. xlii., p. 310.

‡ *Idem*, vol. xliv., p. 279.

§ *Berichte*, 1879, p. 2093.

|| *Annalen*, vol. lxii., p. 101.

¶ *Idem*, vol. xlvii., p. 37; vol. liii., p. 427.

** *Journal für praktische Chemie*, vol. lxvi., p. 334; *Jahresbericht*, 1869, p. 361.

he also recognized the tertiary nature of chinoline. According to Liebig and Woehler,* by the action of cyanic acid upon aldehyde, trigenic acid, $C_4H_7N_3O_3$, was obtained, which, when heated, became charred and gave off chinoline together with cyanuric acid.

Thialdine, $C_6H_{13}N_2$, obtained by the action of sulphuretted hydrogen upon ammonic aldehyde, to which a little ammonia had been added, yielded, when heated to redness with lime, some chinoline, which was recognized by its characteristic odour and its double platinic salt. Nevertheless, it is very probable that the base thus obtained by Liebig and Woehler was collidine, which presents properties analogous to chinoline and which is formed, according to Baeyer and Ador† by distillation of ammonic aldehyde.

Lubavin‡ studied in Baeyer's laboratory, in 1869, the chinoline accruing from cinchonine and obtained from it two well crystallized substitution products, a sulphoconjugated acid and a tribromated derivative. Such was the state of our knowledge of chinoline when the author undertook, three years ago, some researches on chinoline and cinchonine.

Koerner's theory concerning the constitution of chinoline, has already been mentioned. If it be correct it ought to be possible to obtain chinoline from allylaniline, as naphthaline is produced from phenylbutylene or its bromide (Aronheim).§

$$\underset{\text{Phenylbutylene.}}{C_6H_5.CH_2.CH_2.CH : CH_2} - 4H = \underset{\text{Naphthalene.}}{C_6H_4\begin{cases} CH=CH \\ \quad | \\ CH=CH \end{cases}}$$

$$\underset{\text{Allylaniline.}}{C_6H_5.NH.CH_2.CH : CH_2} - 4H = \underset{\text{Chinoline.}}{C_6H_4\begin{cases} N=CH \\ \quad | \\ CH=CH \end{cases}}$$

Perkin had already tried to oxidize allyltoluidine in the hope of obtaining quinine. Instead of quinine, he obtained, by mixing the substituted base with a bichromate solution, a dirty-brown precipitate. It is known, how, in studying the oxidation of a simpler base, aniline, he was led to the discovery of the violet which bears his name and which was the first artificial colouring matter obtained from aniline.

If the vapour of allylaniline be passed over oxide of lead, heated to dull redness, a liquid with a benzonitrile odour is obtained. The product is purified with sulphuric acid; the precipitate of sulphate of aniline is filtered and the liquid shaken with ether; the acid solution is boiled with solution of potassium bichromate, until a filtered test is no longer altered by the oxidizing mixture. The liquid is then made alkaline and distilled with steam; when some oily drops pass over, having the odour of chinoline, the double platinum salt of which corresponds to the formula:—

$$(C_9H_7N.HCl)_2 . PtCl_4$$

The formation of chinoline from allylaniline answers to the synthesis of indol effected by Baeyer and Caro by means of ethylaniline:—

$$C_6H_5NH - CH_2 - CH_3 - 4H = C_6H_4\begin{cases} NH \\ CH \end{cases}\!\!\!\!\gg CH$$

and it may be admitted that in the formation of chinoline, the side chain is condensed in the ortho position, as takes place with indol and naphthaline, by means of phenylbutylene.

From this the formula of Koerner became very probable and it was clearly demonstrated by the beautiful synthesis of chinoline effected by Baeyer with hydrocarbostyrile. By reduction of orthonitrophenylacetic acid, Baeyer* obtained oxindol which, treated with phosphorus pentachloride, gives chloride of oxindol; this last, treated with hydriodic acid in acetic solution, gives retinindol, C_8H_8NO or C_8H_9NO, which yields indol by dry distillation.

If, instead of oxindol, its homologue, hydrocarbostyrile or orthoamidohydrocinnamic anhydride be operated upon, bichlorochinoline, $C_9H_5Cl_2N$, is first formed, a feebly basic body, which, treated with hydriodic acid in acetic solution at 240° C., gives chinoline.†

In successively nitrating and reducing the phenylangelic acid obtained by Perkin by means of essence of bitter almonds and normal butyric acid, Baeyer and Jackson obtained a homologue of hydrocarbostyrile, ethylhydrocarbostyrile, which separates in the form of a neutral anhydride from the acid mixture of isomeric amide acids. This body treated like hydrocarbostyrile, gives ethylchinoline and intermediary products.‡

The chloride of phosphorus does not here effect a substitution, for the second place (starting from the nitrogen) is taken by ethyl. Ethylchinoline has some properties analogous to chinoline; the small quantity at disposal did not allow it to be ascertained whether it is identical with cryptidine, and whether it gives cinchonic acid or an isomeric product by oxidation.

The researches of Baeyer and Jackson have shown that homologues of hydrocarbostyrile can be prepared, whenever the corresponding coumarine exists. The existence of homologues of chinoline with more than 5 atoms of carbon in the side chain is improbable, for, according to Baeyer and Jackson, corresponding hydrocarbostyriles do not seem to be formed, as, for example, by the nitration and reduction of normal phenylvaleric acid.

$$C_6H_5.CH_2.CH_2.CH_2.CH_2.CO_2H.$$

Baeyer and Jackson infer from these facts that the amido group, in the ortho position, combines readily with the second or third atom of carbon in the lateral chain, but not with atoms more remote. A chinolic body is also directly formed, when the third atom of carbon does not exist in the state of carboxyl, but in that of carbonyl (CO), as in phenylethylmethylacetone, and there are great probabilities that, in every case in which the second or third atom of carbon exists in the condition of an aldehydic, acetonic or alcoholic group, anhydrides belonging to the indol or chinoline§ group are formed. To prove this theory, Baeyer and Jackson prepared by means of phenylacetone, an isomer of scatol, the intramoleculary anhydride of orthoamidophenylacetone:—

$$C_6H_4\begin{cases} CH_2 \\ N= \end{cases}\!\!\!\!\gg C-CH_3$$

which they named methylketol; it is a homologue of the unknown ketol:—

$$C_6H_4\begin{cases} CH_2 \\ N= \end{cases}\!\!\!\!\gg CH$$

which should be isomeric with indol. Methylketol behaves in a manner entirely analogous to indol. As has been seen, indol is closely related to chinoline, a fact which could hardly have been expected, since these two bodies present entirely different properties. Whilst chinoline is an energetic tertiary base, which distils without decomposition, and is remarkable for its stability, indol is only a very weak base, of which the salts are decomposed even by boiling with water; it is partially decomposed by distillation and is generally very unstable: it contains an imide group, for it gives an acetyl compound.|| In pyridine, C_5H_5N, and pyrrol,

* *Annalen*, vol. lix., p. 291; vol. lxi., p. 1.
† *Annalen*, vol. clv., p. 311.
‡ *Idem*, vol. clv., p. 311.
§ *Berichte*, 1873, p. 67.

* *Berichte*, 1879, pp. 456, 459 and 1313.
† *Idem*, 1879, pp. 60 and 1320.
‡ *Berichte*, 1880, p. 115.
§ *Berichte*, 1880. p. 187.
|| *Berichte*, 1879, p. 1313.

C_4H_5N, the same analogies occur as in chinoline and indol.

Pyrrol therefore constitutes the nitrogenated ring of indol, as pyridine does that of chinoline; this latter theory is proved by the oxidation of chinoline to the state of pyridino-dicarbonic acid.

By the conversion of hydrocarbostyrile into chinoline, the constitution of this base has been established with certainty. The author was compelled, however, to seek some more convenient methods of preparation than those accomplished by means of hydrocarbostyrile or allylaniline.

By dry distillation of acroleine-aniline, 70 per cent. of chinoline is obtained, which is analogous to the production of picoline with acroleine-ammonia by Baeyer.* Acroleine-aniline, prepared by Schiff's method† is distilled in small retorts in portions of 25 grams. An abundant charred residue remains; the distillate is purified by the method mentioned by Baeyer for picoline, which consists of treating the base with an oxidizing mixture of potassium bichromate and sulphuric acid. The liquid is made alkaline, distilled with steam, and the chinoline afterwards extracted with ether.

Acroleine-aniline, which, according to Schiff, has the formula $C_{18}H_{18}N_2$, should give two molecules of chinoline with a loss of 4H. The yield is, however, very weak. A base, boiling at a higher temperature than chinoline, appears to be formed at the same time as that substance. If oxidized directly, acroleine-aniline gives no trace of chinoline.

A still more simple method of preparing chinoline was indicated in the work of Graebe upon alizarine blue.‡ Graebe obtained, by reduction of the blue by means of zinc powder, an energetic, non-oxygenated, tertiary base, which he named anthrachinoline. He considers that anthrachinoline is to anthracene what chinoline is to benzine.§ It was natural, therefore, to have recourse to the action of sulphuric acid and glycerine upon nitrobenzol for the preparation of chinoline. Nevertheless, only a few traces of chinoline were obtained thus. The action of aniline (1 part upon a mixture of $1\frac{1}{2}$ to 2 parts of sulphuric acid and 1 part of glycerine at 180–190° C.) gave the desired result; acroleine-aniline is probably formed at first, and this, whilst in the nascent state, is oxidized by the sulphuric acid into chinoline, with an abundant evolution of sulphurous acid.

These two methods have been also indicated by Skraup at the meeting of the Vienna Academy of Sciences, April 8, 1880. Skraup also gave a much superior method to the preceding, since it gave him 70 per cent. of chinoline from the mixture employed; this method consists in replacing the aniline by a mixture of aniline and nitrobenzol. Here also acroleine-aniline is probably formed at first and is oxidized by the oxygen of the nitrobenzol to form chinoline, whilst the remaining C_6H_5N of the nitrobenzol, uniting with the acroleine, gives another molecule of chinoline with elimination of water.

[*Preparation of Chinoline.*

The following is the process for the artificial preparation of chinoline, as given by Skraup:||—

Twenty-four grams of nitrobenzol, 38 grams of aniline, 120 grams of glycerine and 100 grams of concentrated sulphuric acid are placed in a vessel having a capacity of 2 litres, and the mixture, which becomes hot, is agitated until the aniline sulphate formed is completed dissolved; it is then connected with a return condenser and heated upon a sand-bath. After five or ten minutes an energetic reaction sets up when the flame must be immediately removed. At first only a small quantity of vapour is given off, but after a few moments the ebullition becomes tumultuous. The reaction ceases after a few minutes, but after a short interval recommences and this takes place several times. Finally the reaction is brought to an end by heating during two or three hours, until the nitrobenzol has completely disappeared. The reactions are represented as follows:

$$\underset{\text{Nitrobenzol.}}{C_6H_5NO_2} + \underset{\text{Glycerine.}}{C_3H_8O_3} = \underset{\text{Chinoline.}}{C_9H_7N} + 3\,H_2O + O_2$$

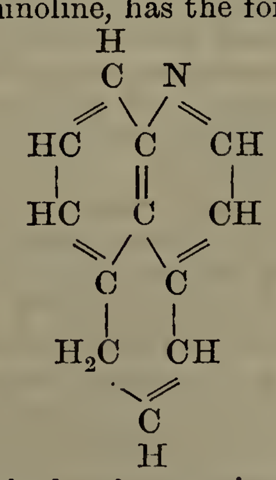
$$\underset{\text{Aniline.}}{C_6H_5NH_2} + \underset{\text{Glycerine.}}{C_3H_8O_3} = \underset{\text{Chinoline.}}{C_9H_7N} + 3\,H_2O + H_2$$

$$\underset{\text{Aniline.}}{2\,C_6H_7N} + \underset{\text{Nitrobenzol.}}{C_6H_5NO_2} + \underset{\text{Glycerine.}}{3\,C_3H_8O_3} = \underset{\text{Chinoline.}}{3\,C_9H_7N} + 11\,H_2O$$

The base is separated either by adding caustic soda in excess and distilling in a current of steam or extracting it by means of ether from the solution rendered alkaline. The former method is preferable as giving a purer product. The crude chinoline is dried and distilled over potash; in the first distillation it passes over between 225° and 230° C., but after twice repeating the operation it passes over between 227° and 228°. The alteration of crude chinoline in the light is due to the presence of a small quantity of non-basic resin, which is difficult to eliminate by simple distillation. To obtain the base quite pure it may be boiled in sulphuric solution with potassium bichromate, or dissolved in six parts of alcohol and the theoretic quantity of strong sulphuric acid added to the alcoholic solution. After cooling, it is filtered, and the residue washed with alcohol; the acid sulphate thus obtained, which is snow white, is then decomposed by caustic potash. Pure chinoline is completely colourless and may be preserved for a long time, especially if sheltered from light.]

The ideas of Graebe upon the constitution of alizarine blue have received a brilliant confirmation by the synthesis of chinoline by Skraup, who has generalized the reaction, by employing, instead of nitrating derivatives, the different amide derivatives, which, according to a communication by Skraup, react very easily upon the mixture of glycerine and sulphuric acid.

Another method of forming chinoline, which, without being synthetical, presents a certain amount of interest, has been discovered by Graebe and Caro.* By oxidizing acridine, which is found in great quantities in coal tar, by means of a dilute solution of permanganate, these chemists obtained acridic acid, a bicarbonated acid of chinoline, $C_9H_5N(CO_2H)_2$, which, distilled with calcic hydrate, gives chinoline. Acridine, which is a tertiary base as stable as chinoline, has the formula—



Of all these methods of preparing quinoline, there is no doubt that Skraup's mode is the best on account of the cheapness of the material employed, the facility of preparation, and above all the purity of the product obtained.

Subsequent researches on the action of reducing agents upon chinoline show that it is very difficult to obtain by the old process of preparing chinoline by means of cinchonine, a product entirely free from

* *Annalen*, vol. clv., p. 281.
† *Idem*, supp. iii., p. 343.
‡ *Moniteur Scientifique*, 1879, p. 1201; 1880, p. 483. *Annalen*, vol. cci., p. 333.
§ Since morphine, $C_{17}H_{19}NO_3$, can be distinctly split up by the alkalies, it is possible that anthrachinoline, $C_{17}H_{11}N$, may be its fundamental pyridic derivative.
|| *Monatshefte f. Chemie*, 1881, p. 139.

* *Berichte*, 1880, p. 99.

lepidine, which is very troublesome in that it sometimes modifies the analytical results and the melting points of the different derivatives.

(*To be continued.*)

CAFFEIC ACID FROM CUPREA BARK.*

BY G. KÖRNER.

The raw material upon which the author experimented was supplied to him by the Lombardy Manufactory of Chemical Products, and was distinguished from other qualities of cinchona bark by giving a reddish-violet colour when a solution of potassic hydrate was added to its aqueous extract. The most important fact discovered by the author while pursuing his researches was that during the manufacture of sulphate of quinine from this bark there is formed a notable quantity of caffeic acid, which is evidently produced by the breaking up of a complex substance existing in the bark in company with the alkaloid. The caffeic acid is found in the mother-liquors as caffeate of quinine. This salt is obtained by repeated evaporation and fractional crystallization in slightly coloured mammilar crystals, which on being treated with dilute sulphuric acid and exhausted with ether sometimes give caffeic acid, but at others an acid which is obtained in such small quantities that it has not yet been studied. The mother-liquors turn brown when in contact with the air and deposit on the sides of the vessel containing them a dark powder, resembling in this respect solutions of caffeic acid and protocatechuic aldehyde. They also often give off an odour closely resembling that of vanilla.

The process adopted by the author for preparing the acid from the bark is as follows, the yield being about 0·5 per cent:—

The powdered bark is extracted with ether and then treated with boiling alcohol until nothing more is dissolved out. The alcoholic solution is then evaporated to dryness and the residue is treated with two and a half times its weight of boiling water, its own weight of caustic potash is added, and the whole is kept boiling for three hours. The liquid is then superaturated with dilute sulphuric acid, filtered while hot and shaken up with an excess of ether. The ethereal solution is then concentrated until crystals, accompanied by a syrupy liquid, are formed, the latter being separated by repeated washings with very small quantities of ether. The crystals are recrystallized from a boiling solution which has been previously submitted to the action of animal charcoal and filtered while hot. These crystals are in the form of somewhat brilliant and hard tables of a yellowish colour and containing 4·8 per cent. of water of crystallization. The solution does not reduce Fehling's solution; it takes a dark green colour with ferric salts, and a tint that turns to a cherry red on the addition of sodic carbonate. The neutral and basic acetates of lead give a bright yellow precipitate, and nitrate of silver a whitish precipitate, which darkens and becomes reduced on being heated. It has a strong acid reaction and is coloured deep yellow by concentrated alkalies, the tint changing to brown in the air. The acid may be obtained fairly well crystallized from its solution in boiling acetic acid in the form of crusts consisting of opaque warts. It does not seem to possess a fixed fusing point, but towards 414° F. it decomposes, giving off gaseous products. Submitted to dry distillation it yields an oil that becomes crystalline on cooling. These crystals give the reactions of catechine, especially the characteristic green colour with caustic potash.

The above are the characteristics of caffeic acid as described by Hlasiwetz in Liebig's 'Annalen,' vol. cxlii. Hlasiwetz obtained his acid by splitting up caffeotannic acid. Analyses of both compounds are similar to each other within ordinary limits. The formula determined from the analytical results, as interpreted by Hlasiwetz, is—$C_9H_8O_4 + \frac{1}{2}H_2O$.

In order to avoid any doubt on the matter the author prepared from the cuprea bark acid some bimethylcaffeic acid and its methylic ether, which both gave precisely the same characteristics as the corresponding compounds prepared from the caffeic acid of Hlasiwetz.

The fact of having produced caffeic acid from the *Cinchona cuprea* as a product of the splitting up of a complex substance contained in it, that acid only having hitherto been obtained by a similar splitting up of caffeotannic acid from coffee, furnishes an additional proof of the relationship which exists between the coffee and cinchonaceous plants, Zwenger having already obtained quinic acid from the former. With several extracts of other species of cinchona bark the author could not succeed in obtaining this acid.

* From the *Annali di Chimica* for June.

AMMONIACAL CITRATES.*

BY E. LANDRIN.

It is well known that many metallic oxides and citrates, insoluble in water, are soluble in the alkaline citrates, even in the presence of reagents, which under ordinary conditions precipitate these oxides. This phenomenon has been made the basis of a quantitative method for the determination of phosphoric acid. Some years ago, Spiller (*Pharm. Journ.*, 1858) carried on a series of investigations, in order to study the influence of citric acid in preventing the precipitation of the metallic oxides, and arrived at the general result that the neutral citrates possess the property of combining with other salts to form a class of compounds of the general formula $M'_3C_6H_5O_7 + 3M'_2SO_4$, in which sulphuric acid may be replaced by carbonic, chromic, or boracic acids. For instance, solutions of these compounds are not precipitated by barium nitrate until a slight excess of sodium sulphate is present. Lebaigue (1864), however, considers that these phenomena are due to an interchange between the acids and bases, which is stable only so long as the citrate liberated in the nascent state is soluble, and thus the peculiar characteristics of the acids and bases present become apparent when the nascent citrate has saturated the alkaline citrate, viz., when the precipitant is in excess of the alkaline citrate. Further, the insoluble citrates are dissolved in the alkaline citrate in definite proportions, and citric acid being tribasic can saturate not only three equivalents of the same, but also of different bases to form soluble salts.

In order to decide between these views, the author has taken up the question, and has arrived at results in accordance with those of Lebaigue, *i.e.*, citrates insoluble in water dissolve in alkaline citrates, with formation of double salts of the composition $M_2M'C_6H_6O_7$, in which M is an alkali-metal, and M′ a metal belonging to some other class.

This result receives support from the following experiments:—If barium carbonate is gradually added to citric acid saturated with ammonia until one equivalent of acid and baryta are present, a clear solution is obtained, from which, on cooling, normal barium citrate separates out. The supernatant liquid contains in solution a double ammonium barium citrate. Analogous phenomena were observed with the oxides of calcium, strontium, lead and cadmium. Again, if aluminium hydroxide be dissolved in ammonium citrate, and the solution evaporated over sulphuric acid, white crystals of a double ammonium aluminium citrate, $3C_6H_5O_7(NH_4)_2H + [C_6H_5O_7(NH_4)_2]_3Al_2 + 6H_2O$, will separate out. A similar iron salt was obtained, a solution of which gives no precipitate with succinic and benzoic acids, no coloration with potassium thiocyanate, and no precipitate but only a green coloration with potassium ferrocyanide. The author also prepared and analysed analogous double citrates of ammonium and magnesium, manganese, nickel, cobalt, zinc, copper and mercury, but was unable to obtain salts of antimony, bismuth, tin or silver.

* From *Journ. Chem. Soc.*, June 1882; *Ann. Chim. Phys.*, [5], xxv., 233.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 23, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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THE "LANCET" ON DRUG ADULTERATION.

THE address delivered by Professor ATTFIELD before the British Pharmaceutical Conference at Southampton has furnished topics for editorial comments in most of our medical contemporaries. We doubt whether in all cases Professor ATTFIELD would be prepared to accept the construction put by the writers upon particular parts of his address, and certainly we think he must have been surprised to find himself ostentatiously thanked in the last number of the *Lancet* for giving the opportunity of writing one of the wildest productions upon the subject of adulterated medicines that has yet appeared in a journal claiming to speak with authority on medical subjects. The determining cause of the publication of such an article as that to which we refer is simply enigmatical to the uninitiated, but the consequences necessarily following such a course are such as to make it much to be deprecated. Amongst the good work done by the *Lancet* in the past that which is perhaps best known and remembered by the general public is the agitation it carried on against adulteration, which paved the way first for the Adulteration Acts of 1860 and 1872 and then for the existing Sale of Food and Drugs Act. Any statements made by our contemporary upon the subject of sophistication or substitution, especially in regard to medicines, with which it might be supposed to have special facilities for becoming acquainted, may well, therefore, be received as authoritative by a large portion of the community, though we are glad to believe that in this case they will not be so accepted by the members of the medical profession generally. The *Lancet* is, moreover, not entitled to the excuse—if it be one—that might be allowed to the *Saturday Review*, where the topic was started, that it was writing about an unfamiliar subject, since it deliberately joined in the discussion with the assumption that that journal was less perfectly acquainted with the facts.

The charge made by the *Lancet* is that death is often attributed to the virulence of disease, or perhaps to want of skill on the part of the doctor, when in reality it is attributable to the use of worthless medicines. "The doctor," it says, "ordered the "appropriate remedy, and if actually administered "it would probably have checked the course of "the disease. But what was actually administered "was not the remedy at all, but a counter-"feit of it, and though the patient did not "detect the difference, the disease did, and the "patient died." If language means anything this must be construed as applying to the conduct of pharmacists in the dispensing of the prescriptions of medical practitioners, and as involving a terrible allegation against the integrity of a class of men in whom, we believe rightly, the medical profession and the public at present repose considerable confidence. And with the exception of one piece of personal experience—the substitution of powdered sugar flavoured with quinine for salicin, which looks very much like an old story told backwards—the only evidence referred to in support of the charge is a report on the deteriorations, adulterations and substitutions of drugs presented to some public body in the United States.

The fact is that the whole article would be too grotesque for serious consideration were it not that a continued repetition of even irresponsible statements cannot fail to produce uneasiness and doubt where only confidence ought to exist. The time is past when men should be placed in a literary pillory without undergoing even the form of a trial. If there be offenders among British pharmacists, such as those described by the *Lancet*, a means has now been provided by Parliament for bringing them to punishment, and the evidence that ought to be considered indispensable before publishing such gross imputations would be sufficient for their convictions. But the absence of such convictions, although the law has now been in operation seven years, during which time the officers acting under its provisions have certainly shown no lack of attention to drugs and medicines, is sufficient to show how little justification there is for the statement above quoted. That drugs of inferior quality and adulterated drugs are still to be met with is not to be denied, but between them and the patient stands the skilled pharmacist who has been specially trained to detect and eliminate such disturbing influences in the battle against disease, and we do not believe the dispensing of the pharmacists of this country is fairly open to reproach. It may be that picked cotton is sometimes introduced into bottles of quinine to increase the bulk, as indeed the *Lancet* says it is; but we presume that our contemporary is hardly prepared to contend that such quinine, cotton and all, finds its way into mixtures upon which the lives of patients depend, or even into less critical preparations.

THE INTERNATIONAL PHARMACOPŒIA.

THE opportunity afforded by the recent meeting of the German Pharmaceutical Association was utilized by the President of the International Pharmacopœia Commission, Herr VON WALDHEIM, to present a statement as to the progress made in carrying out the work confided to that body by the International Pharmaceutical Congress held last year in London. Herr von Waldheim said that the Commission now consists of thirty-two members, two of which represent the United States and the remainder European countries. Only one European state, Spain, remains unrepresented, repeated applications, both oral and by letter, having been made to the Madrid Pharmaceutical Society to elect representatives, without effect. The first step taken by the President of the Commission was to send to each member a list of medicinal substances and preparations occurring in the European and American pharmacopœias, with the request that the recipient would strike out all those articles which he did not think suitable to be included in the International Pharmacopœia, and also add to the list any omitted articles that he thought should be included. From nearly all the members the revised lists have been received, Norway, Italy, and, of course, Spain, being the only defaulters in this respect, the lists being accompanied in many cases with the revisors' reasons for the course taken and as a rule presenting evidence of the most careful consideration. The list sent for revision contained 233 of the most used more or less powerful medicinal substances and preparations, and about 350 other drugs and preparations were recommended by the different members as suitable to be included in an International Pharmacopœia, the French representatives making in addition the general declaration that they were in favour of the largest possible list.

Although at the first glance it would seem difficult to determine among so large a number as 583 articles what were suitable for insertion and what were not, the problem was made considerably easier by, on the one hand, keeping in view the resolutions passed by the Congresses of Paris, Vienna, and especially of London, and on the other, the consideration that the fitness of any particular medicament, however powerful it might be, for a place in the International Pharmacopœia must be dependent upon the extent to which it is known and used. As a result it would appear that altogether 120 or at the most 150 articles should be included in the work, since most of the representatives were in favour of only the most powerful medicines being included, striking out the less active, whilst scarcely any of the 350 articles proposed in addition were recommended by more than one member.

The next step taken by the Executive will be to draw up a list of articles proposed to be included, based upon the revised lists and recommendations, together with formulæ for the preparations, and send a copy to each of the members of the Commission for consideration. The plan proposed to be followed in respect to the formulæ is to compare the recipes for each preparation occurring in the different pharmacopœias, and to recommend those for acceptance which are found in the majority of the pharmacopœias of the larger states, giving especial weight to those in the more recent works; consequently, there can be little doubt that the new edition of the German Pharmacopœia will exercise an important influence in this respect. Among the most difficult points to settle appear to be the materials for and the manner of preparation of extracts and the relative proportions of the original drug to many tinctures and preparations, concerning which the greatest divergence exists in the pharmacopœias of different countries. Herr von Waldheim is of opinion that in the case of countries where existing formulæ differ very widely from the new ones that may be adopted in the International Pharmacopœia, consideration should be shown for what will frequently be a very old custom, and that this could be best done by such old formulæ being retained in the respective countries under names quite different from those adopted in that work, and then indicating such preparations when intended by mentioning the pharmacopœias of their respective countries. With respect to simple substances it is proposed to give only the most important characters and to avoid as much as possible giving tests for chemicals, leaving these definitions to be supplied in the pharmacopœias of the different countries.

MENTAL MIST.

Our United States contemporary, the *Therapeutic Gazette*, assuming that a paper on "Secret Remedies," which appeared in the *Pharmaceutical Journal* for December 17 last (p. 502), was an expression of our editorial opinion, is pleased to express its approval of our aim, but is fearful that there is a mist in front of our mental vision that needs clearing up before we shall be able to see the difference between scientific pharmacy and the unscientific pharmacy of some specialties; to this friendly task, therefore, it devotes the greater part of two columns. Our contemporary is well qualified to speak with authority upon the subject of specialties, but it appears to be labouring under a mistake, which, as its remarks have been quoted by the *Pharmacist* and possibly by other journals, it will be as well to correct. We would therefore disclaim any right to the limited praise or any necessity for the volunteered coaching with respect to the article in question, since the only mist which has interposed has been that which came between our contemporary's own vision and the statement contained in the opening sentences, that the article was a quotation from a German journal.

At the recent meeting of the German Pharmaceutical Association in Berlin, it was announced that during the past year 114 names had been removed from the roll of members and 135 added, being a net increase of 21. The gross total of members of the Association is now 2755, which includes 17 extraordinary and 18 honorary members.

According to a recent Government return, the crop of cinchona bark derived from the Government plantations in the island of Java amounted in 1881 to 165,000 Amsterdam pounds (nearly 180,000 lbs. avoirdupois) against 100,000 pounds in the previous year.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 238.)

A paper was then read on—

THE PURITY OF COMMERCIAL CHLORIDE OF GOLD.

BY F. W. BRANSON.

In the Blue List issued annually to members of the British Pharmaceutical Conference, "The Purity of Commercial Salts of Gold" has, for several years past, appeared as a desirable subject for investigation; the contribution of the results of a series of recent analyses of chloride of gold may therefore prove of interest, especially as most pharmacists have at least occasional transactions in this article of commerce.

A standard of strength and the maintenance of this standard is by no means a matter of indifference, considering the large quantity used by photographers in the process of toning. As most of the salt met with in commerce is found in 15-grain tubes, ten of these from five distinct sources were taken for analysis, low results being obtained from Nos. 9 and 10; two other tubes from the same source were taken to prove whether the deficiency was an average one or due to careless weighing or loss in filling.

In the above series, owing to the distinctive appearance of the various samples, labels, etc., the products of four manufacturers could be recognized, series *A, B, C* and *D*.

After several experiments the following methods for the estimation of the weight of contents of tube and the contained gold were found to be convenient, rapid (if the time required for precipitation, thirty-six hours, be excepted) and accurate, the precipitated gold being nearly chemically pure.

The vol. process with oxalic acid and permanganate, as described by Sutton, was not tried, the direct method being considered preferable.

The actual weight of the contents of each tube was estimated as follows:—After removal of label by soaking in water the tube was filed round the centre to facilitate breakage; the weight of tube with contents was next taken, the salt shaken to one end of the tube and fracture made at filed portion; the two portions of tube with contents were now transferred to a beaker, and treated with successive quantities of distilled water; the resulting solution, after transference to a conical flask having a file mark at 5-oz. capacity (which measure the solution should occupy) was precipitated with oxalic acid.

The weight of fractured tube after drying was deducted from the weight of tube with contents, the difference being chloride of gold.

The annexed series shows the weight found in each tube, the average of each manufacturer is also given—

Sources.		
A	14·781 14·180 14·875 15·995	average 14·957.
B	15·620 14·673	average 15·146.
C	14·627 15·470	average 15·058.
D	13·547 13·948 13·825 13·677	average 13·749.

The best precipitant was found to be pure oxalic acid, several advantages being apparent; for, as the precipitation proceeds at a much slower rate than with either sulphurous acid or ferrous sulphate, should platinum or other metals be present they are less likely to be carried down with the gold; the metal is also thrown out of solution in a more coherent form, thus facilitating the subsequent operations. The non-introduction of a metallic salt is also obviously an advantage if the separation of metals is found requisite.

Experiments proved the time required for complete precipitation to be not less than thirty-six hours at a temperature of about 70° F., and twelve hours' exposure to light.

The quantity of oxalic acid found to give good results was 25 c.c. of the standard solution (63 in 1000) for the contents of each tube; this quantity was therefore measured by means of a pipette into the gold solution, the flask set aside under conditions as above described, and the contents finally raised to boiling point; after subsidence the colourless solution was found in a trial experiment to be not darkened by H_2S, and on evaporation no further reduction of metal occurred, the residue, oxalic acid, being quite white.

After precipitation the greater part of the fluid was poured on a filter, the flask was then shaken in a circular manner so as to cause the particles of gold to sweep off any film adherent to the sides of flask, which should now appear by reflected light to be quite free from metallic coating, the precipitated metal collected on the filter, washed, dried, incinerated and weighed, the following results being obtained:—

A	7·267 6·974 7·313 7·792	average 7·286.
B	7·349 7·082	average 7·215.
C	7·097 7·537	average 7·317.
D	6·595 6·773 6·661 6·588	average 6·654.

Sufficient time not being at my disposal for the complete examination of the residues from the evaporation and incineration of the oxalic acid solution from which the gold had been precipitated, they were placed aside for subsequent analysis. I will now, therefore, merely give in round numbers the weights yielded by series *A*, *B*, *C* and *D*.

A and *B* more than 10 per cent.
C and *D* less than 1 „

Metals precipitated by H_2S or AmHS were practically absent from all the above samples, which were obtained from firms most likely to supply the requirements of pharmacists, foreign samples being purposely excluded.

A small variation *plus* or *minus* within reasonable limits in the quantity of salt or metal contained by any given tube is, of course, allowable, and is to be expected, but the marked deficiency of tubes Nos. 9 to 12, inclusive, obtained from a firm possessing the confidence of the trade demands notice, for a deficiency of 8 per cent. in weight of contents or 5 per cent. in the proportion of metal that should be present demands notice, and it should be mentioned that neither trade mark, seller's name nor guarantee label was attached to either of these numbers; but tubes Nos. 1 to 8 all had attached one or other of these distinctive marks, and from sources *A* and *B* 7 grains of gold was guaranteed, which quantity was fully present, as proved by analysis.

In a paper by my friend, Mr. Richard Reynolds (*vide Pharm. Journ.*, [2], vol ii.), greater discrepancies than the above were detailed, and the proposal was then made that the commercial value of the article should be governed by the equivalent of gold present; now, as then, this desirable practice would, if generally followed, certainly tend in favour of the interest of the consumer, and probably for this very reason is not adopted by some manufacturers.

———

The PRESIDENT proposed a vote of thanks to Mr. Branson, which was carried.

Mr. HAMPSON asked if it would be any advantage to have the solution sold by measure.

Mr. BRANSON said there was the question of convenience of transport involved, as the tubes were frequently sent by post, but there was no reason why a strong solution of definite strength should not be sent out in capsules.

This was followed by a paper on—

THE IODIDES OF BISMUTH.

BY F. W. FLETCHER, F.C.S., AND H. P. COOPER, F.C.S.

The iodides of bismuth described in the text-books are two, viz., a black tri iodide (BiI_3) and a red oxy-iodide ($BiOI$).

To obtain the former, one equivalent of tri-sulphide of bismuth is directed to be heated with three equivalents of iodine in a capacious loosely-covered glass globe. The iodine turns out the sulphur, and the new compound is deposited on the sides of the vessel in the form of brilliant plates. This is Schneider's process. Another method, suggested by Weber, consists in throwing iodine into melted bismuth, and distilling the mixture out of contact with air.

The red oxysalt ($BiOI$) is said to be formed on heating the tri-iodide for some time in a crucible, when it collects below the surface of the crystallized iodide in a mass of copper-coloured rhombic laminæ.

Both of these compounds, however, may be much more conveniently obtained by the decomposition, under certain conditions, of a solution of a bismuth salt by means of a soluble iodide.

Mr. Pattison Muir, to whom, with his coadjutors, chemists are immensely indebted for researches upon bismuth compounds, has recently described a very striking method of exhibiting the formation of the two iodides by pouring a solution of the tri-iodide of bismuth in hydriodic acid into varying quantities of water at different temperatures. On adding the hydriodic acid solution of BiI_3 to a little cold water, the black tri-iodide is thrown down; whilst if a large bulk of hot water is employed, red crystalline $BiOI$ is produced.

We have lately met with a yellow iodide of bismuth, which, partly on account of its novelty, and largely on account of its bearing upon one of the Pharmacopœia tests for the purity of bismuth salts, we considered would be of sufficient interest to bring before the Conference.

In the course of testing a number of samples of metallic bismuth for lead, by the addition of dilute sulphuric acid to the solution of the metal in nitric acid, we observed in one instance that a very considerable deposit was formed after standing for about twenty-four hours. As this appeared to indicate the presence of a very much larger proportion of lead than we had previously met with, the precipitate was collected upon a filter, washed, and treated with solution of ammonium acetate, in which it dissolved. Upon the addition of potassium iodide to the liquid, a bright yellow precipitate was thrown down, having all the appearance of lead iodide.

A duplicate experiment being made, we found to our surprise that no precipitate was in this instance formed, when the solution of bismuth was treated with sulphuric acid; and the subsequent application of Chapuis and Lennoissier's potassium chromate test* conclusively proved the absence of lead in the sample of bismuth.

It occurred to us, on reflection, that the precipitate produced by sulphuric acid was probably a very basic sulphate of bismuth, produced owing to the bismuth solution being too concentrated. Experiment verified this assumption, and it may not be out of place here to mention that we find that if subnitrate or carbonate of bismuth,—free from lead,—be dissolved to saturation in nitric acid, diluted with half its volume of distilled water, as directed in the Pharmacopœia, and an equal bulk of dilute sulphuric acid then added, a precipitate of basic sulphate of bismuth is formed on standing, which, so far as the Pharmacopœia test goes, might reasonably be mistaken for sulphate of lead.

The solubility of freshly precipitated basic, or rather sesquibasic, sulphate of bismuth in ammonium acetate solution, has not, we believe, been previously noted, and it was therefore quite accidentally that we discovered the yellow iodide, which is the occasion of the present paper.

It naturally occurred to us that the yellow precipitate might not be an iodide of bismuth only, but a double iodide of bismuth and potassium. To ascertain this, a portion was treated with nitric acid and excess of ammonia. The filtered liquid evaporated to dryness left no residue on ignition.

The absence of potassium was therefore demonstrated.

We were now anxious to ascertain by what other methods the new compound could be obtained.

Being aware that Drs. Woodman and Tidy had some years since, in the *British Medical Journal*,* described the formation of a red precipitate in a mixture containing iodide of potassium and subnitrate of bismuth, and also that M. Jaillet had prepared various yellow compounds under somewhat similar conditions,† we proceeded to treat various samples of subnitrate of bismuth with iodide of potassium, and found that the products obtained varied in colour from a pale lemon-yellow to a deep orange-red. Knowing that subnitrate of bismuth varies considerably in its percentage of nitric acid, we inferred that in the absence of the latter the yellow salt would be alone produced. The samples of subnitrate were therefore first shaken with solution of ammonium or sodium acetate, in order that acetic might take the place of any free nitric acid that might be developed. The addition of KI to these mixtures formed the yellow iodide only, as we anticipated.

We found also that the iodide could be readily prepared by pouring a very dilute solution of nitrate of bismuth into mixed solutions of potassium iodide and sodium acetate. Liq. bismuthi, B.P., whether neutral or acid, gives no precipitate with potassium iodide, but an orange solution is formed. This, in fact, is the method recommended by Thresh, for preparing Dragendorff's reagent. If, however, scales of citrate of bismuth and ammonia are dissolved in water and the solution acidified with acetic acid a copious orange-yellow precipitate is formed on the addition of potassium iodide.

Yellow iodide of bismuth is sparingly soluble in acetic, and freely in hydrochloric acid. Sulphuric and nitric acids liberate iodine. Digested with zinc and dilute sulphuric acid, the bismuth is deposited as metal, and the iodine passes into solution as iodide of zinc.

It is not decomposed by water, even at a boiling temperature. Ignited in a porcelain crucible it first blackens, and then evolves iodine, leaving a residue of bismuthous oxide, which, however, obstinately retains traces of iodine, which are only expelled after prolonged heating.

We have made a large number of analyses of different samples prepared by various methods, and we find that the relative proportions of bismuth and iodine vary with the colour of the compound, those which are yellow containing more bismuth and less iodine than those which are orange or orange-red.

Analyses of several specimens of a fine lemon-yellow colour, prepared by treating equal weights of subnitrate of bismuth with similar quantities of sodium acetate and potassium iodide, gave concordant results. The bismuth was estimated by the two following methods and the results given represent the mean of several experiments.

1. By ignition, the precaution being taken to moisten the residue with nitric acid, and again ignite before weighing. Bi_2O_3 found = 86·6 per cent.

2. By solution in dilute nitric acid and precipitation with ammonia. The precipitate washed until free from

* *Journ. Chem. Soc.*, xxxvi., 80.

* See *Pharm. Journ.*, [3], i., 464.

† *Pharm. Journ.*, [3], vol. xi., 1063.

any trace of iodide, yielded on ignition 86·8 per cent. Bi_2O_3.

The iodine was also estimated by two methods:—

1. The compound was heated with solution of pure sodium hydrate, the precipitated bismuth hydrate thoroughly washed, the filtrate and washings acidified by nitric acid, and the iodine precipitated as a silver salt. The amount found was 11·35 per cent. A trace of iodine was, however, discoverable in the precipitated bismuth, even after prolonged washing.

2. Known weights of bismuth subnitrate and potassium iodide were agitated with water in the presence of sodium acetate, and the yellow iodide obtained filtered off, washed, dried and weighed. The filtrate and washings were then diluted to a certain volume and the iodine estimated by volumetric solution of silver nitrate. It was found that 12·8 per cent. had been absorbed in the formation of the yellow compound.

An attempt was made to separate the iodine in the form of HI by decomposing the iodide by a current of H_2S, but this was not successful, the resulting black precipitate being found to contain iodine in abundance.

The results obtained tend to show that the yellow compound is a very basic iodide of bismuth, represented by the formula—

$$BiI_3, 5B_2O_3 \text{ or } 3BiOI, 4B_2O_3.$$

This formula requires 12·9 per cent. of iodine and 87·7 per cent. of B_2O_3. The amount of the latter found by experiment was 86·7 per cent., and the iodine (calculated by difference) 12·8 per cent.

The formula of the tri-iodide of bismuth being BiI_3 and that of the oxy-iodide or bismuthyl iodide (BiOI), the latter may be regarded as formed from 1 molecule of BiI_3 and 1 molecule B_2O_3, thus—

$$BiI_3 + B_2O_3 = 3BiOI.$$

Between the latter and the yellow salt which we have described, it is probable that there may be many intermediate compounds, a supposition confirmed by the fact that iodides of various shades of colour, from pale yellow to deep orange-red, are easily obtainable by altering the relative proportions of the iodine and bismuth. A striking experiment illustrating the tendency of the tri-iodide to form oxygen compounds may be shown by dropping a few grains of BiI_3, or a few drops of the solution of the latter in hydriodic acid, into a large bulk of water, the latter at the same time being vigorously shaken. The brownish-black colour of the tri-iodide is seen to give place to a white turbitity, and on the careful addition of a little more of the powder or solution the formation of the yellow iodide is at once apparent.

The PRESIDENT, in proposing a vote of thanks to the authors of the paper, said it was one of considerable theoretical as well as practical value.

Professor TICHBORNE asked if Mr. Fletcher found the temperature at which the salt was precipitated affected its composition, as temperature was known to have a great influence on basic salts generally.

Mr. FLETCHER said the temperature seemed to have no action at all. The salt was not soluble in either cold or boiling water; this would instantly distinguish it from iodide of lead.

Mr. PLOWMAN then read the following:—

NOTE ON MICROSCOPIC ORGANISMS IN CERTAIN ORGANIC SOLUTIONS.

BY C. H. BOTHAMLEY, F.C.S.,

Assistant Lecturer on Chemistry at the Yorkshire College.

The growth of algæ and fungi in solutions of organic substances, as for example, in solutions of tartaric acid or potassium acetate, is a matter of common observation. A number of such forms were described and figured by Pereira many years ago (*Pharm. Journ.*, vii., pp. 337, 370, 426, 1847–48). Not only do they grow in purely organic solutions, but also in organic solutions containing a considerable proportion of metallic salts. Kützing observed the formation of such growths in solutions of "polychrome" (æsculin) mixed respectively with ferric chloride, cupric sulphate, tartar emetic, gold chloride and stannous chloride. Several of the forms which grow under these conditions are described by Pereira (*loc. cit.*), who also states that he had himself observed the growth of a filamentous plant in a solution which was used for the preservation of animal substances, and which contained mercuric chloride. The exact nature of the growth depends on the particular metallic salt present, each salt being favourable to the development of a particular species. In the same paper, Pereira states that he had observed the formation of similar growths in a solution of phosphoric acid prepared by oxidizing phosphorus with nitric acid, and also in a solution of arsenious acid! It is well known, too, that a very singular fungus grows in the cells of Daniell's battery, if allowed to remain unused and at rest for a long time. With these exceptions, however, the formation of such growths in inorganic solutions appears to be comparatively rare.

In the College laboratory we are troubled with the continual formation of a green vegetable growth in bottles containing respectively solutions of ordinary sodium phosphate, magnesium sulphate, and calcium sulphate, though no such growths are formed in solutions of ammonium salts, barium chloride, and other reagents standing on the same shelves. It was natural to suppose that the germs of these organisms are derived from the air, but their appearance only in the three reagents mentioned, and not in any of the others, although some of the latter seemed to constitute more favourable media, led to the supposition that the germs were possibly mixed with the particular salts. Experiments were therefore made to determine this point.

Ten per cent. solutions of magnesium sulphate and sodium phosphate respectively were prepared by dissolving the salt in cold recently distilled water, and portions of these solutions were placed in small flasks, as follows:—

A. Original solution, left exposed to air.

B. Solution boiled five minutes, then left exposed.

C. Solution boiled five minutes and flask plugged with cotton-wool.

D. Solution heated at 55°–60° C. for two hours, then plugged.

E. Solution heated at 70°–75° C. for two hours, then plugged.

For some time no growths made their appearance in any of the flasks, but soon after the air of the balance room in which the flasks were placed had been rendered dusty, in consequence of sweeping, the vegetable growth began to form in the exposed flasks *A* and *B*, and gradually increased. In one of the *B* flasks, containing magnesium sulphate, there was also a greyish flocculent growth. No growth appeared in any of the plugged flasks, even after fifteen months. It is evident, therefore, that the germs of this vegetable organism are derived from the air.

When examined with a good sixth or eighth inch objective the green growth is seen to consist of approximately spherical bodies of very simple structure. They consist of a cell-well, enclosing a green fluid, in which are a few patches of minute reddish granules. In general appearance they resemble *protococcus*, but are much smaller, and belong to that somewhat indeterminate group of bodies which are classed together as *crococcus*. My own observations in this respect are confirmed by those of several biological friends. A small quantity of the growth formed in sodium phosphate, when transferred to a clear solution of magnesium sulphate, multiplies and flourishes just as vigorously as in the original liquid, and *vice versâ*.

Both solutions no doubt contained small quantities of ammonia, and the sodium phosphate contained some sulphate. The amount of phosphoric acid in the magnesium sulphate solution was, however, not sufficient to give a reaction with ammonium molybdate. The magnesium sulphate is, however, prepared from dolomite, which almost invariably contains small quantities of phosphoric acid, hence it is probable that we have here further proof that the formation of these green vegetable growths constitutes a most delicate test for phosphoric acid.

A vote of thanks was accorded to Mr. Bothamley.

The PRESIDENT, in putting it, said he gathered from the concluding paragraphs of the paper that Mr. Bothamley was going on with the subject, and if so he would no doubt tell them in due time what would happen if they put phosphoric acid or a phosphate of potassium, etc., into the solutions in which he had not yet observed any growth.

Mr. PRESTON said he should like to know whether Mr. Bothamley had had under consideration Fehling's solution, which was so very difficult to keep. Very often, when it would act while freshly made, after being kept a little time it would become of little or no value. Perhaps the cause of that might be traced to the presence of these vegetable organisms. He had found when in preparing that solution great care is taken to scald out the vessels, and to use other necessary precautions, the solution kept almost an indefinite period.

Mr. PARKER asked if it were not possible that the growth of fungi might be due to the absorption of ammoniacal salts from the air, such being frequently present in the atmosphere of a pharmacy or laboratory.

Mr. GREENISH said the Conference was indebted to Mr. Bothamley for bringing this subject forward; the changes which took place in pharmaceutical preparations had not received as much attention as they deserved. It was found, for instance in vin. ipecac., that a change was constantly going on in the bottle, and if they examined it by the microscope they found fermentation active, cells being distinctly visible. Again, if they took orange flower water they found a yellow deposit, and on examining it under the microscope it would be found full of bacterian life. It was also of great importance to pharmacists that these fungoid growths which appeared in solutions, even made according to the Pharmacopœia, should be studied; but it was found by many dispensing chemists very desirable and almost necessary to keep solutions of a great many salts, and he found that in nearly every one of them there would be more or less of fungoid growth, which caused great annoyance. It was not confined to any one solution, but he scarcely knew of one in which it did not apppear. He had himself cultivated a fungus grown in a solution of arsenic, a very interesting fungus; and he had cultivated another in a solution of strychnine, which was also very interesting. But it was well known to fungologists that the particular fungus could not be determined from the vegetative process or the mycelium; it must proceed to fructification. Now the fructification of a fungus in a solution would not take place so long as there was any portion of the material which afforded the fungus nourishment in the solution, and what made this matter of great importance was that if the fungus was allowed to continue to vegetate and increase its mycelium in a solution which might contain a certain amount of strychnia, or anything else, a portion or the entire of the active principle or medicinal property would disappear; therefore, it was highly desirable that this matter should be thoroughly investigated, and he sincerely hoped that Mr. Bothamley would continue these inquiries, and in continuing them that he would not be satisfied in examining merely the mycelium which was found in the solution, but would take out the fungus, place it in distilled water, wash it, remove the nutriment on which it fed, and then endeavour if possible to promote its fructification. That could only take place on the surface if it were a fungus; if it were an alga it would of course take place under the solution. As these things appear in almost every aqueous solution used by dispensing chemists it was imperative that attention should be paid to them.

Dr. SYMES said he did not think that the presence of fungoid growth was in itself evidence of the presence of phosphoric acid, but he thought Mr. Parker's suggestion of ammonia assisting in its development would hardly hold good, because the flasks were simply plugged with cotton wool, placed side by side with those not plugged, the contraction and expansion of the air going on freely, and he assumed the ammonia would enter the flasks, and if ammonia had anything to do with the development, the growth would be found in them all.

Mr. PARKER remarked that although ammonia might get into vessels which were plugged by cotton wool the germs would be kept out.

Mr. EKIN said he might mention one instance where neither ammonia nor phosphoric acid had anything to do with a growth of this sort. It occurred in an experiment with one of the azo-colours in which the principal ingredients were amidoazobenzol and β-naphthol. The precipitated colour became a solid gelatinous mass from fungoid growth in the space of twenty-four hours. It certainly startled him, and he had never been able to get any explanation of it.

Mr. GREENISH said Mr. Bothamley spoke of the germs being in the atmosphere and of the fungi appearing in some solutions and not in others. Now the fungi were different in the solutions of arsenic and in the solutions of strychnia. Fungi would grow where there was a nidus suitable for them, one in one material and a different one in another.

The Conference then adjourned for luncheon.

The next paper read was on—

THE SOLUBILITY OF MORPHIA SALTS.

BY D. B. DOTT, F.R.S.E.

Early last year I read a short paper on the solubility of some of the salts of morphia, a report of which was printed in the *Pharmaceutical Journal* of January 29, 1881. Since that time two communications on the above subject have appeared in the same Journal, both originally proceeding from the other side of the Atlantic. The first is a paper* by Professor Frederick Power on "The Solubility of Sulphate of Morphine," and the second is by Mr. J. U. Lloyd on the "Solubility of the Officinal Morphia Salts in Water and Alcohol."† Neither of these experimenters has thought fit to take any notice of my paper, nor would I of theirs, if they merely confirmed or superseded mine. As, however, I consider both of them to be very much open to criticism, I should like to take this opportunity of pointing out what I believe to be their errors.

No exception can be taken to the method employed by Professor Power in determining the solubility of the sulphate, although it is not a process applicable to all salts. It consists simply in estimating the sulphuric acid as sulphate of barium and from that calculating the corresponding amount of sulphate of morphia. Professor Power also determined the solubility by evaporating to dryness a weighed portion of the saturated solution. The ratio given by the two methods, which ought to have yielded identical results, presents a difference of about 2·5 per cent.—a somewhat serious discrepancy. The former method is the one relied on, and Dr. Power concludes that "1 part of sulphate of morphia requires in round numbers 24 parts of water at 15° C. (59° F.) for solution." This result, however, is arrived at by dividing the *weight of the solution* by the weight of the salt dissolved therein. Now it is manifest that in order to ascertain the amount of water holding a salt in solution we must deduct the weight of the salt from the weight of the solution. The solubility is then obtained by dividing

* *Pharm. Journ.*, [3], 798.
† *Ibid.*, 1036.

the weight of the solvent by the weight of the salt. Thus treated Professor Power's numbers give for the solubility of morphia sulphate in water at 15° C. 1 in 22·99, by the precipitation method, and 1 in 20·44 by the evaporation method. The Professor speaks of "disregarding the slight increase of volume produced by solution;" yet I cannot see what increase of volume has to do with the matter.

Turning to Mr. Lloyd's paper I find that his method of determining the solubility of salts in the cold is by evaporating a weighed portion of the saturated solution, which is the plan I have always adopted. Mr. Lloyd allows the solution to evaporate spontaneously, weighing the residue with its water of crystallization. This, of course, is of no consequence if care be taken that the crystals have not effloresced. Referring to the residue remaining from an alcoholic solution, Mr. Lloyd remarks: "The alcohol may abstract more or less water of crystallization, and fail to take its place in like amount, if at all, thus leading us into a slight error." I am not aware of a single instance of alcohol combining with an alkaloidal salt, and all the well-known morphia salts separate from 85 per cent. alcohol with the same proportion of water of crystallization as when crystallized from water. I regard Mr. Lloyd's system of boiling a known weight of water in a retort and gradually introducing the salt through the tubulure as an elaborately erroneous method of ascertaining the solubility of the salt in the boiling menstruum. For ordinary determinations the flask containing the boiling solution may be tilted so as to pour some of the liquid into a capsule, which is immediately covered, and weighed when cool; while for more accurate estimations a small vessel fitted with a cover may be let down into the boiling solution. The solubilities given for the hydrochloride and sulphate are evidently nearly correct, but that of the acetate is certainly wrong. I am quite aware that there is some difficulty in ascertaining exactly the solubility of the acetate. This arises from the readiness with which that salt loses its acid, and also from the fact that a proportion of the free morphia is dissolved when the basic salt is brought in contact with water. Mr. Lloyd's ratio of 1 part acetate to 11·7 parts water is far wide of the mark, as the true solubility is not far removed from 1 in 2, which are the numbers given in my paper formerly referred to. When a saturated solution of morphia acetate is boiled, decomposition takes place and a certain amount of morphia is deposited. No doubt if a sufficient quantity of acetic acid be then added a clear solution is obtained, but it would hardly be safe to take the result of such an experiment as indicating the true solubility of acetate of morphia in boiling water; yet this is Mr. Lloyd's process. All the morphia salts, so far as I am aware, are less soluble in alcohol than in water, but the statement that "acetate of morphine is not so soluble in alcohol as the alkaloid morphine" is quite erroneous, the converse being correct.

I intended to have ready for this Conference a carefully compiled table of the solubility of morphia salts, but various circumstances have conspired to prevent me, especially the warm weather, as I wished to make all the determinations at 60° F. I trust, however, that what I have written will help to clear the ground for future work. Meanwhile the table which I formerly gave, and which is printed in the 'Year-Book of Pharmacy' for 1881, will be found "sufficiently correct for practical purposes."

The President, in proposing a vote of thanks to Mr. Dott, regretted that he was not present, and also Professor Power. Considering the difficulty of getting at the solubility of any salt or substance in fluids, and indeed the general indefiniteness and haziness of the matter altogether, he was not sure but that Professor Power was right in disregarding the slight increase of volume which was produced when a salt was added to water; at all events, in the cases mentioned. At the same time investigators were not quite so accurate as they might be in describing what they meant by solubility. It was common to see the solubility of a given salt stated to be 1 in 10, but one did not know whether that was 1 part by weight in 10 volumes, or that 1 part had been put into 10 parts of the fluid, or whether 10 parts by weight of the fluid contained 1 part of the solid.

Mr. Parker said he had been looking forward with considerable pleasure to this paper, and was very disappointed at Mr. Dott's absence. The subject of solubility was somewhat unsatisfactory; he would suggest that there should be standard conditions for the taking of solubilities, recognized through all countries. It was a disputed point as to its variability, but as far as his own work went he was satisfied that solubility might vary very much with the conditions under which it was observed. The solubility of a body of definite chemical constitution which was not altered in composition by the action of heat might be very well taken by the method of evaporation, but there were many bodies, volatile at a moderate dry heat, which could not be taken in that way; the solubility of the substance which he had the honour of bringing before the Conference on the previous day illustrated this fact. The chief point he had noticed was that when the substance was added to the cold menstruum, and the "point of saturation" observed, the result differed from that obtained by making a stronger solution with the aid of heat, and noting the "point of crystallization." In the case of terpin hydrate the solubility in cold alcohol was 1 in 13, whereas, taken in the hot way, it would be 1 in 11, so that either statement would be altogether useless unless the conditions under which the solubility was observed were mentioned. It would be very valuable to have throughout the whole range of chemical solubilities one standard by which they should be taken. Of course there would be some cases in which it might be taken more satisfactorily by another method, but these should be mentioned as exceptions to the general rule. The point of cold saturation appeared of most value to the pharmacist.

Mr. Williams thought this question of solubility had really a wider bearing than had perhaps been indicated either by the author of the paper or by the last speaker. The solubility of bodies seemed to be very intimately connected with their power of crystallization, and with that which arrested crystallization. He might remind the Conference of a paper which appeared in the *Pharmaceutical Journal* a few weeks before, by M. Tanret, in which he proved that caffein, which was extremely insoluble, was rendered soluble by salicylate, benzoate, or cinnamate of sodium. He had made some of the salicylic and some of the benzoic compounds, and they certainly were not chemical compounds, for chloroform dissolved the caffein from them; therefore, the caffein was merely held in them in a chemical form, or in a solution, but they could be converted into dry substances. These bodies, however, caused caffein to be perfectly soluble. This would upset, therefore, any attempted standard of solubility in a most important manner, and he believed caffein was not the only substance in which the same thing was illustrated. He would refer to salicylic acid and many of the alkaloids, which were really uncrystallizable until they got rid of the impurity, often in a very minute quantity, which entirely prevented their crystallization. That was very often represented by what was called solubility. He was very much of opinion that solubility should be taken rather as the measure of the want of power of crystallization than as simply the power of solution. Sulphate of lead, for instance, was a very insoluble body, absolutely insoluble probably in pure water, but it was known how terribly soluble it was in some solutions, such as sugar, acetate of sodium and some other bodies. For these reasons it seemed almost impossible to make a standard.

Mr. SHENSTONE said that already there was one practice which predominated in the statement of solubilities. He had lately been engaged a great deal on this question, and in looking through other people's work he found a large number of the old investigators gave their solubilities as the amount of salt dissolved by 100 parts of water, and those who made experiments of this kind would save a great deal of trouble by adopting that as their standard. If it became the practice of everybody working in this line to adopt that method it would simplify matters for the future, for if all adopted different standards it was very inconvenient. With regard to Mr. Williams's remarks, he did not think the case he alluded to, *i.e.*, the solubility of caffein in salicylate of sodium, was necessarily not a case of chemical action, because of the possibility of extracting the caffein from that solution by chloroform. It was possible that when caffein came into the presence of the sodium salicylate chemical action took place, a certain amount of salicylate of caffein being formed, and a certain amount of sodium hydrate set free in the solution. If the solution were now treated with chloroform, the result would be that the free caffein which remained there would be removed, and then the equilibrium being upset a reverse action would take place, some of the caffein being set free, which the chloroform would then remove, and this would be repeated, so that practically it might all be got out again.

Mr. P. W. SQUIRE said the value of solubilities depended very much on the object in view. For example, if a person wanted to dissolve a salt in water and had no notion about how much it would dissolve, the information he required was how much salt would dissolve in a given quantity of water. If, on the other hand, a manufacturer had a liquor which he wished to crystallize out, he viewed it from the point of how low it ought to go before the substance ought to crystallize out, and therefore he looked at the question from a totally different point of view from the other man. The salt would not crystallize out until it was supersaturated. It occurred to him, therefore, it was something like the case of 32° F. being looked upon as either the freezing point of water or the melting point of ice. It was rather the melting point of ice. He should call solubility the amount which would be dissolved in water, and the other point when it would crystallize after evaporation the point of crystallization rather than solubility.

A paper was then read entitled—

NOTES ON THE PHARMACY OF CINCHONA.

BY R. W. GILES.

It may be taken for granted that the members of the Pharmaceutical Conference are perfectly well aware of the contradictory and unsatisfactory state of the pharmacy of cinchona, for there has scarcely been a meeting at which it has not been pressed upon their notice, so that they may possibly ask "What is the use of this wearisome iteration?" The answer is that the grievance remains, and custom and prejudice are so inveterate that it is necessary to attack it again and again, even with the same weapons, before amendment can be hoped for. In this way alone pharmacists are able to exercise some influence upon their own Pharmacopœia.

All practical pharmacists must be aware that it is next to impossible to obtain officially recognized cinchona bark of the official alkaloidal standard; while there is no lack of barks of superior alkaloidal value and equally well adapted to pharmaceutical purposes which are not officially recognized. These evident truths have been asserted amongst others by Trousseau et Pidoux (*Traité de Thérapeutique*), Professor Flückiger (*Pharmaceutische Zeitung*), and by Messrs. Umney, Holmes, and Dr. Paul, at meetings of this Conference.

The only dissentient that I know of is Mr. de Neufville, who asserted in a paper read at the last Conference (*Pharm. Journ.*, vol. xii., p. 369), that the *supply* of *flat* calisaya during the past few years had been abundant, and the *quality* of *quill* calisaya had been good; but I cannot put that and that together so as to amount to a statement that in his opinion there had been an abundant supply of good calisaya bark; and even then I should be obliged to conclude that the preponderance of evidence was against him.

Thus far the cinchona difficulty appears to be geographical; good barks, far exceeding the modest pharmacopœial standard, being excluded because they do not grow west of Greenwich and do not bear the name of calisaya. These do not appear to be distinctions of sufficient importance to place in opposition to scientific tests. Dr. Paul put the case clearly and conclusively when he said that an alteration was necessary in the range of selection o. pharmaceutical barks; that South American barks should not be excluded, but that Indian barks should be admitted. In other words, let alkaloidal standard be the sole test.

In consequence of the "fearful deterioration of calisaya bark,"* and the unsatisfactory state of its pharmaceutical preparations, cinchona has fallen more and more into disuse, to the prejudice of pharmacy and of medical practice, its place having been usurped by quinine, contrary to the opinion of the best authorities upon the relative value of the two medicines. It is the province of pharmacists to rectify this miscarriage amongst their wares, and to restore one of the most valuable articles of the materia medica to its proper place and functions. It is not suggested that they should substitute even good Indian bark for inferior calisaya, when the latter or its preparations are prescribed, however unadvisedly; but that they should take care to have in stock bark of sufficient alkaloidal value (independent of the B.P. standard, which is too low) and that they should *educate* the medical profession to the use of it.

Although therapeutics are a forbidden subject, it may be permitted to quote the opinions of orthodox authorities upon the therapeutical qualities of cinchona and its alkaloids as an indication of the direction which pharmaceutical research ought to take, the more so as those opinions show that the chemistry of cinchona has hitherto moved in the wrong direction.

It has been well established by the Medical Commission appointed by the Government of India to investigate the febrifuge properties of the cinchona alkaloids,† and their conclusions are supported by the testimony of English and more especially of continental observers,‡ that the febrifuge and antiperiodic action of cinchona is common to *all* its alkaloids, and it follows that the exclusive employment of quinine, as it has long prevailed, is a wasteful mistake. But more than this, the best writers upon therapeutics assert that *cinchona* possesses medicinal properties superior to those of any or all of its alkaloids, which Dr. Pereira attributed in part to the astringent properties of the cinchotannic acid, and in part to the aromatic quality of the bark causing the alkaloids to sit more easily upon the stomach.§ From this it may be inferred that pharmaceutical preparations of cinchona would be free from the objection sometimes charged against the mixed alkaloids employed in India under the name of cinchona febrifuge, that they excite nausea. In Neligan's 'Medicines,' similar opinions are expressed, viz. (p. 737): "Most practitioners are of opinion that none of the alkaloids possess the same medicinal properties as cinchona bark, *more especially in the treatment of intermittent diseases*. . . . and . . . I must, however, confess that every day's increased experience induces me to prefer the preparations of bark to those of any of its alkaloids when a *tonic* effect is sought for."

Why then should "*most practitioners*" have so far changed their opinions, or at any rate so altered their

* See *Pharmaceutical Journal*, vol. ix., p. 213.
† *Pharmaceutical Journal*, vol. ix., pp. 78, *et seq.*
‡ Pereira, vol. ii., pt. ii., p. 132; Neligan, p. 736.
§ Pereira, vol. ii., pt. ii., p. 137.

practice, as to substitute quinine for cinchona almost universally, and particularly in those periodic diseases for which it is so emphatically asserted that none of its alkaloids possess equivalent virtues? Is it not, at least partly, because, in the words of Mr. Umney already quoted, "Calisaya bark has deteriorated to a fearful extent of late," and, as Dr. Paul told the Conference last year, "it now really contains nothing more than a little cinchonine."

It may be very loyal to the Pharmacopœia to continue the unquestioning supply of calisaya bark which was described upon the same occasion as "almost invariably worthless;" but how about the welfare of fever-stricken patients, and the credit of pharmacy? It must not be forgotten that the Pharmacopœia never initiates anything; it is a codex of remedies which have already been approved and which it has become desirable to place under control.

The reputation of cinchona has once before suffered, at a very early period after its introduction into Europe, from a similar deterioration in the importations of South American bark. The early supplies brought over from Peru by the Count and Countess of Chinchon (1640) proved so effectual in the cure of fevers and agues that more orders were sent out than the Peruvian merchants could execute properly, and they sent back consignments of inferior barks, which proved worthless and brought the new remedy into temporary disfavour. This deception is as good a reason as any other for the name of Jesuits' bark which was conferred upon it at about this period.

There was no quinine in those days or probably the parallel with our present experience would have been complete; but having no substitute the common sense of the 17th century set an example to the science of the 19th. It discarded the worthless barks and supplied itself with others of suitable alkaloidal standard assayed by the fever test. In these days of practical science brokers sell and quinine-makers buy cinchona bark on the basis of its alkaloidal percentage, ascertained by exact analysis. The pharmacist alone buys hap-hazard the "showy barks," often very poor in alkaloids, and hence known as "druggists' barks," which the quinine makers are only too happy to leave for him and the dealers only too pleased to get rid of, though for pharmaceutical purposes percentage of alkaloids is more than a relative test of value,—it is an absolute test of fitness.

The very reverse ought to prevail; the pharmacist should secure the first choice by being willing to give a better price than the quinine makers, who can only give the alkaloidal value, which is literally the intrinsic value of a part of its constituents. Under this system the pharmacist would get much better value for his money than he does now by buying a "showy bark destitute of alkaloids." I have heard of a time-honoured establishment, which I must not further particularize, buying several serons of calisaya bark at 3*s.* 6*d.* lb., which proved to contain not a particle of quinine and only a very small amount of cinchonine. Its assay value certainly would not have exceeded 6*d.* This is a sort of bark which should be left for the stores, whom it would exactly suit, and where no questions are asked.

The question then is "What standard should be adopted for the cinchona of pharmacy?"

First, it should be an alkaloidal standard, not a quinine standard.

Secondly, it should be a mean and not an extreme standard.

And, thirdly, it should be catholic, admitting barks from all sources without arbitrary geographical distinctions, which, originally intended as definitions, have now become irrational limitations.

At the Conference of 1878, Mr. Umney spoke of East India bark containing 5 or 6 per cent. of quinia as the future source of fine fluid extract, and, if of fluid extract, of other pharmaceutical preparations. Assuming him to have meant 5 or 6 per cent. of mixed alkaloids, that would be a reasonable standard to insist upon,—say a minimum of 5 per cent., which holds a mean place between the extremes. I have computed the actual average of ninety-three lots offered on sale by the Dutch Government last year, and find that it is exactly 4·7 per cent. The highest quality reached 9·8 per cent., the lowest touched 1·2 per cent., giving a mean of 5·5 per cent. The mean of the two results is therefore 5·1 per cent.

It remains to be considered how this standard should be secured, for it is to be feared that pharmacists generally do not submit their purchases of cinchona to the pharmacopœial test, and it is as well to acknowledge that refined tests are not practicable in the pressure of daily business. Mr. Holmes, probably having this difficulty in view, suggested that the wholesale druggists should be required to state the percentage of alkaloids in the samples they offer, but this is scarcely sufficient for the protection or for the credit of the pharmacist.

The same difficulty seems to have presented itself to Messrs. Squibb, of New York, who have endeavoured to meet it by publishing what they consider a simple, easy process of assay suited to the wants and the skill of well-trained pharmacists who are not expert quinologists. Whether the process possesses the desired qualities of simplicity and facility may be judged by perusal of the description at p. 77 of the third number of Messrs. Squibb's 'Ephemeris.'

In pursuit of a similar object I have been led to prefer the more simple hydrochloric acid process, which I tried on the recommendation of Dr. De Vry, in his laboratory at the Hague and with the advantage of his assistance. The *modus operandi* finally adopted is as follows:—

Take 25 grams finely powdered cinchona bark, mix with 2·5 c.c. strong hydrochloric acid (=2·6 c.c. B.P. strength) in 30 c.c. distilled water, or just so much as suffices to moisten the bark; set by for two hours, add 100 c.c. distilled water and let stand for twelve hours or more, stirring occasionally, until all foam disappears from the surface. Pour into cylindrical glass percolator, the mouth of which has been stopped by a pinch of charpi loosely drooped into it and moistened with a little water, and recover the clear percolate. Pour on more water until the percolate ceases to be precipitated by caustic soda. In this way about 300 c.c. are recovered. Precipitate with caustic soda in considerable excess. Set the mixture by for twelve hours, when it will be found that the alkaloids have settled in a compact coherent stratum from which nearly the whole of the supernatant may be decanted. The decantate must be reserved. The precipitate is then poured upon a filter and washed with a little weak solution of soda to remove traces of cinchona red; finally it is washed with a little distilled water, the whole of the washings being added to the decantate and the measure noted. When the precipitate has drained it is to be carefully transferred to a tared porcelain dish, dried over water-bath and weighed. The weight should not be less than 1·25 grams, corresponding to 5 per cent. mixed alkaloids. But this will not be an exact indication of the alkaloids contained in the bark, as an appreciable quantity remains dissolved in the mother-liquor. Practically this may be estimated as 0·05 grams in 100 c.c., which should be added to the ascertained weight of the precipitate, and the sum multiplied by 4 gives a very close approximation to the true percentage, quite near enough for pharmaceutical purposes. When greater accuracy is desired the mother-liquor is treated with benzol and the alkaloids are recovered by operations which it is not necessary to describe as they need not be employed in pharmaceutical assays.

The merit of the above process is its simplicity and facility of manipulation; the several stages may be set going as opportunity offers and they proceed automatically without withdrawing the operator from other duties. Secondly, the results correspond with the amount of alkaloids which can be extracted in practical operations.

If it were not for the title of this paper there would be no reason for saying anything about the pharmaceutical preparations of cinchona. As it is, a very few words will suffice. It is notorious that they do not meet the demands of modern medical practice. Cinchona won its reputation by administration in the form of powder, it has lost it by the substitution of inferior preparations of inferior bark. The tincture, decoction and infusion of former generations have had their day and are becoming obsolete, never again to find favour with prescribers, pharmacists or patients. They are all too feeble in alkaloids for administration when the specific effects of cinchona are in question. Their qualities and their condemnation will be found in a paper by Mr. Ekin, in *Pharm. Journ.*, vol. ix., p. 213. Nor can it be necessary to pour more obloquy upon the much abused fluid extract, which has never yet found a single defender. Its poverty and its wastefulness have been often told. The best that can be said for it is that when carefully prepared from barks of suitable quality (which does not mean barks rich in alkaloids) it possesses agreeable astringent properties associated with an unimportant amount of alkaloids which render it acceptable as a vegetable tonic, but it leaves the major part of the valuable and characteristic cinchona principles in the imperfectly exhausted bark.

Fluid extracts are the pharmaceutical preparations of the day. Their convenience commends them equally to the medical practitioner, to his patient and to the dispenser, and the demand for them is not likely to be diverted; but a fluid extract of cinchona, worthy of its name, is still a desideratum in pharmacy.

The PRESIDENT proposed a vote of thanks to Mr. Giles. He feared the present was not the proper occasion for going into any question as to what principles the cinchona bark owed its therapeutical properties to; their time would not suffice to discuss that, even if they had sufficient medical knowledge to do so; but several important pharmaceutical questions had been brought forward in the course of the paper, and those might very profitably be discussed.

Mr. WELLCOME said the subject of supplying chemists with bark of definite alkaloidal strength for dispensing and manufacturing purposes had been much discussed before, and he believed that some houses did offer to chemists with their bark an assay giving the definite alkaloidal strength. That was the custom of some houses in regard to opium, and he believed Dr. Squibb and others supplied the trade in America with barks with which he furnished assays. It appeared to him that that was one of the most important safeguards, and, while he thought it desirable that every chemist should be able to assay for himself the alkaloidal strength and to determine the amount of the respective alkaloids, it was hardly practicable that he should depend entirely on his own assays, and after all the guarantee of a respectable house would be the best general safeguard. As to the question of the strength that should be accepted as a standard for pharmaceutical preparations. Some members of the Conference might remember that he strongly urged last year that the quinine strength should not alone be accepted, but that a definite alkaloidal strength of the various alkaloids should be the only standard. A bark which yielded two per cent. of quinine ought to be satisfactory for manufacturing pharmaceutical preparations, providing it contained a proper amount of cinchonidine, quinidine and cinchonine, say to make 5 per cent. total alkaloidal strength. Quinoidine was also very active, and some of the preparations most sold in the Tropics for checking fever and ague consisted almost entirely of that resin, which was by many considered a modified or uncrystallizable quinine.

Mr. SOUTHALL said he could quite confirm the difficulty which had been mentioned in regard to getting a reliable calisaya bark for pharmaceutical purposes. There was still a good run on the preparations of bark other than the extract and tincture. The decoction was very much ordered by medical men in his part of the country, and was more relied upon than either the fluid extract or tincture.

Mr. HAMPSON thought they would be more likely to reach the point the author aimed at of having an accepted standard quality of bark, or bark yielding a certain proportion of alkaloids, if there were a standing committee of pharmacists, and not a pharmaceutical committee formed by the Medical Council entirely. The Pharmaceutical Society ought to be legally recognized in all these matters, and if practical pharmacists held their proper position with respect to the National Pharmacopœia these important changes or improvements would be sooner brought about. As it was these changes came about in an indirect and slow manner, and improvements did not take place as fast as they should.

Mr. EKIN said he feared the medical men in Birmingham had made rather an unhappy selection, according to Mr. Southall's statement, for in the experiments he had made, which were referred to by Mr. Giles, he found the decoction was by far the weakest in alkaloidal value of all the officinal preparations.

Dr. SYMES confirmed Mr. Southall's statement that the decoction was very largely used and very much relied upon by medical men; it was not peculiar to Birmingham.

The PRESIDENT said it would be seen from the remarks which had been made that they greatly needed increased activity in the promotion of therapeutical research, and it would be well if there were a society for this purpose formed by medical men having competent chemical and physical knowledge.

Mr. GILES, in reply, said he could not claim that what he had brought forward was new, but still it sometimes did good to repeat what was already known. With regard to the alkaloidal standard, Dr. Pereira pointed out that cinchona made its reputation as a febrifuge by the use of a species of cinchona which was not rich in quinine, but in which cinchonine largely prevailed, and this seemed to show that they had made a mistake in pinning their faith so much to the alkaloid which happened to be first discovered. Although recent investigations appeared to show that it was necessary to give cinchonine or quinidine or cinchonidine in larger doses than quinine to produce the same effect, there appeared to be no difference in the effects produced and, therefore, it seemed to be a great waste to throw away that which might be recovered simultaneously with the quinine. At all events it seemed to him that it was rather their business to support the pharmaceutical manipulation of things than the chemical. He had often been disposed to think that chemistry had been ridden a little to death, and that isolation of active principles had been carried too far.

The following three papers were read succesively before a discussion was taken upon them:—

NOTE UPON THE ACTION OF GLYCERINE ON SOME SALTS OF IRON.

BY G. F. SCHACHT.

About two months ago our friend and fellow member Mr. Shenstone brought me the remains of a mixture that had been dispensed for him and which appeared to have undergone during the interval a somewhat interesting change. The prescription runs as follows:—

℞	Tr. Ferri Perchlor.	ʒiss.
	Glycerini	ʒvj.
	Aquæ	ad ℥vj.
M.		

The mixture when first prepared was of a pale sherry colour, and possessed an astringent metallic taste. When brought to me, however, by Mr. Shenstone the colour had almost disappeared and the taste was sweet and metallic but not astringent. It appeared, in fact, as though the iron had become reduced from the ferric to the ferrous condition.

The application of ferricyanide of potassium and of sulphocyanide of potassium showed us that this change had really taken place to a very considerable extent, but not quite to the complete reduction of the perchloride.

Mr. Shenstone kindly left the matter in my hands and I deem it of sufficient interest to bring before the Conference.

My first experiment naturally started with a repetition of the original prescription and an examination of the results at the moment of mixture, and though somewhat prepared for the fact by previous observation, I found it necessary to record as the first memorandum that the *tincture* of perchloride of iron taken from the ordinary dispensing bottle was no longer what it was when originally mixed, for it gave an emphatic bright green colour with ferricyanide of potassium.

It was clear, therefore, a change in the condition of the iron in the *tincture made with ordinary alcohol* had commenced to take place, similar to that suspected to have been developed under the influence of glycerine.

The mixture, however, still exhibited the usual deep red reaction with sulphocyanide of potassium, indicative of a plenteous proportion of unreduced ferric chloride. It was loosely corked and placed in a fairly light position in the laboratory, but not in direct sunshine.

After a fortnight's interval it was examined. It still in part retained its pale sherry colour, it produced a deep blue with ferricyanide and a much less deep red with the sulphocyanide of potassium.

It has been kept since that time (about three weeks) under similar conditions and I do not observe much further change.

A similar mixture was prepared and placed where it could *receive the direct rays of the sun.* After two days it was found to be colourless, to show abundant evidence of ferrous iron, but not to have entirely lost its property of reddening with sulphocyanide, nor has further exposure to the sun and the addition of more glycerine to the mixture entirely deprived it of this property.

Sunlight was also found to produce a similarly accelerating effect when the ferric chloride was subjected to the reducing action of ordinary alcohol.

It being clear, then, that glycerine possessed in a marked degree the power of reducing iron from the ferric to the ferrous condition, it was thought probable that it might be employed to prevent the converse change of ferrous into ferric salts which is sometimes so inconvenient.

A mixture was therefore prepared consisting of—

Ferrous sulphate	gr. x.
Dilute sulphuric acid	ℳxv.
Glycerine	ʒvj.
Water	to ℥vj.

and was kept in the diffused light of the laboratory. When first mixed it resisted all the fascinations of the sulphocyanide and bestowed upon it not the slightest blush, but after a few days the usual demoralization had commenced and the salt showed distinct signs of peroxidation. The amount of this action, however, appeared to have a limit, the proportion of ferric salt produced being very similar to that left unreduced in the former experiment.

Exposure to sunlight did not appear to influence this mixture in any special manner.

In connection with the probable further chemical changes that accompany these phenomena, I may mention the results of two further sets of experiments that were made, though I need not recite their details. They showed that both glycerine and ordinary alcohol reduce permanganate of potash rapidly.

I find that the behaviour of glycerine under treatment with permanganate has been already studied and that according to Kasmann (*Bull. Soc. Chim.*, [2], xxvii, 246) the change consists in the conversion of 2 molecules of glycerine *plus* 1 molecule of oxygen derived from the permanganate into 1 molecule of glucose and 2 molecules of water thus:—

$$2(C_3H_8O_3) + O_2 = C_6H_{12}O_6 + 2(H_2O).$$

Whether the changes brought about by the persalts of iron are similar to the above throughout I am not at present prepared to assert, but that such should be the case appears to me very probable. The question is very interesting and will I hope one day be answered.

In the meantime, pharmacists and medical men may with advantage remember that ethyl alcohol and glycerine (and probably other alcohols) reduce persalts of iron and tend to prevent the oxidation of protosalts, and that this influence appears to be stronger when the mixture is exposed to sunlight than when it is left in the shade.

Note on a Reaction of Glycerin and other Polyhydric Alcohols.

BY WYNDHAM R. DUNSTAN, F.C.S.,

Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society.

The reaction which forms the subject of this note is one which has been observed during the course of an investigation upon the action of some polyhydric alcohols upon sodium biborate. The fact that when certain of these alcohols are added to a solution of borax an acid reaction results, was first noticed by Klein (*Compt. Rend.*, lxxxvi., 826). In the case of glycerin, this reaction has been further studied by Senier and Lowe (*Pharm. Journ*, [3], viii., 819), who have also proposed a test for glycerin based upon it (*Journ. Chem. Soc.*, xxxiii., 438). In this reaction glycerin appears to resemble an acid in its action. If, however, the acid solution obtained by the addition of glycerin to an aqueous solution of sodium biborate be heated, the liquid becomes alkaline. The first published observation of this fact was made by Donath and Mayrhofer (*Zeits. f. anal. Chem.*, xx., 379), who considered this reaction characteristic of glycerin and propose to employ it as a test for this substance, using litmus as an indicator of the reaction. No test experiments, however, are detailed by these observers. In the present note the results of some experiments are given which, although not originally instituted for this purpose, indicate the delicacy of the reaction and also its invalidity when considered as specially characteristic of glycerin.

A number of experiments were first made to determine the delicacy of the reaction. The results led to the employment of a dilute solution of sodium biborate and to the abandonment of litmus as an indicator of the reaction. Even when a dilute solution of borax was employed the colour-changes of the litmus were ill defined. Other indicators were then experimented with and, finally, satisfactory results were obtained by the use of phenol phthalein. When an alcoholic solution of this substance, which is faintly yellow, is added to a solution of borax a rose-red colour is produced owing to the alkalinity of this salt. Upon the addition of glycerin to this solution the red colour at once disappears, the solution being acid and colourless. Upon heating the liquid the rose-red colour is again developed, reaching the maximum tint near the boiling point of the solution. As the liquid cools, the colour gradually fades away, until finally the solution is again colourless. The colour-changes are sharp and well defined. Experiments have been made with solutions of borax of various strengths; the best results were obtained with a half per cent. solution. A convenient method of applying the test is to take two cubic centimetres of a half per cent. solution of borax and add sufficient of an alcoholic solution of phenol phthalein to impart a decided rose-red colour. To this liquid gradually add the solution of glycerin made neutral or faintly alkaline, until the colour is discharged. Heat the solution to the boiling point, the red colour is restored, and after cooling the liquid is again colourless. Excess of glycerin is to be avoided, otherwise the alkalinity of the solution is only partially restored by boiling. The delicacy of the reaction is dependent not only upon the excess of sodium biborate which might be present, but also upon the amount of water. If the colourless solution obtained in the above manner be largely diluted with water the red colour is partially restored. After a great many experiments it was found that using a half per cent. solution of borax the limit of the test is practically reached at a two per cent. solution of glycerin. Using two cubic centimetres of borax solution, about five cubic centimetres of a two per cent. solution of glycerin were necessary to discharge the colour. When a stronger solution of glycerin is used the amount required will of course be less than that of a two per cent. solution, but not proportionately less, for the more dilute the solution of glycerin the greater is the action of the water, which tends to reproduce the alkalinity of the solution. Hence the quantity of a stronger solution of glycerin required will be less than the proportional amount calculated from a more dilute solution. The test is not satisfactory with solutions of glycerin of greater dilution than two per cent., as the changes of colour become indefinite, owing to the action of the water. Neither can a more dilute solution of borax than a half per cent. solution be used for the same reason. I have made a series of experiments upon the utilization of this reaction as a basis for the quantitative estimation of glycerin, but so far the results have not been altogether satisfactory. The reaction is far from characteristic of glycerin, but is more so of the polyhydric alcohols in general. I find that it is also given by mannite, erythrite, dextrose, levulose, lactose and mycose. Sucrose (cane sugar) does not behave in the same way. In the case of mannite the reaction is extremely delicate, more so than with glycerin, and the solution is not so amenable to the influence of water as is the solution of the latter substance. Guaiacol, pyrogallol and saligenin also give the reaction. Orcin and resorcin, when added in large quantity, partially destroy the red colour, but it is not restored by boiling.

Ammonium salts, which are known to liberate boracic acid from solutions of borax (Woodcock, *Journ. Chem. Soc.*, xxiv., 785), discharge the red colour of the test solution, but it is not restored upon heating. In testing liquids for glycerin by this method ammonium salts should be removed by ebullition with sodium carbonate, and the solution either made nearly neutral or evaporated and extracted with a mixture of ether and alcohol before applying the test.

It appears from the above experiments that this reaction is not only given by glycerin but also by many other polyhydric alcohols, both of the paraffin and benzene series, and by certain sugars. Therefore in testing for glycerin by this method the absence of these substances must be ensured. I hope in a future paper to show precisely the nature of the reaction which occurs between certain of these polyhydric alcohols and sodium biborate.

The Solubility of Boric Acid in Glycerine.

BY DAVID HOOPER,

Pharmaceutical Chemist.

The extended application that has recently been made of boric acid combined with glycerine has created a demand for these two antiseptics in many forms. The most prominent among them is a preparation introduced by Professor F. Barff, M.A., and named by him "Boroglyceride" (*Journal of the Society of Arts*, xxx., 516), and still later the glycerborate of calcium and the glycerborate of sodium fully described by M. Le Bon (*Comptes Rendus*, xcv., 145). But it appears, on reference, that a more simple preparation, the mere solution of the one substance in the other, has been little investigated, or at any rate determined, and therefore some experiments were instituted to elucidate this point, and after determining the strength of a saturated solution at the mean temperature of our latitude, observations were continued in order to discover the relationship this result bore to its solubility at other temperatures.

As only two chemical bodies were to be employed in the following determinations, special attention was directed to their purity. The boric acid (B_2O_3,3 H_2O) was free from compounds of ammonium and magnesium, and from other salts and acids likely to be met with in its natural state or in its preparation from borax. Its specific gravity was taken and found to be 1·485. It was used in fine powder and kept under a bell jar over sulphuric acid to prevent absorption of moisture or gases. The glycerine was a very pure sample, it had a gravity of 1·260 at 15·5° C. and was always measured as near this temperature as possible.

The viscid nature of the glycerine, its slower dissolving capacity, and the alteration of boric acid when subjected to heat, make it tedious to estimate their solubility by any of the few ready methods employed when water is the solvent. It eventually occurred to the author that in a case like this some physical formula involving a knowledge of density and volume might well be utilized. As a datum, therefore, a solution was thus prepared. An excess of boric acid was added to some glycerine half filling a pint bottle, the mixture was kept with frequent agitation in an apartment where the temperature ranged from 18° C. to over 20° C., after three days the solution was poured off and transferred in another bottle to a cellar where it was kept for a similar period at 16° C. A slight crystalline deposit had formed in the mixture, due to the reduction of temperature. The specific gravity of the resulting saturated solution was then carefully taken. The weight of a certain volume and the gravities of its constituents being known, the following formula was used to obtain their proportions:—

$$V = V_1 + V_2$$
$$VS = V_1S_1 + V_2S_2$$

when V, V_1, V_2 represent the volumes of the mixture, the glycerine and the boric acid respectively, and S, S_1, S_2, their relative gravities.

The working of this formula may be illustrated by calculating from an actual experiment. The weight of a saturated solution when taken in a 1000 grain bottle was found to be 1290 grains. Substituting this with the other data the formula becomes

$$1000 = V_1 + V_2$$
$$1290 = V_1 . 1{\cdot}260 + V_2 . 1{\cdot}485$$

these two equations worked out simultaneously will give for glycerine, 866·6 and boric acid, 133·3 grain volumes per thousand; the volume of the last-named substance has, however, to be converted into weight. Then by proportion, it is shown that 4·37 parts by volume of glycerine dissolve 1 part by weight of boric acid at 16° C.

Some experiments were also made by mixing different quantities of glycerine with the same amount of boric acid and agitating them occasionally for several days, when it was again determined that 4·4 c.c. or practically 4½ c.c. of glycerine were sufficient to dissolve 1 gram of boric acid.

The methods used for determining the saturation point at higher temperatures were according to the following description:—The apparatus employed was, a long test tube furnished with a rubber stopper and graduated from the bottom in cubic centimetres accurately corresponding with those marked on a burette containing the glycerine, and a water-bath consisting of two beakers containing water, the one immersed in the other of larger size, and placed at such a distance over the source of heat so that the temperature might be regulated to any desired degree. A weighed quantity of boric acid and a measured quantity of glycerine were run into the tube, the acid being in excess, glycerine was cautiously dropped in until, after remaining in the water-bath for about half an hour, perfect solution was obtained. The temperature was then lowered and the degree at which the mixture began to be turbid was noted, and this was used as a check on the particular determination. After numerous experiments in this manner a line of solubility was formed extending to the boiling point of water. Some of these higher saturation points were tested by keeping the mixtures in stoppered bottles in an air oven with regulated temperature, but I consider the determinations as detailed in the above description would be performed with more expedition if not with more accuracy. It now remained to take the solubility at zero; this was found by diluting a saturated solution with glycerine until the acid ceased to crystallize out when immersed for half an hour in a tube in melting ice.

In the following table the results are exhibited as parts by weight dissolved in 100 parts by volume of the solvent; such a representation is found in the lines of solubility shown in Fownes's 'Inorganic Chemistry' (p. 144):—

Solubility of Boric Acid in 100 parts of Glycerine from 0° to 100° on the Centigrade Scale.

20	parts at	0°
24	"	10°
28	"	20°
33	"	30°
38	"	40°
44	"	50°
50	"	60°
56	"	70°
61	"	80°
67	"	90°
72	"	100°

The solubility of boric acid in water has been determined by Brandes and Firnhaber (Watt's 'Dictionary of Chemistry,' i., p. 639), the results were calculated so as to make a line comparable with the table just represented. The line formed is not absolutely straight, and although it occurs much lower down on the scale, it is not parallel; a slender convergence takes place in the direction of zero. I propose, if opportunity is afforded, to make fuller comparisons of these two lines and find what relation exists between them when lines of solubility are formed by dissolving the boric acid in glycerine diluted to various strengths with water.

Votes of thanks having been passed to the authors of the above papers,

The President said Mr. Schacht's note was very acceptable, and was a model in many respects. It belonged to a class which was always welcome, being the result of observations in the course of dispensing. With regard to the reaction itself, it had long been known that perchloride of iron was reduced to a ferrous condition by alcohol, and indeed there was in a former North German Pharmacopœia a preparation called ethereal spirit of chloride of iron, made by dissolving the perchloride of iron in alcohol and exposing it to light until the green colour was produced, and a tincture of a very pleasant flavour was obtained. Apparently the reaction was more rapid with glycerine. There might be a reaction such as Mr. Schacht had described, and probably there was a reaction with the glycerine, that substance being, indeed, an alcohol, a polyhydric alcohol as Mr. Dunstan had remarked. Mr. Dunstan's paper had considerable interest, inasmuch as it would throw light on the constitution, not only of glycerine, but of boric acid, and borax; all which substances being used in pharmacy, any further knowledge respecting their constitution would be interesting to pharmacists. Mr. Hooper's paper seemed rather to bear on the action of antiseptics. Not only were chemists and druggists interested in the preparation and sale of antiseptics, but advice respecting their employment might be very properly given by pharmacists. It was very gratifying to see that Mr. Hooper had produced a paper of this kind involving a large amount of skill and knowledge, just the paper that should be produced by a chemist who was also a druggist.

Mr. Kingzett said there was no reason to suppose that the antiseptic property of boroglyceride was any greater or more definite than that of boracic acid on the one hand, or glycerine on the other, or a mixture of the two substances into which the compound is resolved again by the agency of water, or even of the tissues in which water is always present. He therefore failed to see on what grounds this substance was put forward as a new or improved antiseptic. Boroglyceride might be regarded for all practical purposes as a mixture of glycerine and boracic acid, and there was no evidence on record pointing to the superiority of the compound as an antiseptic.

Mr. Gerrard was very much pleased with Mr. Schacht's communication, because it explained what took place in a perchloride of iron mixture which was very largely used in his hospital. It always contained some glycerine, and he found, after standing a week or so, the last portion was much clearer in colour than when first made, consequently a mixture made with this residual portion differed in colour from that first made, and it was often a question asked of dispensers why the mixture sometimes appeared dark and at others light. The explanation now given seemed very satisfactory.

Mr. Schacht, in reply, said he had nothing further to add except this, that he must acknowledge he did not remember, perhaps he never knew of the German preparation that had been referred to, but he was aware that there had been plenty of observations bearing upon this point by other men, and he should not have troubled the Conference with it, but at the time he first made his notes he thought it was just possible that he should be able to add something to what was known of the processes that went on during the change. The difficulties of the case, however, had been a little too much for him, and he had not been able as yet to determine what exact changes did take place.

(*To be continued.*)

Parliamentary and Law Proceedings.

Excise Prosecution.

At the Hull Police Court, on Tuesday, September 12, 1882, before Mr. E. C. Twiss, Stipendiary Magistrate, Robert Banks, chemist and druggist, Porter Street, was summoned by the Excise authorities "for unlawfully selling a certain article, capable of being used internally as a medicine, viz., paregoric, in the preparation of which methylated spirits and derivatives of methylated spirits had been used."

Mr. Claxton, Inspector of Inland Revenue, stated that, from complaints that had been made, two samples of paregoric were purchased at the defendant's shop, which were analysed, and both found to contain methylated spirit instead of ordinary alcohol, but in different quantities in each, which must have been taken from two different sources.

The defendant admitted the offence, and could only account for it by supposing that the paregoric had been taken out of the wrong jug, as he had one containing methylated spirit and the other ordinary spirit. He was not certain whether he or his assistant served it.

His Worship said defendant had made himself liable to a penalty of £100. He would be fined £10, including costs.—*Eastern Morning News.*

Suicide by Hydrocyanic Acid.

On September 14, Mr. Malcolm, coroner for Leeds, held an adjourned inquest touching the death of Mr. Wm. Hornby, a gentleman, aged 71 years, and who had formerly held the office of an alderman of the borough. The deceased was found dead in bed, and a *post-mortem* examination and chemical analysis made by Mr. Scattergood revealed the presence of hydrocyanic acid. A bottle which had contained the poison was found in the bedroom. From the evidence, it appeared that the deceased applied at the shop of a chemist where he was well known for an ounce of hydrocyanic acid, stating that he wished to kill a dog. From a letter addressed to his son by the deceased a deliberate intention of self-destruction was manifest, the cause being pecuniary difficulties originating in railway speculations some time since. The jury found that deceased died from poisoning, and that he was of sufficiently sound mind to know what he was doing.

Poisoning by Laburnum Seed.

At Richmond, Yorkshire, on Monday week, three young boys were poisoned by eating the seed which had fallen from a laburnum tree near the infant school in Dundas Street. Whilst at school during the afternoon the children vomited a good deal. Medical aid was afterwards obtained, and although the usual restoratives were applied, the boys continued in a very bad state until midnight, when they took a turn for the better, and they are now making favourable progress. There have been several similar cases in the town lately, but none of them have proved fatal.—*Leeds Mercury.*

Poisoning by Aconite.

A peculiar case of poisoning by aconite has come under the notice of Mr. Frederick G. Baker, one of the house surgeons at the Poplar Hospital, and from which no less than five persons are suffering. From what the surgeon has learned, it appears that one of the persons poisoned (a young man) saw something drop from one of Messrs. Pickford's vans, and on picking it up thought it to be a piece of horseradish. He tasted it, and on finding the root palatable he ate some and gave a piece each to three other young men, one of whom gave a portion to his sister. Alarming symptoms of poisoning soon began to show themselves, and the sufferers were taken to the Poplar Hospital, where Mr. Baker managed to keep up artificial respiration for about four hours, when the effects of the aconite began to be exhausted. The symptoms exhibited by the poisoned persons were paralysis of the legs and arms and a burning sensation on the tongue. A piece of the supposed root was examined by Mr. Baker, who at once found that it was aconite. All the persons are now nearly recovered.—*Leeds Mercury.*

Obituary.

Notice has been received of the death of the following:—

On the 15th of July, Mr. Henry James Henderson, Chemist and Druggist, Shieldfield, Newcastle-on-Tyne. Aged 62 years.

On the 7th of August, Mr. John Woods, Chemist and Druggist, North Street, Chichester. Aged 66 years.

On the 8th of August, Mr. Joseph Frederick Malins, Chemist and Druggist, The Dispensary, Reading. Aged 54 years.

On the 19th of August, Mr. James Sinclair, Chemist and Druggist, Llandudno. Aged 66 years. Mr. Sinclair had been a Member of the Pharmaceutical Society since 1877.

On the 23rd of August, Mr. William Graham Carr, Pharmaceutical Chemist, Berwick-upon-Tweed. Aged 78 years. Mr. Carr had been a Member of the Pharmaceutical Society since 1841.

On the 26th of August, at Scarborough. Mr. Edward Cass Coverley, Chemist and Druggist. Aged 51 years.

On the 1st of September, Mr. Henry Brearley, Chemist and Druggist, Swine Market, Halifax. Aged 41 years.

On the 2nd of September, Mr. George Frederick Kent, Chemist and Druggist, Shirehampton, near Bristol. Aged 44 years.

On the 4th of September, Mr. James Watmore, Pharmaceutical Chemist, Peach Street, Wokingham. Aged 31 years.

On the 5th of September, Mr. Hamilton Murray, Chemist and Druggist, Lancaster Street, Newcastle-on-Tyne. Aged 50 years.

On the 9th of September, Mr. Samuel Johnson, Pharmaceutical Chemist, Church Street, Liverpool. Aged 70 years. Mr. Johnson had been a Member of the Pharmaceutical Society since 1841.

On the 14th of September, Mr. Andrew Brunton, Chemist and Druggist, Partick, N.B.

Correspondence.

The Decomposition of Salicin.

Sir,—Permit me to remark upon certain of the points raised in the discussion which followed Mr. Brownen's paper at the late Conference meeting, as reported in your issue of last week.

With the general tenour of Mr. Kingzett's remarks I perfectly agree, but they contain one statement which I believe to be an error, and one which is so widely repeated that I venture to point it out a second time. The statement I refer to is that if salicin "were boiled with a dilute acidulated solution, the compounds mentioned by Mr. Brownen would be obtained, viz., glucose and saligenin." In a paper published in this Journal ([3], ix., 865) I showed that saligenin cannot be obtained by the action of boiling dilute acid upon salicin in quantity sufficient to give the blue colour with a ferric salt, much less to give the crystalline scales mentioned by Mr. Brownen. The fact is that though perhaps saligenin is formed in an intermediate reaction, the action cannot be stopped at that point, and the result is invariably glucose and saliretin. In the paper referred to I quoted the original investigator of the reaction in support of my results, and against the statements of most works on chemistry. If, however, anyone can show how different results may be obtained I shall readily admit that I am wrong.

Another point I wish to refer to is mentioned by Mr. Groves, and is certainly important. Have the digestive ferments any action upon each other which modifies their activity in any important respect? Some experiments of mine, published in the *Pharmaceutical Journal* ([3], ix., 751), though fragmentary, bear directly on this. They prove that in the case of a starch-converting ferment, such as that of malt, its activity is not affected by the presence of pepsin (itself not starch-converting) nor by a very weak acid, but that it is destroyed by a certain degree of acidulation.

Professor Attfield showed his usual tact in his veto of a discussion upon the "mysterious factor" or "vital force," but at the same time, as Dr. Symes pointed out, it is practically impossible in the chemical laboratory to imitate the conditions which obtain in the living alimentary canal. While, therefore, it must be admitted that the value of such an investigation as Mr. Brownen has commenced is immensely reduced by this fact, still its importance as a check upon purely biological evidence is quite enough to induce a hope that the subject will be thoroughly studied.

Alfred Senier.

R. G. Mumbray.—(1) *Suæda fruticosa*; (2) *Suæda maritima*; (3) *Euphorbia Paralias*; (4) *Senebiera Coronopus*; (5) *Aster Tripolium.*

J. J. Hall.—(1) *Polysiphonia fastigiata*; (2) *Fucus canaliculatus*; (3) Fruit of *Fucus platycarpus.*

Asthmaticus.—See a paper on "Drug Smoking," in vol. x. (1878), p. 386.

Gulielmus.—Rectified "oil of tar," a product of the distillation of wood tar.

Silvester.—We do not think there is any special law regulating the practice of pharmacy in the country.

F. J. H.—The doctor is right. A little consideration should show you that the rule to which you refer is a necessary one. At any rate you appear to have been acquainted with it, but chose to ignore it; you have, therefore, no fair ground of complaint.

F. J. Jackson.—*Spergula arvensis.*

Communications, Letters, etc., have been received from Dr. W. J. Clark, Messrs. Klinker, Umney, Lamble, Foster, Beck, Hart, Pratt, Kempenfeldt, Mason, 1878.

"THE MONTH."

Autumn is undoubtedly the best time to study the structure of fruits, more being then available for the purpose than at any other period of the year. The scarlet berries of the bryony, dulcamara and mezereon, and the still more specious fruits of the yew, as well as the cherry-like fruit of the deadly nightshade (*Atropa Belladonna*), are just such as would tempt the eye, and it is scarcely a matter of surprise that they should be picked and eaten by young children. In the *British Medical Journal* (p. 521) a case of poisoning by mezereon fruits is recorded, the patient being a little girl, two and a half years old, living at Maidstone, who seems to have eaten about fifty of them. After the administration of emetics and castor oil (the former of which did not cause the ejection of the seeds), the application of mustard to the chest, and the use of ammonia and brandy internally, she evacuated the seeds and recovered next day. The case possesses some interest as six to twelve berries have been considered a fatal dose, and the narcotic symptoms which formed a marked feature in this case have been disputed. A somewhat similar case of poisoning lately occurred at Plumstead in the same county, a little boy two years old having eaten some berries supposed to have been collected in the next garden. The medical man who saw the child found him suffering from inflammation of the stomach and intestines, "due to some irritant mineral poison." After a *post-mortem* examination death was attributed by the same medical man to the deceased having eaten some of the berries. These were said by the coroner to be belladonna berries; but the *British Medical Journal* doubts whether this plant is likely to have been found in a garden and suggests the *Solanum nigrum* or *S. Dulcamara.* It seems strange that the medical man should not know belladonna when he saw it, yet it can scarcely be called an irritant poison. The frequent mistakes which occur concerning this plant and the hemlock water dropwort seem to suggest that a practical knowledge of our indigenous poisonous plants, as well as of the commoner garden species, does not form so prominent a feature in botanical lectures as it should do.

At this time of the year orchids with green or white flowers seem to be the predominant species. The musk orchis, *Herminium monorchis*, the *Spiranthes autumnalis* (both with greenish-white flowers and fragrant towards the evening), and the *Habenaria viridis* are not unfrequent in pastures, but probably often overlooked. Another species, also with green flowers, *Malaxis paludosa*, probably often escapes notice from occurring in spongy bogs where it is dangerous to tread, but when found the curious gemmæ on the leaves are worthy of notice. The *Spiranthes* has, for the size of the plant, remarkably large tubers, which would probably make as good salep as the Indian kind.

At the Botanical Gardens at Regent's Park, one or two interesting economic plants may be seen in fruit. That of the star-anise, in which the carpels are erect in the centre of the flower when in blossom, may now be seen extended with the follicles occupying a horizontal position. The smooth fruits of *Croton Tiglium*, in the Economic House, present a marked contrast to the prickly fruits of the castor oil plant, which more resemble externally the thorny "apple" of the *Stramonium*. *Adenanthera pavonina* is also in fruit, and will afford an opportunity of watching the change of the seeds from green to the brilliant red colour which characterizes them. The sensitive plant, *Mimosa pudica*, is now decked with heads of flowers of a delicate lilac hue, and the jaborandi (*Pilocarpus pennatifolius*) is putting forth fresh flowering spikes.

At Kew the Economic Beds still present a number of medicinal plants in blossom, among which are conspicuous the pinky-white flowers of the scammony plant, while the violet-blue ones of the alkanet and the sky-blue of the borage are in close contrast; peppermint, lavender, horehound, chicory, safflower, hemp, and many others, also continue in flower. The barren terminal bracts of *Salvia Horminum* seem to concentrate in themselves all the colouring matter of the plants, and if colour serves to attract insects it is difficult to understand why they should present so conspicuous a purple, while the small, almost white, flowers might easily be overlooked.

In the country the colchicum should be in full blossom, enlivening the damp pastures, to which it is partial, by its brightness of colour. The camomile is abundant on damp grassy commons and the hop hangs its graceful festoons on the hedgerow. The catmint, too, with an odour which has been likened to that of some of the cages at the Zoological Gardens, is now in blossom on chalky banks.

Of roses the name is legion, and it requires some little courage to attempt the feat of mastering the distinctive features of even the British species. A new variety of a species of this intricate genus has recently been discovered by Mr. George Nicholson, Assistant Curator of Kew Gardens, at St. Cyrus, Kincardineshire. It has been named by M. Crepin, in compliment to the discoverer, var. *Nicholsoni* of *Rosa subauda* (*Gardeners' Chronicle*, p. 272).

The new British umbellifer, *Selinum carvifolium*, mentioned as having been discovered in Lincolnshire, has now been met with in great quantity, and undoubtedly wild, in Cambridgeshire, by a young botanist named Cross (*Gardeners' Chronicle*, p. 276). It is satisfactory to know that the plant may therefore be accepted as a native of Britain; probably a species so easily overlooked may yet be found in some of the other eastern counties of England.

Another new British plant has recently been discovered, viz., *Lycopodium complanatum*. This plant, which had previously been found as near this country as Belgium, was met with in heathy ground in Gloucestershire. Except in its compressed frond and procumbent habit, it bears considerable resemblance to *L. alpinum*, for which it might perhaps be overlooked. A figure and full account of the plant are to appear, it is said, in the forthcoming number of the *Journal of Botany.* Several other interesting discoveries have also been made recently, *e.g.*, the occurrence of *Eriophurum gravile* in the New Forest, and also *Isnardia palustris*, in tolerable abundance.

In *Nature* (p. 477), Dr. Schaarschmidt Gyula corrects a statement of Professor Pringsheim concerning the occurrence of hypochlorin in the *Bacillariaceæ* and *Cyanophyceæ*. Dr. Gyula says that he has with the use of hydrochloric acid found hypochlorin in all the *Bacillariaceæ* and *Cyanophyceæ* investigated, the experiment having succeeded best with *Calothrix scopulorum*. As this species is not uncommon all round the British coast, forming a dark green skin on the rocks, the accuracy of Dr. Gyula's remarks can easily be tested.

The investigations of Pringsheim on the nature and mode of formation of chlorophyll have been gone over by A. B. Frank (*Journ. Micr. Soc.*, p. 528), and among other interesting results arrived at he concludes that the change of colour of leaves in autumn is due to the disappearance of the protoplasm of the cells, in consequence of which the chlorophyll grains come in contact with the acid cell sap, the result being the change of the green colour into yellowish green or yellow, followed by the separation of oily drops of hypochlorin. The same change takes place in fruits and also in leaves which become yellow from want of light. Wiesner regards the protection of chlorophyll from injury as one of the functions of vegetable protoplasm.

In *Comptes Rendus* (xcv., 487), a note by Mr. E. Mer is published which throws some light on the curious dimorphic leaves of aquatic Ranunculi. He considers that as the petioles of submerged leaves elongate, while the contrary is the case with the floating leaves, it is probable that the petiole absorbs the nutritive matter to the detriment of the limb, the submerged leaves not producing starch and not being capable of transpiration. This does not apply to sessile leaves, since in them there is no disturbance of the nutritive balance, the dimensions only of the leaf being lessened.

Some interesting results have been obtained by A. J. Kunkel (*Journ. Micr. Soc.*, p. 532) concerning the various electric phenomena observed in plants. He found that the leaf veins are generally positive towards the rest of the leaf, but the direction of the current is reversed if the spot on the leaf where the electrode is placed is wetted before the other electrode is placed on the vein. A spot long moistened is positive towards one freshly wetted. When a plant is bent or wounded the electrode near the bend or wound is negative to the other. Dr. J. Burdon Sanderson has noticed somewhat similar phenomena in the leaf of the Venus's fly trap (*Dionæa muscipula*), the under surface of the sensitive lobe of the leaf being electro-negative to the upper at the moment that the leaf is irritated; after about half a second the upper surface becomes electro-negative and remains so for some time.

Baron F. Mueller, the well-known botanist, Director of the Botanical Gardens at Melbourne, defends, in the *Gardeners' Chronicle*, p. 278, his use of the words "algs" and "fungs" instead of "fungi" and "algæ," on the ground of conformity with the terms mosses and lichens. In the same way he uses the word "eucalypts" instead of "eucalypti," just as we say 'elms" instead of "ulmuses." His use of the diminutive termination "let" in "stalklet," "fruitlet," etc., and other alterations proposed by him, are, it may be hoped, the commencement of a change of foreign botanical terms into more easily understood English ones, a change which would certainly render the study more easy and pleasant than it is at present, and tend to remove the reproach that botany is a science of hard names.

In the report by Dr. Cobbold (*Nature*, p. 492) to the British Association, on the injurious parasites of Egypt, he points out that the little fluke parasite (*Bilharzia hæmatobia*) which causes endemic hæmaturia, although it is a genuine fluke parasite of the class which requires a change of hosts for its development, can still produce the disease if swallowed in the form of the free swimming *Cercania*, and that therefore the canal water in which these occur should not be drunk in the unfiltered state. In another paper, on the brown coloration of the Southampton water, by Dr. A. Angell, the colour is attributed to a brown organism (*Pendinum fuscum*), from which both brown and green solutions can be obtained giving the spectroscopic appearances characteristic of chlorophyll. The author considers it probable that the organism is of a vegetable nature.

In some experiments as to the conditions conducive to the action of pepsine, made by Herr A. Mayer (*Zeits. f. Biol.*, xvi., 351; *Mon. Scient.*, [3]., xii., 842) it was found that the action was favoured by elevation of temperature; the limit is, however, reached at 55° C., for between 55° and 60° the ferment is killed. Hydrochloric acid of a strength corresponding to 2 parts of acid in 1000 was found best to promote the action. Other acids were tried and gave results corresponding with the following order:—nitric, oxalic, sulphuric, lactic, tartaric, formic, succinic, acetic, butyric, salicylic. The last two had no action. Coagulated albumen was the substance operated upon and the pepsine used was prepared by macerating the mucus from a pig's stomach with glycerine and precipitating with alcohol. The presence of bacteria did not in any way retard the action of the pepsine.

In a recent communication to the Société de Biologie, M. de Korab described some results following the use of "helenin" in pulmonary diseases. The same observer now reports (*Comptes Rend.*, xcv., 441) some experiments made as to the action of that substance upon the bacilli of tuberculosis. He states that when the organisms were suspended in sterilized serum and placed in tubes, into some of which helenin was also introduced, the bacilli multiplied in the liquor containing no helenin, but that in which it was present showed no signs of their development. Further, whilst the former liquid when injected into animals produced the tuberculous condition the latter appeared to be inert in this respect. Some other experiments appeared to show that helenin administered in the food or injected subcutaneously acted as a preventive to tuberculous infection by inoculation, or in cases where the disease already existed modified it favourably. As the publication of this communication may possibly lead to some inquiries respecting helenin, it may be useful to recall the fact that it is a crystalline substance occurring in small quantity in elecampane root (*Inula Helenium*), and is represented by the formula C_6H_8O. According to the authors of 'Pharmacographia' the crystals have a slightly (?) bitterish taste, but no odour, and melt at 110° C.

A chemical investigation of the white and the yellow water lilies (*Nymphæa alba* and *Nuphar luteum*) has been carried out by Herr Grüning, in the laboratory of the University of Dorpat. He reports (*Archiv*, xx., 589) that he has separated an alkaloid from the rhizomes of each of these plants. The alkaloid from *Nuphar luteum*, which he has named "nupharine," is soluble in alcohol, chloroform, ether, amyl alcohol, acetone and dilute acids, but is almost insoluble in petroleum spirit. No crystalline salts have yet been obtained, and of the alkaloid only small greenish crystals have been obtained with difficulty. Nupharine is precipitated by the usual alkaloidal reagents. Upon analysis results were obtained corresponding with the formula $C_{18}H_{24}N_2O_2$, which is the composition attributed by Pelletier and Couerbe to menispermine and paramenispermine, with neither of which is it, however, identical. The alkaloid from *Nymphæa alba*, which had previously been observed by Dragendorff, resembles nupharine in its physical characters and its behaviour towards solvents and alkaloid reagents, but differs entirely in a series of colour reactions. No alkaloid was obtained from the seeds of *Nuphar luteum* or from the seeds or flowers of *Nymphæa alba*.

The conditions under which ammonia in contact with copper becomes oxidized have been studied by Dr. S. Kappel (*Archiv*, xvii., 567). He finds that in contact with copper, and with access of atmospheric air, ammonia is converted into nitric and nitrous acids even in the cold, but that the conversion is accelerated by heat; in both cases, however, all the ammonia is eventually oxidized. An acceleration of the oxidation takes place also in the cold if the operation be conducted in a current of carbonic acid gas, due to the formation of carbonate. If access of atmospheric air be entirely excluded, the oxidation of ammonia in contact with copper can no longer be recognized with certainty. Zinc and iron in contact with ammonia and with access of atmospheric air are capable of producing nitrites, but their action is weaker than that of copper, which Dr. Kappel thinks is possibly due to the hydrogen liberated in the nascent state exercising a reducing action upon the nitric and nitrous acid already formed.

According to M. Debray (*Comptes Rend.*, xciv., 1222) the reaction by which mercuric chloride in aqueous solution is converted into calomel in the presence of sulphurous acid no longer takes place under ordinary conditions if the solution contains a considerable quantity of sodium chloride, even if the solution be boiled and the sulphurous acid be continually renewed. But the reaction does take place slowly if the mixtures of chloride and dissolved sulphurous acid be heated in sealed tubes to a temperature of about 120° C. M. Debray also states that when mercuric chloride is precipitated with potash or soda in the presence of a considerable excess of sodium chloride the formation of intermediate oxychlorides does not take place, but after a short time there is produced a crystalline precipitate of oxide, which is more dense than the oxide ordinarily obtained by precipitation; this precipitate is yellow when formed in a cold liquid, but if the liquid be boiling it is of a red colour near to that of the oxide obtained by calcination of the nitrate. Like this latter, the red crystalline precipitated oxide is not attacked by dry chlorine; but the yellow crystalline oxide is slightly attacked, though much more slowly than the ordinary amorphous oxide.

In a paper on the hydrocarbons of the formula $(C_5H_8)n$, read before the Chemical Section of the British Association at its recent meeting (*Chem. News*, Sept. 15), Dr. Tilden mentions an experience that may eventually become of some practical importance. It related to isoprene (C_5H_8), a very volatile liquid discovered by Mr. Greville Williams among the products of the destructive distillation of india rubber, which has the property of being reconverted into india rubber by treatment with strong aqueous hydrochloric acid or nitrosyl chloride. As isoprene, when heated to about 280° for some hours, polymerizes into a terpene, which appears to be identical with terpilene, the optically inactive hydrocarbon obtained from turpentine, and when subjected to the action of sulphuric acid behaves precisely in the same manner as turpentine oil, Dr. Tilden was induced to try whether turpentine could be partially depolymerized into isoprene, and the synthetical production of india rubber be accomplished in this way. Upon passing turpentine through a red-hot tube and fractionally distilling the product a small quantity of liquid was actually obtained having the same composition and some of the properties of isoprene, and which by the action of hydrochloric acid yielded a tough substance closely resembling caoutchouc. But sufficient of this liquid has not at present been obtained to enable Dr. Tilden to say positively that it is isoprene.

It is known that the presence of organic matters in saline solutions will in some cases prevent the formation of precipitates, and a communication from Messrs. Lefort and Thibault (*Jour. de Pharm.*, [5], vi., 169) appears to show that a substance commonly used in dispensing, gum arabic, is capable of affecting the formation of precipitates to an unexpected extent. In operating under certain conditions these chemists have found that in the presence of gum precipitates of metallic sulphides are not formed in dilute solutions (one-tenth of an equivalent per litre). Metallic oxides behave similarly in more concentrated solutions, corresponding with their greater solubility in water. The same result was observed with mixtures of neutral phosphate of ammonia and chloride of calcium, nitrate of uranium and ferrocyanide of potassium, and perchloride of iron in dilute solution and ammonia. But what is perhaps of even more importance is the influence of gum arabic in the case of alkaloids, solutions of 1 in 1000 of quinine, cinchonine, morphia, strychnia, brucia, and veratria not giving in the presence of gum a precipitate with phosphomolybdate of ammonia, the double iodide of mercury and potassium, or tannin. On the other hand, iodide of lead, iodide of mercury, sulphate of barium and carbonate of lead are precipitated from solutions containing gum, as completely, though more slowly, than from distilled water. This action of gum may be profitably taken into consideration by a respected correspondent of this Journal who, a short since, criticised the recommendation to use gum mucilage in dispensing.

According to Payen, as much as 50 per cent. of crystallizable sugar remains in molasses, being prevented from crystallizing by other bodies present with it. Several methods have been suggested for avoiding the consequent loss; amongst others treatment with baryta or lime, so as to form insoluble compounds with the sugar. Strontia has also been recommended for the same purpose, and appears recently to have found practical application at Dessau. According to Dr. Bittman, in a lecture delivered at Magdeburg, caustic strontia is added in excess of the sugar to the heated molasses and the mixture is raised to boiling, when a separation takes place of an almost insoluble saccharate of strontium. This compound after separation is mixed with water, and allowed to decompose spontaneously, when a portion of the caustic strontia crystallizes out; the remainder is precipitated as carbonate by carbonic anhydride. The residual solution of sugar is then treated as refinery syrup. It is estimated that 38 per cent. of crystallizable sugar can be recovered from molasses by this process. At first some difficulty was experienced as to a sufficient supply of caustic strontia, which was obtained by roasting strontianite, but this has been overcome by the discovery of fresh mines of the mineral and the use of celestine. The strontium carbonate formed in the process is regenerated by making it with sawdust into bricks, and burning these in a gas furnace.

In an interesting account of the chemical industries of Italy (*Chemiker Zeitung*), the surprising fact is pointed out that although lemon juice is made in many places in Sicily, when it represented in 1881 a value of nearly three millions of francs, the whole being exported, chiefly to England and France, yet in Italy no one appears at present to be engaged in the manufacture of citric acid. Up to 1880 one factory existed at Messina, but when that town was made a free port it had to stop operations.

The *Weekly Drug News* (Sept. 1, p. 3) contains an article on sponge fishery in the Bahamas, from which it would appear that the Governor of those islands has approved a law passed in a special session of the Legislature to prevent the use of dredges, which have for some time past been used with considerable success instead of the pole and hooks. The penalty for violation of the law is a fine of 100 dollars and confiscation of the vessel on which a dredge is found. The law seems to have been passed under pressure of popular clamour, and in forgetfulness of the fact that there are many sponges to be obtained at a depth where the use of the pole and hooks is impracticable, and that the use of the dredge would have increased the trade without affecting vested interests had its use been confined to fishing at such a depth. How far this law will affect the price of sponges remains to be seen.

About twelve months since some cases were reported (*Pharm. Journ.*, [3], xii., 81, 176) in which symptoms simulating an attack of erysipelas followed the use of a scent sold as a preparation of heliotrope, and the explanation was suggested that the preparation might have been an artificial coal tar product. However this may be, it would appear that heliotrope is not without beneficent physiological properties. A medical correspondent of the *Medical Press and Circular* (Sept. 13, p. 230) states that while suffering from a long illness of gastric fever, instead of using the ordinary opiates, he had a small bunch of heliotrope placed in his bedroom at night, and to the odour of the flowers he attributes the refreshing sleep he obtained.

The effect of prescribing disagreeable medicines for some classes of patients, and especially the roving class which is often met with in hospital practice, is well known. Sometimes an artifice in the shape of a pleasant medicine is useful in securing the return of a patient whom it is desired to see again. The following form for a "lemonade iron" prescribed in a case of this kind was recently mentioned in a clinical lecture by Professor Goodell, of Pennsylvania University (*Practitioner*, Sept., p. 223):—

℞ Tinct. Ferri Chloridi	. . . . . .	ʒij.
Acidi Phosphorici dil.	. . . . . .	ʒvj.
Spiritus Limonis	. . . .	ʒij.
Syrup.	. . . . ad	℥vj.

M. Sig. A dessertspoonful, in water, after meals.

The spiritus limonis, U.S.P., is prepared by dissolving two fluid ounces of oil of lemon in two pints of stronger alcohol (sp. gr. 0·817), adding a troy ounce of freshly grated lemon peel, macerating for twenty-four hours and filtering through paper. It is used in this case with simple syrup as not being so sour as syr. limonis.

The value of jalap root is often roughly estimated by its weight, some pieces being much heavier than others and containing less resin. The powder likewise varies much in percentage of resin, twelve American samples recently assayed by Mr. V. Coblentz (*Amer. Journ. Pharmacy*, [4], xii., 385) being found to vary in yield of resin from 3·8 to 16·2 per cent. In the *Pharmaceutische Centralhalle* (iii., 307), Dr. H. Hager remarks that specimens of the root which have a specific gravity below 1·40 should be rejected. He considers that unless ninety out of a hundred specimens of a sample of the root sink in a solution of salt of the above specific gravity, the drug cannot be considered of good quality. He founds this opinion upon the fact that the resin of jalap is heavier than water, its sp. gr. being 1·15 to 1·16, while that of the sugar is 1·5 to 1·6. From these figures, however, it is obvious that the weight may be affected by the proportion of sugar and cannot necessarily be considered a criterion of the resinous contents of the root. Indeed some specimens selected from the stores of the Museum of the Pharmaceutical Society a year or two ago and separated into light and heavy portions were examined with the result that more resin was obtained from the light than from the heavy pieces. Dr. Hager, however, asks other experimenters to confirm, or otherwise, the results he has obtained.

From samples of belladonna root which have reached this country from New York, it is evident that the Japanese belladonna root has been sold for the genuine root in the United States and that the roots have not been distinguished.

Dr. Denis Dumont recently communicated to the Paris Academy a report of a case of hydrophobia in the Caen Hospital, which he had cured by hypodermic injection of nitrate of pilocarpine three times a day (*Practitioner*, p. 213). One so frequently hears of cases of cure of hydrophobia, that any cases in which confirmation of previous reports is given are worth recording. Unfortunately, however, as yet no remedy seems to have been successful in different hands.

Dr. Dumonprez (*Bull. Gen. Therap.*, p. 89) considers worm seed superior to santonin for killing as well as expelling round worms. He states that santonin does not kill the worms outright, but excites them to livelier movements which may reflexly stimulate the intestine to expel them. If this be true, it is important to know whether the fatal action of the drug on the worms is due to essential oil, and also whether the Barbary or Levant or other worm seed was used in Dr. Dumonprez's experiments, since the Barbary kind is not known to contain santonin, but is to be met with in commerce.

The mango fruit (*Mangifera indica*) it may be presumed in an unripe state, is being tried in the United States in medicine. Dr. Linguist, who has introduced it, states (*Practitioner*, p. 220) that it is an astringent with a special tonic action on the mucous membrane, and that in the treatment of hæmorrhage and muco-purulent discharges he knows of no equal to it.

In the *Boston Medical and Surgical Journal* (p. 221), Dr. A. P. Mason, gives an account of experiments made on himself with coca. He has arrived at the conclusion that coca had a good effect upon him both mentally and physically; that it almost always produced exhilaration and without exception prevented fatigue. This he believes to be due to stimulation of the nervous system and retardation in some way of the process of metamorphosis, so that work is done with less expenditure of force with than without coca. The experiments were made with the fluid extract. Coca leaves are so very variable in quality that experiments made with them cannot be said to be so satisfactory as if made with either the crystalline alkaloid, cocaine, or the volatile oil, hygrine.

Dr. E. W. Barton, in the *Lancet* (p. 333), recommends sulphide of calcium in the treatment of cancer. In two cases which appear to have been well authenticated, one of them being cancer of the breast, the remedy was given with the result of the disappearance of the disease. The sulphide was administered in the dose of 1 grain, increased to 3 grains, during the day and continued for three months.

Dr. J. H. Whelan, in the *Lancet* (p. 348), in describing some medical uses of the alkaloid atropine points out that it is valuable in preventing "death from shock" or nervous fright, and that it is valuable on that account for giving before operations. He calls attention also to the statement made by Dr. Gentilhomme, of Reims, to the effect that $\frac{1}{100}$ gram of the alkaloid relieves coryza or severe cold in the head in a most remarkable manner. In one case in which the drug was administered in fifteen minutes afterwards all sneezing ceased, the secretion stopped and respiration became normal.

A singular account is given in the *Lancet* (p. 311) of the deleterious effect of powerful electric light on the eye. Two workmen engaged in adjusting the carbon points of a lamp of 3000 candle power omitted to use coloured glasses while performing the operation. On ordinary occasions the brilliancy of the spark causes more or less paralysis of the retina, so that it is rarely possible to perceive the people walking on the footpath when descending the ladder from adjusting; but on this occasion one of the men experienced a severe attack of inflammation of the conjunctiva, the ball of the eye becoming of a brilliant scarlet; the other workman was similarly affected, but to a less extent. It does not appear whether the symptoms were caused by the brilliancy or radiant heat.

Pharmacists who have to handle metallic nickel for electro-plating will be probably glad to know of an easy, expeditious method of testing it. Mr. Thomas T. P. Bruce Warren, while trying the magnetic properties of some nickel cubes, found that only a portion of the sample was attracted by the magnet. On analysis the cubes remaining unattracted were found to contain over 33 per cent. of copper; the attracted cubes contained over 96 per cent. of pure nickel and less than a tenth of a per cent. of copper (*Electrician*, ix., p. 367). From this observation it will be seen that examination of samples of nickel by a magnet may occasionally give some useful information.

During the past month, a section of New York has been lit by the Edison incandescent lamp, being the first practical application on a large scale of electricity as a domestic lighting agent. The area lit includes no less than one square mile of the busiest part of New York, and fourteen miles of street mains are already laid. There are nine hundred and forty-six subscribers whose premises are already wired, the number of lamps supplied amounting to nearly fourteen thousand five hundred; at present some five thousand lamps are at work, but some ten or twenty buildings are being added daily to the number lighted. The subscribers pay "electricity rent" for the new light equivalent to the ordinary "gas rent," for the same amount of light. Thus the incandescent lamp, for the first time in its existence, enters into actual commercial competition with its powerful rival, gas, and, whatever may be the result, the community will certainly be gainers by the competition. The accounts published of the quality of the light are extremely flattering, and are all that its most sanguine supporters could possibly wish for. It now only remains to be seen what its financial future will be. The dynamo machines are of a somewhat larger type than the Holborn machines, which were described in this Journal (*Pharm. Jour.*, [3], xii., p. 925), otherwise they do not apparently differ in their essential details. Each machine is said to be capable of working 1800 lamps, at 16 candles, but it is only proposed to work them up to 1200. An extremely ingenious and original device is used to enabled unskilled labour to be utilized in regulating the current. It is an indicator consisting of two incandescent lamps, one of which has a blue glass globe, the other lamp having its globe of red glass. Neither of these lamps incandesce while the current is of normal strength. If from any cause the current in the circuit should increase in volume, the blue lamp lights up; the attendant then increases the resistance of the shunt circuits of the field magnets by means of a wheel switch which brings into the circuit one resistance coil after another, and this is done until the blue lamp goes out. If the reverse of these conditions should obtain (*i.e.*, too little current in the circuit), the red lamp becomes illuminated; in this event the attendant reduces the resistance of the shunt circuit by means of the wheel switch until the red lamp goes out. There are at present six of the large dynamo machines at work and these send their current into the two great main leads. Should it be suspected that one of the machines is working improperly it can be switched out of circuit without interfering with the others. The current of the suspected machine is then sent into a test battery of 1000 lamps; if these are found to have the proper amount of incandescence the dynamo is pronounced to be in proper order and is reinstated in the great circuit. All the details of the installation are very interesting reading and are exceedingly creditable to the great inventive genius of Edison, its originator.

It is a question whether the time has yet come when meteorology is entitled to be considered a science, for the conditions affecting weather phenomena are still so imperfectly understood that "forecasts" often include a considerable amount of speculation. In a letter, dated 4th September, that appeared in the *Scotsman* on the following day, attention was directed to the value of the spectroscope as an aid in this direction, and the writer, on the strength of the absence of the "rain band" on the morning of writing,—it having been for some time previously very strong,—ventured to predict the setting in of fine weather. This prediction appears to have been strikingly verified, as the 4th and the following four days were very fine in that part of Scotland, not a drop of rain falling, although the forecasts of the Meteorological Office for four of the five days predicted more or less wet. Confirmatory evidence as to the value of the spectroscope as a weather indicator appeared in a letter in the *Times* for the 14th inst., from Mr. Cory, who states among other things that if the amount of "rain band" is under 20 per cent. fine weather is certain for six hours, but that if, when the spectroscope is directed to the zenith, 80 per cent. of the dark band is shown, there will be a downpour of rain before long, although the barometer may be high and steady.

THE LACQUER INDUSTRY OF JAPAN.

BY JOHN J. QUIN,

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The following particulars are taken from a report intended chiefly as a description of the articles of various kinds illustrative of the lacquer industry of Japan, collected for the use of the Museum of Economic Botany at Kew, under instructions from Her Majesty's Chargé d'Affaires at Tôkiô.

Great difficulty has been experienced in obtaining thoroughly reliable information, as not only are the artificers, for the most part, uneducated, but they are entirely ignorant of what takes place in any other department except that to which they have been brought up. A well-known and most intelligent manufacturer, who has been over twenty years himself a worker in gold lacquer, was quite unaware of the mode of tapping and treating the trees, and had never even seen a cut specimen of the wood. He states that his head workman, a highly-skilled artizan over fifty years of age, hardly knows the name of a single article that he uses.

The *Rhus vernicifera*, the well-known lacquer tree of Japan, is met with all over the main island, and also in smaller quantities in Kiushiu and Shikoku, but it is from Tôkiô northwards that it principally flourishes, growing freely on mountains as well as in the plains, thus indicating that a moderate climate suits the tree better than a very warm one. Since early days the cultivation of the tree has been encouraged by the Government, and as the lacquer industry increased plantations were made in every province and district. The lacquer tree can be propagated by seed sown at the end of January or the beginning of February. The first year the seedlings reach a height of from 10 inches to 1 foot. The following spring the young trees are transplanted about 6 feet apart, and in ten years an average tree should be 10 feet high, the diameter of its trunk $2\frac{1}{2}$ to 3 inches, and its yield of lacquer sufficient to fill a 3-ounce bottle.

A more speedy method is, however, generally adopted. The roots of a vigorous young tree are taken, and pieces 6 inches long and the thickness of a finger are planted out in a slanting direction a few inches apart, 1 inch being left exposed above the ground. This takes place in the end of February and through March, according to the climate of the locality. These cuttings throw a strong shoot of from 18 to 20 inches the first year, and are likewise planted out the following spring. Under equally favourable circumstances these trees would in ten years be nearly 25 per cent. larger in girth, some 2 or 3 feet higher, and would yield nearly half as much more sap than the trees raised from seed.

It has not hitherto been the custom to bestow any special care on the trees after planting them out, but in cases where leaf or other manure has been applied they are much finer. Of late years hill sides and waste grounds alone have been used for lacquer plantations, as, owing to the rise in the price of cereals and farm produce generally, it does not pay the farmers to have their land cumbered with trees. Those that have been hitherto planted along the borders of the fields are being rapidly used and uprooted, and, where practicable, mulberry trees are planted instead, with a view to rearing silkworms. Nevertheless, as a good workman is expected during the season to tap an average of 1000 trees ten years old, and as the Province of Yechizen alone sends out about 1500 "tappers" yearly to the various lacquer districts, it will be seen that an immense production annually takes place, stimulated, doubtless, by the demand for cheap lacquered articles abroad. To remedy the possible exhaustion of the supply, and in view of the great rise which has taken place in the price of lacquer, several companies are being projected to plant waste lands with the trees. A ten-year-old tree, which some five years ago only cost from 1 to 2 sen, now costs 10 sen, which, allowing even for the depreciation in the value of the paper currency, shows a rise of about 500 per cent.

The best transparent lacquer comes from the districts of Tsugaru, Nambu, Akita, and Aidzu. It is largely used by the workers of Kioto, Osaka, and the southern provinces, but though also used in Tôkiô is not so much appreciated there as the lacquer produced from the neighbourhood of Chichibu in the Province of Mus-ashi, from Nikko in Shimotsuke, and that produced in the Provinces of Kōdzuke and Sagami, which hardens more rapidly, and is best for black lacquer.

There are some districts the lacquer obtained from which is best for certain kinds of work, but is not so well adapted for others. The kind which is used for transparent lacquer is mixed in large tubs, to insure a uniform quality, and being allowed to stand for some time (say, a week or ten days), the best portion, which is ordinarily 70 per cent. of the whole, is skimmed off. This is used for *Nashiji* and *Shu* lacquer, while the remainder is used for making inferior mixtures, such as *Jōhana*, etc., all described elsewhere. Almost all the various classes of lacquer are similarly dealt with to insure uniformity, as some qualities dry much quicker and are better than others, and the slow drying qualities would otherwise remain unsold.

The whole country produces at present on an average from 30,000 to 35,000 tubs per annum, each tub being of about 4 gallons capacity. Some 70 to 80 per cent. of this total amount is produced from Tôkiô northwards. Nearly one-half of the lacquer produced is sent to the Osaka market, where it is prepared as required and resold all over the western and southern provinces, the remaining portion being used up locally and in Tôkiô.

The usual age at which a tree is tapped is ten years, but in some few cases a tree is tapped when only three or four years old. The best lacquer for transparent varnish is obtained from trees from one to two hundred years old, as their sap has more body, and is more glutinous. The tools used in obtaining the lacquer are as follows:—

Kawa-muki (bark parer), a curved knife with which the workman smooths all inequalities of the bark before tapping the tree.

Yeda-gama (branch sickle), an instrument with a gouge on one side and a knife on the other, fitted with a piece of bamboo to give the hand a good hold when tapping branches.

Kaki-gama (scraping sickle), a similar instrument, without the piece of bamboo used for tapping trees generally.

Yeguri (a gouge), used in autumn to scrape the bark smooth before giving the final cut with the *kaki-gama*.

Natsu-bera (summer spatula), used for scraping the sap out of the incisions into the receptacle named *gō*.

Hōcho (knife), used for cutting the bark of branches in obtaining *seshime* or branch lacquer.

Seshime-bera (seshime spatula), used for collecting the sap which exudes from the incisions in the bark of the branches.

Gō, the bamboo or wooden pot, in which the sap is put as it is collected.

Gō-guri (pot gouge), a long straight knife for scraping the lacquer out of the pot into the tub.

Te-bukuro (glove), worn by the tapper to protect his hand from contact with the sap.

The first tapping takes place about the beginning of June. The standard number of trees allotted to a tapper for the season is 1000—presuming them to be about ten years old (the size of the small specimen), about 800 of the size of the large specimen, and so on, less and less according to the size of the trees. Having cleared away the grass from the roots, the workman makes the round of his allotted trees, marking each with small notches about $\frac{1}{2}$ inch long. The first of these notches is made about 6 inches from the bottom of the tree on the right hand side; and next, one "hand stretch" higher up on the left hand side; the next, one "hand stretch" higher on the right, and so on, alternately as far as the workman can reach. These preliminary markings, which are to determine all the places for subsequent tapping, take fully four days, being at the rate of 250 trees a-day. The tapper then goes round, provided with the bark scraper, the ordinary scraping sickle, the summer spatula, and the pot to held the lacquer, and first smoothing the bark where required gives one cut above and one cut below the two lower marks, and one cut above the remainder of the other marks, the cut being in each case about 1½ inch long. After giving the cut the instrument is reversed, and the knife is run along the incision to insure the bark being entirely cut through. This process is repeated every four days, each incision being made a little longer than the preceding one, up to the fifth tapping, inclusive, after which the remaining incisions are made of the same length. At each round, when all the requisite incisions have been made on the tree, the workman gathers the sap which has exuded with the spatula, beginning with the two lowest incisions, and so on to the uppermost cut. Twenty-five is considered the normal number of cuts, which, at the rate of one incision at each place every four days, occupy one hundred working days, and allowing for some twenty days of rain during which the sap cannot be drawn, the season is brought to a close by the end of September. If the workman has any large trees to tap, the whole of which he cannot reach when making his ordinary rounds, he taps all he can reach, and when his round is concluded he returns with a ladder, and mounting each tree taps the remainder of the trunk and the leading limbs in the same manner as above described, previous to making a fresh round.

When the full number of incisions has been given, the workman gives an extra long cut underneath all the initial notches on each tree to obtain the sap which has collected there, and another above the uppermost cut of each set. These incisions are called *Ura-me* (back marks). The workman also makes a number of cuts, each about a foot apart, in all the branches whose diameter exceeds 1 inch. This operation requires about sixteen days to get through the whole number of trees. The next operation is called the *Tomé* (the finish). This consists in a number of incisions completely encircling the tree wherever the workman perceives a likely place. The next process consists in cutting off all the branches: the larger ones are once more tapped after being cut off to extract any sap that may still remain in them, and the small branches which have not yet been tapped are tied in bundles and steeped in water for about ten days. When taken out and dried the bark is cut with a knife, and the sap which exudes is collected with the branch spatula, and is called *Seshime* lacquer. This word seems to be derived from *Sehi*, the name of a machine, and *shimeru* (to press), from a practice which obtained in olden days of pressing the branches in such a machine to optain the sap. It is also known as *Yeda urushi*, or branch lacquer, which latter more explicit term is, for the sake of convenience, used throughout this report.

The sap obtained from the first five cuts above each notch is poor, containing, as it does, a large proportion of water; the middle fifteen cuts produce the best sap, and the sap obtained from the last five incisions is poor, and lacks consistency. Again, the sap obtained from the *Ura-me* (back marks) and *Tomé* (finishing) cuts is very good, and dries quickly.

The sap from the first twenty-five cuts is mixed and sold together, but the *Ura-me* and *Tomé* sap is almost always mixed and sold separately. The operations above described kill the tree in one season, but frequently the tree is made to last two years or more, by giving only half the number of incisions, and reserving the *Ura-me* and *Tomé* cuts for the final year. The sap obtained the second and following years is, however, of an inferior quality, and this method is only resorted to by private individuals, who tap their own trees during the intervals of farming. Ordinarily, a wholesale dealer in lacquer buys so many thousand trees from the owner, and, as a matter of course, extracts the sap with as little delay as possible, making a contract for the purpose with professional tappers. A first-rate workman will receive over 100 yen (equal, at the present low rate of exchange, to nearly £13 sterling) for the season, and can collect four and a-half tubs (equivalent to 18 gallons), but the average receive 75 yen, and collect proportionately less. The present price per tub of lacquer ranges from 90 to 100 yen.

After the sap has been taken the exhausted tree, which remains the property of the seller, is cut down by him, and is used for firewood, for building purposes, or for making boxes. The roots of the young trees throw from three to five shoots the following spring, and these can be used in six or seven years. Of these five sprouts three are commonly much stronger than the other two. In such cases, the strong ones only are tapped and cut down, the weaker ones being allowed a year or two longer to grow, when, receiving the whole of the nutriment, they shoot up in one year as much as an ordinary tree would in three. After tapping and cutting down, fresh shoots to the number of five are again allowed to sprout, and so on, the root not seeming to become exhausted by the process; but when a very old tree is cut down the root will not give out new shoots. In the northern provinces very old and large trees are met with in considerable quantities. These were kept for the sake of their berries, from which the wax used for the Japanese candles was obtained. This was the more profitable use to which to put the tree, as a good tree, from eighty to one hundred years old, yielded yearly, on an average, equal to 6*s.*, while the price of a ten-year-old tree to be used for extracting the sap was under ½*d.* Previous to the revolution of 1868 every tree reserved for making wax was officially registered, and the owner was not allowed to mutilate it in any way. Even if a tree died, he had to get official permission before removing the stump. The Shōgun's Government and also the local magnates had large plantations of the lacquer tree reserved for wax, but since the opening of the country to foreign trade, and the introduction from abroad of kerosene oil, the wax industry has greatly declined, and there are now no restrictions on the free sale of the tree for tapping, and, consequently, all the fine old trees (which will sell for from 5 to 6 yen each) are fast disappearing.

To show the relative value of the berries and the trees a few years ago the following may be cited:—A wholesale lacquer merchant informed me that five or six years ago he went as usual to purchase trees in the district of Aidzu, and among others bought one tree for a yen (then equal to 4*s.*), the owner reserving the berries that might be got as his own property. He does not consider the bargain was a cheap one, but the owner realized the sum of 80 sen (equal to 3*s.* 2*d.*) from that year's yield of the berries alone before cutting down the tree.

It should be mentioned that the above description of the method pursued in tapping the lacquer tree is that which is recognized as the proper one; but, as even the specimens of the lacquer tree forwarded will show, the rule is not rigidly observed, the style and size of the tree, and the caprice of the workman, combining to cause variations in the number of incisions given in each series.

Various Woods used in making Lacquer Ware.

The woods chosen for lacquering on are naturally selected according to the use to which the lacquered article is to be put. For shelves, cabinets, and boxes of all kinds, the following are principally used, and are set down in the order of their excellence:—

Hinoki (*Chamæcyparis obtusa*).—This is by far the best wood for making boxes, as it does not warp.

Kiri (*Paulownia imperialis*).—A light wood, used for clothes boxes, which are only lacquered on the outside. It is also used for making teacaddies, as the wood has no smell.

Hōno-ki (*Magnolia hypolema*).—All sword sheaths have hitherto been made of this wood.

Sawara (*Chamæcyparis pisifera*).—This is a wood of a coarser grain than *Hinoki* (*Ch. obtusa*).

Hime-ko-matsu.—This wood is used for carved figures of men, animals, etc. It is not liable to split and crack.

Tsuga (*Abies tsuga*).

Hiba (*Thujopsis dolabrata*).—Used for making cheap articles.

Akamatsu (*Pinus densiflora*).

Sugi (*Cryptomeria japonica*).—This wood is only used in making the cheapest and most inferior goods.

The following woods are mostly used in the manufacture of such articles as are turned in a lathe, as bowls, rice cups, round trays, etc.:—

Keyaki (*Planera japonica*), the best being obtained from the province of Hiuga.

Shoji.

Sakura (*Prunus pseudo-Cerasus*).

Katsura (*Cercidiphyllum japonicum*).

Tchō (*Ginko biloba*).

I-go.—Grown in large quantities in the neighbourhood of Hakone. It is principally used in the manufacture of toys and cheap articles.

Buna.—Principally used in the district of Aidzu for the same kind of utensils as *Keyaki* and *Sakura*, but being a brittle wood, it cannot be turned in a lathe to make such fine articles; those made of this wood are coarser and heavier. For raising gold lacquering over the unvarnished surface, the following hard ornamental woods are often used:—

Shitan.

Tagayasan.

Karin (quince).

Kuwa (mulberry).

Keyaki (*Planera japonica*).—Ornamental grain.

(*To be continued.*)

ACETATE OF LIME AND ALLIED SUBJECTS.*

From an interesting paper on this subject, by Messrs. Stillwell and Gladding, read before the American Chemical Society, we abstract the following:—

METHODS OF ANALYSIS.

1. *Based on the Amount of Soluble Lime Salts present.*—The value of an acetate of lime depends entirely on the amount of glacial acetic acid present. Two methods of analysis are in use at the present time; one determines the amount of lime salts soluble in water, and by calculation the amount of lime so found is converted into acetate of lime, or glacial acid, as the case may be. This method is based on the supposition that all the soluble lime salts present are acetates; but this is not so. Acetates of lime almost invariably contain caustic lime in slight amount, and if the lime has been overheated, it is present in still greater quantity. Again, organic salts of lime are always present. With improved methods of manufacture, the amount of these has diminished of late years, and the difference between the amounts of acetate of lime found by distillation of the acetic acid and that found from the amount of soluble lime is much less than formerly. The better the sample of acetate, the less is the difference between the results given by the two methods.

In the year 1872 (see *American Chemist*, vol. ii., p. 324, and vol. iii., p. 8), this question of methods of analysis came up. It is necessary to state here the objection raised by certain English chemists against the process of distillation, which was advocated by some American chemists, since the objectors to a distillatory process had no good foundation upon which to rest. But as the general custom of the trade was at that time based upon the method of analysis by means of the soluble lime salts present, we have before and since that date used the term "*English Commercial Test*," to designate analyses made in this manner, and so state the results on our reports of analysis. Whenever an analysis is made by distillation it is so stated.

2. *Based on the Distillation of the Acetic Acid.*—Three acids may be used in the process of distillation—hydrochloric, sulphuric, or phosphoric.

a.—When *hydrochloric acid* is used, a part of it is carried over with the acetic acid and must be estimated and a correction made. It possesses these two advantages; that it does not act upon the organic matter present, and that the solution of chloride of calcium will permit of the distillation being carried to a low point without danger of error. The distillation is made in a retort connected with a condenser, and the total acids present in the condensed liquid are estimated, and the proper correction applied for the amount of hydrochloric acid found to be present.

b.—The use of *sulphuric acid* has three disadvantages.

First.—As it becomes concentrated in the retort during the process of distillation, it acts upon the organic matter present, forming sulphurous acid, which is carried over with the acetic acid and included in the estimation of the total acid power of the distillate. Thus the amount present would be calculated as acetic acid, and the result thereby increased unduly. To prevent such action, recourse is had to distillation in a current of steam. (See *American Chemist*, vol. vi., p. 294.)

Second.—The sulphate of lime formed by the addition of sulphuric acid to the solution of the acetate of lime, is troublesome on account of the bumping which takes place during the distillation. This is partly prevented by the use of a current of steam.

Third.—When a sample of acetate of lime contains *chloride of calcium* or *chloride of sodium*, the chlorine is carried over in the form of hydrochloric acid and neutralizes its equivalent amount of the standard soda, used to receive the acid distillate. The amount thus distilled must be estimated and the correction made. To prevent this, the chlorine present is precipitated by the addition of sulphate of silver to the solution of acetate before distillation begins.

c.—*Phosphoric acid* is the best acid for use in the process of estimating acetic acid by distillation. It has three advantages.

First.—It does not act on the organic matter.

Second.—During the distillation, the liquid in the retort is not suffered to fall below 15 c.c. in bulk. Under such circumstances, phosphoric acid does not decompose any chlorides of calcium or sodium which may be present in the acetate, thus requiring no addition of sulphate of silver. Only the merest trace of chlorine is carried over, as shown by experiments with a sample of acetate containing nearly 5 per cent. of chloride of sodium and also by trial on a known amount of pure chloride of sodium. This unexpected result merits attention, since in this respect phosphoric acid differs so decidedly from sulphuric acid.

Third.—It forms a perfectly clear solution with the acetate of lime. By the use of a large amount of glacial phosphoric acid, at least five times the weight of acetate of lime taken for analysis, the phosphate of lime first formed is redissolved to a clear solution. The distillation proceeds quietly and uniformly without bumping, and the liquid in the retort is easily kept at any desired point. The use of a current of steam is necessary, both for ease of manipulation and accuracy of results.

After a thorough trial of hydrochloric and sulphuric acids we discarded both in favour of phosphoric acid, and for some years past have used it to our full satisfaction. It is important that the phosphoric acid used should contain no nitric or other volatile acids which would increase

* *Journ. of the Amer. Chem. Soc.*, iv., 104. Reprinted from *New Remedies*, September, 1882.

the results obtained above the truth. Each new lot of phosphoric acid should be examined for such impurities before use. If it be suspected that any phosphoric acid has been carried over during the distillation it is easily detected in the distillate by the use of molybdate of ammonia.*

The process of distillation, if carefully and intelligently done, is very accurate. Duplicates made by this method agree with each other fully as closely as do those made by the estimation of the soluble lime. For example, in January last a sample of grey acetate was analysed by distillation in our laboratory with a result of 78·22 per cent. acetate of lime. Three months later the same sample was re-analysed by another man in our laboratory, using fresh standard solutions, and 78·20 per cent. of acetate was obtained. This sample contained 3·16 per cent. of common salt, shell-lime having been used in its manufacture. With care and experience in this method of analysis by distillation it is not difficult to obtain duplicates which agree to two-tenths of one per cent. of acetate of lime; usually the difference is less than that. A sample of grey acetate analysed recently was distilled with sulphuric acid, and a duplicate with phosphoric acid. The results agreed exactly; the latter distillation, however, requiring less attention than the former, for reasons given above under processes of distillation.

The indicator used for titration is a few drops of a solution of phenol-phthalein, one gram in 250 c.c. of a mixture of equal parts of water and alcohol. We have found this indicator far preferable to either litmus or cochineal; of course, whichever indicator is used the same must be used both for the standardizing and the actual analysis.

To show the need of some uniform and accurate method of analysis we refer to a note in Allen's 'Commercial Organic Analysis,' vol. i., p. 205. He finds from experiments made in his own laboratory on the *same sample* of acetate of lime that results were obtained varying from 47·4 per cent. to 57·6 per cent. of acetic acid. In our own practice for many years previous to the publication of the present, we found differences fully as great between results by distillation and by the various commercial processes; but, as we said before, at the present time the differences are not nearly so great as formerly.

In conclusion, we wish to lay strong emphasis upon the facts that, inasmuch as the process of distillation is the only one which gives the real amount of glacial acid present, and inasmuch as it is an imitation of the actual manufacturing process for obtaining acetic acid from its acetates, it is the most reliable and should be adopted. This position we have maintained for many years, and we notice that, especially in the case of grey acetate, buyers are more and more insisting on the test by distillation. The price should be based on the unit of glacial acid, just as, in fertilizing materials, the prices are based upon the units of phosphoric acid, nitrogen, and potash.

In the course of discussion on the preceding paper, Dr. Grothe asked if the authors had noticed the presence of acetone in the products of the decomposition of acetate of lime by heat.

Mr. Stillwell said he had not noticed it particularly, since his attention had been confined simply to the loss of acetic acid.

Regarding the production of acetic acid from wood Dr. Squibb remarked that it was not necessary to carbonize the wood, but that all the acetic acid could be obtained at a much lower temperature (about 160° to 200° C.), and the products then contain no acetone. For the analysis of sodium acetate he uses a glass retort covered with copper gauze, and heats it on one side to prevent frothing and bumping. He uses 10 grains of the acetate with 20 c.c. of water, and 10 c.c. sulphuric acid; after distilling off 10 to 15 c.c. of the liquid the distillation is interrupted—about 20 c.c. of water are added to the retort, and 10 to 15 c.c. of liquid again distilled over. This is repeated a third time, when all the acetic acid will have come over, without trouble from frothing or bumping during distillation.

Dr. Squibb further remarked that he used in his factory retorts 20 feet long, 2 feet wide, and 10 feet deep, holding 2½ cords of wood, and heats them in a hot air bath. During the first twelve hours, only water is given off. In about twenty-four hours the acetic acid begins to distil over, the process being completed in six to seven days for each retort. Seasoned oak is preferred, and any admixture of softer woods diminishes the yield of acetic acid. Chestnut is notable in this respect. Throughout the active heating, but more copiously toward the end, a gas, colourless and odourless (and so far as tested, uninflammable), comes over, having anæsthetic properties. This gas adheres to the wood after the charge is cooled and drawn, and seems to be a reason why small vermin will not remain near it. If the charge is heated too long, smoke appears at the exit pipe, and carbonization of the wood begins at the centre of the top of the charge, extending in V-shape toward the bottom. When once started, this carbonization proceeds spontaneously without further application of heat. Indeed, it is sometimes found difficult to check it, even by the liberal application of cold water to the outside of the retort. In the course of the operation, when properly managed, the charge shrinks to one-third of its volume. 4000 lbs. of wood yielded about 2800 lbs. of residue. The residue retains all the appearances of the wood before distillation, only that it becomes walnut-coloured, and it has the same elementary composition as that of kiln-dried wood. It is brittle and not well adapted to construction, but forms a most excellent fuel for many purposes, especially for kindling anthracite coal. The distillate is neutralized with soda-ash and distilled to about one-fortieth its volume. The first product is crude wood spirit. This is redistilled, and gives rectified wood spirit, and lastly wood oils, which contain large quantities of furfurol and no acetone. The wood oils are separated by passing the last portions of distillate into water. The rectified wood spirit contains about 80 per cent. of methyl acetate, and when saponified gives a very pure methyl alcohol. One cord of well-seasoned wood will afford 1200 to 1400 lbs. of liquid products. A cord of oak yields 60 or 70 lbs. of glacial acetic acid.

Dr. Squibb further remarked that there was no process commercially practical for obtaining pure acetic acid from pyroligneous acid or acetate of lime, but only from acetate of soda.

Mr. Parker remarked that he had tried a process for making acetic acid by heating wood fibre with steam, under a pressure of 60 lbs. at 275° C., and confirmed Dr. Squibb's observations on the deterioration of the woody fibre, and also the impracticability of making pure acetic acid from pyroligneous acid.

* The objection raised against this method by Dr. Waller, namely, that the presence of acetic acid interferes decidedly with the precipitation of phosphoric acid by the molybdate solution, was answered by Mr. Stillwell to the effect that he overcame the difficulty by using large quantities of ammonium nitrate.

IRRITATING EFFECTS OF STINGS IN THE ANIMAL AND VEGETABLE KINGDOMS.*

BY PROFESSOR AUGUST VOGEL.

It is well known that the effect of a stinging nettle on the skin agrees very closely with the sensation produced by the sting of a bee or wasp. But the great similarity is not limited to the feelings it causes, but, what may not be so well known, the cause of the irritation produced on the skin is essentially the same. It may be considered as definitely settled that formic acid is present

* From the *Scientific American*, September 9, 1882.

in the poison sac of the bee sting, in the so-called bee poison. The same corrosive acid also occurs in the sting of the nettle. Some species of caterpillars have formic acid in some of their hairs, which they seem to be able to shake off at will, and when a person touches such a caterpillar the poison penetrates the skin wherever it is moist and causes burning, itching, and inflammation. These poisonous members preserve their irritating powers even after the death of the worm. This accounts for reliable statements that visitors to collections of caterpillars have suffered from exanthematous eruptions on the neck. "Many hairy caterpillars cause itching and burning of the skin when touched, and sometimes it gives rise to swelling and redness. This depends on the fine hairs, which produce the same effect when they float around in the air. Many ladies who visited the caterpillar room of the naturalist Reaumur had a breaking out on the neck."

In the sting of the bee, wasp, hornet, etc., a minute drop of a transparent liquid may be observed on the sting, and is called "bee poison" (formic acid). It penetrates into the wound produced by the sting, and causes the well-known effects. It would, hewever, be a great mistake to assume that the only object of this is to increase the effect of the sting, that is, that it serves only to injure. It has a far more important purpose, namely, to prevent fermentation and decay. The celebrated bee cultivator, Holz, reports that in his long experience with honey that which came from what are called "rancorous swarms" (boshaft) had peculiar properties. It always had a bitter, harsh taste, and its smell was sharp too. How can the character of the swarm affect the smell and taste of the honey they gather? We know that bees, when they are disturbed, run out their stings, on the end of which may be seen a tiny drop. This little drop, as we have already said, is bee poison, or formic acid. When the disturbance is at an end they draw in their stings again, but the little drop of liquid does not go back with it, being wiped off on the comb, and sooner or later getting mixed up with the honey. This explains how honey from such excited bees must taste and smell sharper than from peaceable bees. Excitable bees will rub off this little drop of formic acid more frequently than other bees; perhaps a larger drop is formed by nervous bees than by those that are not nervous, and hence the honey is richer in formic acid. This acid is never absent from genuine honey, but the amount differs. This contamination is not only uninjurious but very useful, in fact, necessary, for it keeps the honey from spoiling; we know, indeed, that purified honey, from which the formic acid has been removed, very soon ferments, while unpurified honey will keep unchanged for years. Nature furnishes the bees with this knowledge instinctively, and therefore they do not carry this drop of formic acid away out of the hive. Bee connoisseurs assure me that the bees add it to the nectar which they collect that is free from it so as to make it keep, and they do this in places where they are not disturbed too.

Bee stings are often spoken of in agricultural and popular papers as a remedy for rheumatic affections, and numerous cures are adduced to prove it. If the formic acid that accompanies the sting can be looked upon as the principal agent in the cure, it would be worth while to try the experiment of rubbing the spot with this acid or injecting it under the skin, so as to avoid the somewhat inconvenient method of applying live bees.

Two hundred years ago formic acid was made from the brown wood ants, by triturating them with water and distilling it. The acid liquid was used to irritate the skin. The reddening of the skin, by using baths of pine leaves, is also due to the action of the formic acid. The anti-fermentative action of formic acid has also long been recognized.

As regards the irritative action of stinging nettles and other similar vegetables, it depends, as already stated, on formic acid. The point of the nettles is brittle as glass, and by the lightest touch penetrates the skin and breaks off, pouring out its acid and causing the burning sensation.

ANIMAL PRODUCTS IN THE CHINESE MATERIA MEDICA.*

BY F. NEWCOME, F.S.S.

Of animal products, musk probably stands highest in repute among Chinese doctors, but owing to prohibitive prices, the use of it is confined exclusively to the wealthier classes. For the pure unadulterated article obtained from the male *moschiferus*, or Thibet musk, from 20*s.* to 40*s.* an ounce is the common price to pay, and although the dose given is small—seldom more than ½ a drachm to a drachm at a time—it is impossible that the poor can afford such a luxury. Even high prices are frequently paid *wholesale* by Chinese merchants for home consumption, and this fact, viewed in connection with the average value of the musk exported to this country (during last year it was less than a guinea an ounce all round), leaves but one conclusion in our minds, namely, that the supply for this market is adulterated to a greater or less extent, despite London druggists charging for it gold price or higher. Last year (1881) the total exportation from China amounted to 1877 catties, or say 2503 lbs., valued at 149,780 taels, or about £41,501; in other words, the average was something like a guinea an ounce, whereas true musk always fetches from 30*s.* to 60*s.* an ounce at Shanghai or Tientsin. Here, again, it is just possible that some of the unfavourable results attributed to musk, and its bad repute among Europeans, may have been owing to adulteration, which, as everyone knows, was, and still is, largely carried on.

Bezoar stones are equally in repute, almost fabulous sums being given for the genuine article. For *Bezoar bovine,* classified in the Returns of Trade as "Cow Bezoar," the export price varies from 400 to 500 taels the catty; that is to say, from £6 to £7 10*s.* per ounce. Probably, however, several kinds of bezoar, including stones derived from animals of the goat tribe, are included under the generic term; but upon this point our knowledge is deficient. When such an astounding price is paid for the Chinese article by native dealers, there is little wonder if the samples that formerly reached Europe were spurious as alleged. Whether there is any great medical virtue in bezoar, or whether there is none, is a question that will probably be decided in time; but to settle the point it is necessary to examine and test the true Chinese article, which evidently cannot be sold under double its weight in gold.

The Chinese also import a considerable quantity of Indian Cow Bezoar. This, after transport to China, is only worth about 8*s.* to 9*s.* an ounce, or barely one-twentieth that of the genuine native article, which we have no hesitation in asserting to be one of the dearest drugs in existence. Beargall is another expensive animal product, being commercially worth some 16*s.* an ounce in Shanghai; but for what medical purposes it is used we are unable to state. All we know is that it forms a part of the Chinese *materia medica*, the same as do the ordinary vegetable nutgalls, with which the country-side everywhere abounds.

Beeswax plays a by no means unimportant *rôle* in Chinese medicine, forming the base of most ointments and plasters, in the manufacture of which an enormous quantity is annually consumed. So vast, indeed, is the consumption of beeswax for this purpose that one is inclined to join the good Dominie in crying "Prodigious!" That the Chinese should elect to use beeswax as the base for their ointments is somewhat curious, seeing how many other equally suitable substances are to be found within the borders of the empire.

* From a paper in the *Medical Press and Circular*, September 13.

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THE FUNGI SEASON.

AT this season of the year one is forcibly reminded of the truth of the old saying, "A little knowledge is a dangerous thing." Owing partly to the fashion for fungus forays and partly to the publicity given by newspapers to the fact that other species of fungi besides the common mushroom are edible, the impression has gone abroad among those who cultivate a superficial knowledge of science, that many species of fungi can be eaten with impunity, while the fact is ignored that poisonous species often so closely resemble the edible ones that they can only be distinguished by those who have seen both. Persons reading that the champignon (*Marasmius oreades*) grows in open pastures straightway draw the conclusion that all fungi growing in pastures are wholesome, collect and eat *Agaricus semilanceatus*, or perhaps a dangerous *Hebeloma*, and pay the penalty of their rashness. Unfortunately the penalty is often severe, as in the recent case of an English clergyman in France, whose lamentable death from eating a poisonous species comes as a timely warning at a time of year when fungi are most abundant.

Perhaps no nation eats so few fungi as the British; certainly none is more careless in ascertaining the characters by which edible species may be distinguished from poisonous ones. But forewarned is forearmed, and the simplest way to prevent these constantly recurring accidents would probably be to teach in schools the means of distinguishing the edible and poisonous species and the danger of experimenting with all others. The number of edible fungi occurring in our woods is estimated, by Dr. BADHAM, at thirty species, and the number being so limited, it would be just as easy to teach the young how to discriminate the wholesome from the dangerous as it is to teach them how to distinguish the different chemical compounds in common use. At all events there are probably more deaths caused every year by poisonous plants than by poisonous drugs accidentally administered, and if the latter deserve the attention of Government the former ought not to be altogether ignored.

In other countries legislation has been enacted to prevent the frequent occurrence of poisoning by fungi. Thus, in Rome, as long ago as 1837, an Inspector of Fungi was appointed by Government to examine every morning all the fungi offered for sale. This official had powers to direct that all stale fungi left from the preceding day, as well as all that were mouldy, maggoty, or dangerous, including any specimen of the common mushroom, should be sent under escort and thrown into the Tiber; also to fine or imprison anyone not complying with the Government regulations. In a country where a city of 154,000 inhabitants consumed yearly between 60,000 and 80,000 pounds weight of fungi, such regulations were indeed requisite. But the very fact of such an enormous consumption of these plants shows that the want in England of a practical knowledge of this class of plants deprives the poor of a considerable amount of cheap, and, if properly inspected, wholesome food, no country being richer than our own in esculent fungi.

Practical instruction also in the characters of the more dangerous poisonous plants cultivated in gardens or growing wild in this country might well replace a great deal of the botanical knowledge of much less real value at present taught and required in science and other schools. Mezereon and yew would then be not so likely to tempt children with their bright-coloured berries, nor would aconite be mistaken for horseradish; neither would some of our leading daily papers make the mistake of including species not yet recorded as British (*e.g.*, *Agaricus Cæsareus*) among the edible fungi of this country.

On the Continent and in China and Japan dried fungi are largely used, and doubtless there is less risk in eating these than in eating fresh fungi, the poisonous principle probably undergoing decomposition. In some cases the kitchen fire will render fungi which are acrid when raw, innocuous when cooked; this is the case with some of the species yielding a milky juice. In others the poison is extracted by immersing the fungus, before dressing it, in vinegar or brine, the liquid then containing the poison which was originally in the plant. This was known to the Greeks, who said, "Prepare your funguses with vinegar, salt or honey, for thus you will rob them of their poison." The practice is still continued in Russia, where many species reputed to be poisonous are eaten with impunity after having been soaked in vinegar before being cooked. We know, however, very little concerning the influence of climate in developing poisonous principles in this class of plants. Aconite is said to be eaten without danger in some parts of northern Europe, and it is a recognized fact that many plants are less poisonous in the north than in the south of Britain. And the mushroom, which is wholesome in this country, is reckoned poisonous in Italy.

It is very easy to mistake the poisonous *Amanita phalloides* for the edible *A. rubescens*, or the orange-coloured false chantarelle (*C. aurantiacus*) for the delicious *C. cibarius*, especially if a cold in the head prevents the delicate apricot odour of the last from being perceived. The downy margin and white milk of the very poisonous *Lactarius torminosus*, also, are not likely to be noticed by anyone unacquainted with this plant, which bears a strong resemblance to the esculent *L. deliciosus*. No one, therefore, even though he may know the edible species well, should attempt to experiment on those differing from them in even the most trifling particulars. The pleasure to be derived is not worth the risk.

Those who wish to enjoy eating fungi with safety should follow the practice of the Italians, and cultivate known species. *Agaricus caudicinus* is thus grown with but little expense or trouble. The pollard head of the black poplar tree is brought home, watered freely for the first month, and in a short time becomes covered with abundant specimens of the above species, and the block continues to yield for twelve to fourteen years. *Polyporus avellanus*, an excellent species to eat, is grown on stumps of the cobnut tree, which are singed over a little burning straw and then watered plentifully. In about a month the perfectly white fungi, each about 2 to 3 inches in diameter, appear so profusely as almost to hide the wood from which they spring. It is said that *Boletus edulis* can be grown by watering the ground in suitable places with an infusion of the spores. It should not be forgotten that fungi, especially fleshy ones, decay very rapidly, and that a species which may be good eating at noon may undergo such changes in a few hours as to be anything but good eating at night.

Good service might be done to science, and possibly many a valuable life might be saved, were the poisonous principles of the different groups, such as *Russula, Lactarius, Boletus*, etc., isolated and examined by chemists, and their physiological action investigated by medical men. Unfortunately, even the antagonistic action of belladonna to muscarine, and possibly to the poisonous group to which *Amanita muscaria* belongs, appears to be so little known that it is hardly ever tried as an antidote, whilst our knowledge of other poisonous principles of fungi is almost *nil*.

PROSECUTION FOR COUNTER PRESCRIBING IN CANADA.

A CASE of prosecution for counter prescribing is reported from Ottawa, which is of a somewhat unusual character. It appears that the defendant, a Mr. MORTIMER, who is described as "an old and respected druggist," had a physician's prescription presented to him to dispense, but instead of doing so, he informed the patient that he could give him something better, and on the strength of that statement sold to the patient a preparation of his own. This led to his being summoned to appear before a police magistrate on a charge of giving advice without being a licentiate of any medical college. In defence Mr. MORTIMER pleaded that what he had sold was a specialty, and that he had given his advice gratis, which he claimed anyone had a right to do; further he alleged that he had acted similarly for thirty-five years previously and that it was only what every druggist in the Dominion was in the habit of doing. The magistrate, however, held that the law had been broken, and fined the defendant twenty dollars and costs. With rather mistaken zeal a local newspaper took up the case of the druggist, and in "spread eagle" diction championed the right of the public to free trade in medicine. But the *Canadian Pharmaceutical Journal* very properly remarks that the magistrate's decision was alike in accordance with law, justice and common sense, since Mr. MORTIMER decidedly overstepped his position as a druggist and had no right whatever to substitute any preparation for that named in the prescription. Moreover our contemporary expresses the opinion that every druggist in the province will repudiate the assertion that he is in the habit of doing as Mr. MORTIMER has done.

THE OPENING OF A NEW SESSION.

THE first week in October is in London always noticeable for the opening of schools and the delivery of "introductories." First among them in point of interest to pharmacists stand the proceedings in connection with the School of Pharmacy in Bloomsbury Square. The new session commences, as will be seen by the official advertisement, on Monday, October 2, with the lectures on Chemistry and Pharmacy by Professor REDWOOD and the instruction in Practical Chemistry under the supervision of Professor ATTFIELD; whilst on Thursday, the 5th, Professor BENTLEY will commence his lectures on Botany and Materia Medica. It is to be hoped that a good number of pharmaceutical students will avail themselves of the opportunity thus afforded them for obtaining instruction in the science of their calling. But the meeting on Wednesday evening will appeal to a larger number, since on that occasion the successful students of a past session are to be rewarded and the new comers are to be welcomed. An invitation to this meeting is extended by the Council to all students and friends, both ladies and gentlemen, and we do not doubt that, as in former years, the theatre will be well filled. After the Professors have made their reports, the prizes will be presented by the President, and then an address to the students will be delivered by Mr. JOSEPH INCE, which we do not doubt will be worthy of the occasion.

LIVERPOOL CHEMISTS' PRICE LIST.

RECENTLY we had the opportunity of calling attention to a new edition of the Price List issued by the Manchester Association, and we now have the pleasure of referring to the fifth edition of the Dispensing and Retail Price List recommended by the Committee of the Registered Chemists' Trade Association of Liverpool. The acceptability of this little work is proved by the fact that four editions have been exhausted in less than seven years, and additions and improvements have been made in the present edition which it is hoped will make it even more useful. We presume that copies may be obtained from Mr. J. HOCKEN, the Honorary Secretary to the Association.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Concluded from page* 259.)

The following papers were then read—

Note on Methyl Orange as an Indicator of Free Acid.

BY B. S. PROCTOR.

Dr. Lunge, in an article in the *Chemical News*, December 16, 1881, advocates the use of methyl orange (sulpho-benzene-azo-dimethylamine), as an indicator in alkalimetry. I have found it useful also as an indicator of the presence or absence of free acids in salts, which in their normal condition have an acid reaction with litmus.

One grain of the dye in a pound of water makes an orange-yellow test liquor, two or three drops of which added to 1 ounce of water give it a yellow tint, which is changed to pink by a very small trace of free mineral acid.

It is not so sensitive to oxalic acid, still less so to acetic and not at all affected by carbonic.

Ferrous Sulphate.—The yellow liquor is not coloured pink by a solution of pure ferrous sulphate though the change is at once effected by a trace of free sulphuric acid in the presence of the sulphate.

With Perchloride of Iron the indications are not so satisfactory; the colour is deepened but the reaction is not clearly marked when neutrality is disturbed by additions of hydrochloric acid or ammonia.

Alum.—Pure or commercial alums do not change the colour of the orange, though they strongly affect litmus; a trace of free sulphuric acid added in the presence of the alum at once changes the orange to pink. Ammonia being added to this pink liquor promptly rendered it yellow and turbid; dilute sulphuric acid being then added drop by drop with an interval, and constant stirring, each drop produced an instantaneous tint of pink, which gradually changed back to yellow, as the acid was neutralized by the alumina in suspension; when the successive additions of acid had dissolved nearly all the alumina, the restoration of the yellow colour became very slow, finally the pink colour appeared permanent before the last traces of the alumina had dissolved.

Sulphate of Zinc.—1 ounce of water, 1 grain of sluphate of zinc, 4 drops of test liquor, remained faint yellow and changed to pink on the addition of $\frac{1}{4}$ of a drop of dilute sulphuric acid. On adding ammonia and acid the reactions were similar to those obtained with alum.

Repeating the test with sulphate of zinc to ascertain its delicacy, 1 ounce of water with 1 drachm of sulphate of zinc, and 4 drops of the test liquor, remained faint yellow, but changed at once on the addition of 0·08 of dilute sulphuric acid.

Organic Acids.—The action of organic acids though not so sharp as that of the mineral acids, is as clear as with most of the indicators in use.

With 1 ounce of water and 5 drops of test liquor, a small fraction of a grain of tartaric or citric acid sufficed to develope the pink colour. One drop of B.P. acetic acid produced the change, but 1 drop of vinegar strength did not produce a pink colour, though there was a change in that direction. In the liquor thus tinted by acetic acid, $\frac{1}{100}$ of a grain of sulphuric acid at once developed the pure pink colour.

Bicarbonate of Lime.—Water tinted pink in this way is very sensitive to ordinary hard water, and might probably give a fair approximation to the degree of temporary hardness in a water free from alkalies.

Chloride of Zinc produces no change of colour.

Corrosive sublimate causes a tinting towards pink, which is removed by the addition of chloride of ammonium.

Boracic Acid causes no change.

Cream of Tartar gives a tinting towards pink which is not much altered by small additions of caustic potass, or by tartaric acid, nor even by small additions of hydrochloric acid, until the addition probably left some free hydrochloric acid in the solution.

Hydrocyanic Acid produces no change even when present in nearly full pharmacopœia percentage, but the addition of a fraction of a drop of dilute hydrochloric acid developed the pink colour in a solution containing more than a drachm of the B.P. hydrocyanic acid.

Arsenious Acid has no action on the colour even on boiling for some minutes with the reagent.

Sulphurous Acid in small quantity produces the red coloration and does not bleach it when added in large excess.

Superphosphate of Lime does not cause reddening unless there is more phosphoric acid present than is requisite for retaining the lime in solution.

Note on a Commercial Sample of Liquor of Iodide of Iron.

BY B. S. PROCTOR.

If I had had a vote in establishing the laws of nature, I should probably have arranged that ferrous iodide should not have a propensity to absorb oxygen, liberate iodine, or behave in any other unsightly way on our shelves, and so I should have earned the thanks of all good pharmacists.

There has been evinced in our body a chronic desire to circumvent the nature of iodide of iron; and every now and then we have been promised by some maker, or someone who has devised a new formula, that we should at last be relieved of the hitherto troublesome changeability of iodide of iron or its syrup.

To my mind it does not appear probable that the *same* material should possess different properties when made by different processes, and if it were possible to obtain the same material endowed with different properties by deviating from the B.P. process, I should say that deviation ceased to be legitimate.

Holding these views I have not been very prone to accept the unchangeable iodides, but in a weak moment I was tempted to buy a little "Liq. Fer. Iodidi," which I was assured by the maker was not prone to darken, and could be made into a syrup of full Pharmacopœia strength by mixing with simple syrup as wanted; and which I was also assured I might examine as I liked and would find nothing but the legitimate iodide of iron and water.

I noted his words and concluded that it contained some preservative which he felt safe to promise me I should not find; perhaps he counted on my not carrying out my suggestion to examine it.

The first thing I noted was that it was freely acid, it not only reddened litmus more than solution of iodide of of iron made by the B.P. process, but it also reddened methyl orange (sulpho-benzene-azo-dimethylamine) which is not acted upon by pure iodide of iron.

Sulphuretted hydrogen, when passed through the liquor, caused no change except the slow precipitation of white sulphur, which would result from the presence of a small quantity of a ferric salt, or a little sulphurous acid. The same reagent produced a small black precipitate, with the pure neutral solution of iodide of iron. The commercial liquor was free from odour of sulphurous acid and from appearance of oxidation. The reaction suggested that oxidation might have been masked rather than prevented. It also suggested that the ferric salt, if present, might be the oxalate, which is green and of such a pale tint as not to be visible in the blue-green of the iodide.

As a check to this surmise a little ferric oxalate was added to a portion of liquor of iodide of iron and it developed a little yellowness which again disappeared on heating with a little free oxalic acid, the original blue-green colour being restored.

I do not find, however, that oxalic acid has any specially protective power.

The presence of a little sulphurous acid, too small in quantity to be readily detected either by odour or reagents, would probably account for all the unchangeableness noticed, but would not account for the acidity of the liquor.

Phosphoric acid, having a reputation of preserving the presentable appearance of the liquor, was also sought for, and its presence proved by separation as ferric phosphate, and confirmed by precipitation as ammonio-magnesium phosphate.

After most of the experiments had been tried I noticed a small precipitate at the bottom of the bottle, which had previously escaped my notice from the dark blue colour of the glass.

This precipitate, removed and washed, proved to be ferrous oxalate, as its lemon-yellow colour at first suggested.

Half a fluid drachm of the liquor, precipitated with nitrate of silver, indicated gravimetrically 13·47 grains iodide of iron, instead of 17·2, which was required to make a full strength syrup when the liquor was used according to the directions accompanying it.

A trace of sulphuric acid was found, but only such as might represent a little hard water, or the product of the oxidation of sulphurous acid. A trace of hydrochloric acid also, but too small to have any significance.

I do not profess that this is an exhaustive examination of the sample; my object was gained when I ascertained that its permanence was not the result of purity, not attained without a sacrifice of purity. I do not suggest the propriety of adding any foreign matter as a preservative. I have not even suggested the impropriety of such a course; but I do suggest that if any pharmacist feels himself impelled to any other expedient than that of keeping his solution in contact with an iron wire, he had better at least know what he is doing. Add the adulterations yourself rather than buy the liquor ready adulterated and not know what it contains.

The President, in proposing a vote of thanks to Mr. Proctor, said there had been so much said and written on the subject of solutions of iodide of iron that he need not say anything to stimulate discussion upon it. This last note on methyl orange as an indicator seemed particularly useful and it would be well if they had a similar series of experiments made with phenol-phthalein. Litmus really seemed to have too much its own way in this matter of acid and alkaline reaction; they had been using the terms acidity and alkalinity for so many years that they had got into the way of thinking that those were definite properties of a substance, whereas really all they were doing was speaking of the qualities of that substance in terms of litmus. He did not see why they should not speak of them in terms of phenol-phthalein or of methyl orange. If they did so they might even get nearer to truth repecting acidity, alkalinity, and neutrality.

Mr. Ekin said the use of these bodies as indicators was first brought into notice in this country by Dr. Witt some years ago. He advocated the use of what was known as Tropœoline O.O., which had very much the same chemical composition as methyl orange, the methyl being replaced by the phenyl group and it was more stable. Professor Lunge, in the article in the *Chemical News* referred to, had claimed that methyl orange was more delicate as an indicator, which was doubtful, and one of his statements that it was not affected by acetic acid, as Mr. Proctor had shown and he could confirm, was decidedly erroneous. He had sent Mr. Proctor a sample of Tropœoline O.O. to try against the methyl orange, and he had heard from him that he had not had time to try it properly, but he fancied it gave a purer red with acid and purer yellow with alkali, but was not quite so delicate.

Mr. Fletcher said no meeting of the Conference could be considered complete without the question of iodide of iron coming up, and when he saw Mr. Proctor's paper on the list, he had the curiosity to turn up some old volumes of the *Pharmaceutical Journal*, and in ten minutes he counted no less than forty-two papers on the syrup and liquor of iodide of iron. Dr. Thompson, in 1834, first suggested iodide of iron as a medicine, and, rather curiously, it was introduced first as a liquor. It was made official in the old Edinburgh Pharmacopœia, the strength being that of the present syrup, viz. 4·3 grains of ferrous iodide to the fluid drachm. In 1836, Mr. Squire, for even then this solution did not seem to have been quite immaculate, suggested that when dispensed it should be sent out with a coil of iron wire traversing the whole length of the solution. In 1842, Dr. Thompson read a paper at an evening meeting of the Society, when Mr. Savory was in the chair, and he seemed to have thrown cold water on the suggestion, for he said that having prescribed the solution of iodide of iron for a lady patient, she gravely wrote to ask him whether the iron screw which the bottle contained was to be swallowed whole, or taken in parts after each dose of the mixture. Dr. Thompson then recommended the syrup of iodide of iron, and suggested the very formula which has remained without alteration to the present time. He (Mr. Fletcher) had noticed that whenever this question came up, some gentleman always rose and said he was surprised that there should be any bother about making syrup of iodide of iron; that he was always able to make it perfectly colourless and keep it. The very fact that such a number of papers had appeared in the Journal upon it, was pretty good evidence that the majority did not find it satisfactory. He felt a little delicacy in offering any remarks on Mr. Proctor's paper, partly because that gentleman was a much more experienced pharmacist than he was, and he also feared that as a manufacturer of iodide of iron his remarks might be misinterpreted; still he should like to say a word upon it purely from a chemical point of view. If there was one thing about making iodide of iron, which he had hoped had been thoroughly settled, it was that when iodine and iron were brought together in the presence of water hydriodic acid was developed. That had been proved to demonstration over and over again, and if the solution were distilled very large quantities of hydriodic acid might be got from it. If iodine and iron were boiled together in water and the solution afterwards boiled up with more iron there would be very brisk effervescence, which showed that there was free acid in the solution. That could be proved by distilling and precipitating the hydriodic acid as a silver salt. Mr. Proctor took exception in the first place to the solution because it was very acid; but he was open to challenge Mr. Proctor, or any other pharmacist, to make any solution of iodide of iron which should not be very acid when tested; at all events he would challenge him to make one which would not contain hydriodic acid. Then Mr. Proctor said he found ferrous oxalate. The wholesale druggists and manufacturing chemists had not had a very good time of it at this Conference, but he really thought that no manufacturing chemist or wholesale druggist would have the hardihood to introduce such a poisonous substance as oxalic acid into a medicinal solution, if he had any reputation he cared to lose. With regard to sulphurous acid, he would only say that if anyone wanted to try and keep a solution of iodide of iron by sulphurous acid, he had better try it; it would give a thick muddy deposit and do all sorts of other disagreeable things. The suggestion of preserving the solution by phosphoric acid was due to an ex-President of the Conference, Mr. Groves, some years ago, and at the Swansea meeting, he recollected an admirable little paper, by Mr. Groves also, in which he suggested that if coloured syrup of iodide of iron were treated with a few drops of liquor potassæ, the colour would disappear, and if a little phosphoric acid were then added it would keep very well; and he concluded with the very sensible remark that of two evils he preferred to choose the lesser. He could not help regretting that Mr. Proctor was not present to answer any questions. He did not make any mention of the specific gravity of the liquor, which was in itself an indication of its strength. Further than that, he said that he separated phosphoric acid as ferric phosphate; but if phosphoric acid were really there, and he had a ferric salt there, he should imagine the ferric phosphate would already have come down. Mr. Proctor maintained, in the early part of the paper, that it was illegitimate to add anything whatever to a pharmaceutical preparation, whether it was faulty or perfect; but he recollected, at the London meeting of the Conference, Mr. Proctor read a paper on hydrocyanic acid, wherein he recommended the addition of some mineral acid to preserve it, and at another meeting, Mr. Williams recommended the addition of glycerine. The question for pharmacists was whether they should send out syrup of iodide of iron of all sorts of colours, or whether they should modify the process, as it was evident the Pharmacopœia never intended to have hydriodic acid present, and send out a preparation, which was always perfectly white and good and which no one could complain of.

Mr. Williams said his recommendation was not that glycerine should be added to hydrocyanic acid by chemists without authority, but that it might be added as a preservative by the authorities of the Pharmacopœia. He never presumed to say that a chemist should add glycerine on his own responsibility.

Mr. Fletcher said in the course of the paper he referred to, he believed Mr. Williams said that no chemist, whoever he was, would be able to make hydrocyanic acid to keep without the addition of some trace of mineral acid, and in the place of mineral acid he recommended glycerine.

Dr. Symes said Mr. Fletcher had rather sat on those chemists who had said that syrup of iodide of iron by the Pharmacopœia process could be made to keep without some preservative being added to it; he happened to be an individual who, on more than one occasion, had said that. He did not believe even in Mr. Proctor's suggestion of adding iron wire. The syrup properly made and put in small, well-filled, stoppered bottles, exposed to a strong light, kept well. A liquor which kept well under almost any conditions was an undoubted convenience to many chemists and deserved to be appreciated, but the syrup prepared from it and that by the Pharmacopœia process should not differ.

Mr. Parker wished to say one word in support of Dr. Symes. He had in his possession a specimen of syrup of iodide of iron, prepared according to the British Pharmacopœia, which had remained unaltered for two years and a half. The only precaution he took was to fill the bottle so as to entirely exclude air. To his mind the use of a "liquor" was, in many cases, very convenient, but he doubted whether it would be so in the case of this syrup, where the difficulty in dispensing small quantities, say a drachm, or ½ a drachm, would be very much increased if one-eighth the quantity had to be measured. The only excuse he could see for a pharmacist using liq. ferri iodid. for the preparation of the syrup was from his being unable or finding it very inconvenient to prepare and store the syrup properly.

Professor Tichborne quite agreed with the remarks made by the last speaker. In giving a history of the syrup of ferro-iodide Mr. Fletcher was not quite correct in some respects. As far as he recollected the history of syrup of ferro-iodide, the first improvement suggested was the use of iron wire, which he (the speaker) strongly objected to as he did not think the wire preserved it at all. The next improvement was suggested by himself many years ago, in a paper read at Bloomsbury Square. In that paper it was pointed out that up to that day the proportion of sugar was not sufficient; by the formulæ used up to that date a very thin syrup was produced, and one of the essential points of his (the speaker's) paper was to propose that the ferro-iodide should be run into a supersaturated syrup. Such a syrup, according to his experience, kept perfectly well. Hydriodic acid was formed in making iodide of iron in the first instance, but the amount formed would depend a great deal on the boiling, and the error which was implanted in the student's mind by the direction of the Pharmacopœia was that he did not boil the iodide of iron enough. The direction was that when the yellow froth became decolorized the iodide of iron was supposed to be formed. That, however, was not a measure of the completion in the operation, and there was no doubt at that stage a considerable amount of free hydriodic acid present. If the boiling were continued for a considerable time the hydriodic acid would be brought down to a minimum, and that was one of the secrets which made the difference between a well prepared and a badly prepared syrup.

The next paper read was—

Report on the Strength of Commercial Samples of Tincture and Liquid Extract of Opium.

BY JOHN WOODLAND, F.L.S., F.C.S., ETC.

Having, during the past year, made several determinations of the strength of different samples of these two preparations of opium, I submit a compilation of the results of these and other estimations in the form of a paper to the members of this Conference.

From the variation in strength of the samples of opium used in pharmaceutical operations, a divergence in the results was anticipated and experienced, and in the present state of pharmaceutical progress such variation ought not to exist, and might be remedied.

Regarding morphia as the chief of the active ingredients of opium, and the assaying of this alkaloid an operation attended with no very great difficulty, I do not see why the samples, as they are wanted for use, should not be estimated, and having an official standard of say 8 or 10 per cent. (one or the other) of morphia, a mixture of the various samples made, which would bring the whole to this standard.

Many samples of best Smyrna opium contain 12 or even a greater percentage of this alkaloid; in such a case allowance could be made for the excess over the standard; for instance, a sample of opium is found to contain 12 per cent. of morphia, and a gallon of tincture is required; if the standard be 8 per cent. and the proportions of drug and spirit the same as now exist in the Pharmacopœial formula, 12 ounces will be necessary, but in the present case 12 per cent. being contained, either a gallon and a half can be made with 12 ounces of this opium, or 8 ounces can be used to prepare a gallon.

It may be urged that the other principles contained in opium are of physiological value in the administration of the tincture, and therefore they ought to be estimated as well; but whilst their number is so great, and isolation tedious, I do not see that it would be practicable, the estimation of morphia only being sufficient for all practical purposes. The following is a table of the percentages of solid residue and morphia obtained from fourteen samples of tinct. opii procured from both London and provincial chemists:—

No. of sample.	Character of residue.	Percentage of residue.	Percentage of morphia.
1.	Resinous	4·35	·62
2.	Resinous	3·21	·41
3.	Resinous	3·93	·45
4.	Oleaginous	4·81	·38
5.	Resinous	4·22	·61
6.	Resinous	4·51	·59
7.	Resinous	5·01	·68
8.	Resinous	3·56	·32

No. of sample.	Character of residue.	Percentage of residue.	Percentage of morphia.
9.	Resinous	3·41	·45
10.	Resinous	4·67	·70
11.	Resinous	3·82	·51
12.	Oleaginous	5·11	·41
13.	Resinous	4·28	·65
14.	Resinous	4·54	·69

The samples were evaporated at a temperature of 70° C. in an air-bath, and when perfectly dry treated by a modification of Prollius's method for the estimation of morphia as follows. The solid residue was taken up with ten times its weight of equal parts of rectified spirit (60 over proof) and water, to this solution enough liquid ammonia was added to render it strongly alkaline, and then an equal bulk of ether was introduced, and having well shaken the mixture it was set aside for twenty-four hours, after which the crystalline morphia was collected, washed with ether, dried and weighed.

One or two blank experiments were made with a known quantity of morphia in solution by which the accuracy of this method was demonstrated, the difference between the quantities introduced and estimated being extremely slight.

Allowing that the opium from which the tincture is made contains the maximum percentage of morphia mentioned in the Pharmacopœia, viz., 8, the percentage of this alkaloid in the tincture will be about ·6, hence in six of the samples examined an over percentage was found, whilst in eight a deficiency existed, the lowest being No. 8.

Ten samples of liquid extract of opium were treated in a similar manner to those of the tincture, viz., evaporation to dryness, and the subsequent estimation of morphia in the residue. The following table indicates the results:—

No. of sample.	Percentage of residue.	Percentage of morphia.
1.	4·47	·37
2.	3·39	·21
3.	4·45	·30
4.	4·71	·36
5.	3·11	·19
6.	3·40	·23
7.	4·92	·37
8.	4·21	·31
9.	3·85	·21
10.	3·02	·22

On calculation it will be found that if a sample of opium contains 8 per cent. of morphia, the liquid extract made from this sample should contain ·38 per cent. of this alkaloid, but in each of the above instances the percentage was too low, especially in the cases of Nos. 2, 5 and 9.

The PRESIDENT, in proposing a vote of thanks to Mr. Woodland, said this paper opened up the question of drug standards, which was rather a large subject. The percentage of morphia, indicated in the Pharmacopœia, which should be contained in opium was not 8 per cent., but from 6 to 8 per cent., but even assuming it was 8, it was rather curious that these samples of tincture should yield on the average apparently within 10 per cent. of that quantity, while the liquid extracts did not yield enough morphia by 25 per cent. It would seem as if the opium were very poorly extracted in the case of the solutions.

Mr. PLOWMAN said it would be useful to know on what data Mr. Woodland proceeded when he said, on calculation, it would be found, if crude opium contained 8 per cent., the liquid extract ought to contain ·38 per cent. of morphia. It could not be the same in every case.

The last paper read was—

REPORT ON THE PURITY OF COMMERCIAL SAMPLES OF SILVER SALTS.

BY JOHN WOODLAND, F.L.S., F.C.S., ETC.

I was led to make the following analyses partly by seeing on the green paper issued by the Conference Committee that such a report was wanted, and partly on account of curiosity, awakened by seeing various sized caustic points sold for the same price, and after obtaining a large caustic point for a small piece of money, came to the conclusion that the maker, fearing that the caustic point might prove too strong, with due regard to the tender feelings of the public modified its action by the aid of a diluent. The diluents found in the two forms of nitrate of silver, viz., caustic points and crystals, were the nitrates of potash and soda, those of potash being chiefly present, as the following table will show:—

Caustic Points.

No. of Sample.	Percentage of $AgNO_3$.	Name of Diluent.	Percentage of Diluent.
1	63	Potassium nitrate	36
2	71	Sodium ,,	26
3	64	Potassium ,,	35
4	75	Potassium ,,	25

Crystals of Silver Nitrate.

No. of Sample.	Percentage of $AgNO_3$.	Name of Diluent.	Percentage of Diluent.
1	89	Potassium nitrate	10
2	99	None	—
3	92	Potassium ,,	8
4	84	Sodium ,,	14
5	80	Potassium ,,	19
6	100	None	—

In the estimation the points and crystals were reduced to powder and dissolved in recently boiled distilled water, to which a standardized solution of pure cyanide of potassium (prepared from an alcoholic solution of KHO) was added until the precipitated cyanide of silver at first formed was exactly dissolved, the data being derived from this equation—

$$2KCN + AgNO_3 = AgCN,KCN + KNO_3$$

It may be noticed that the above figures do not in every case aggregately come to 100, the deficiency in number being due to a slight amount of moisture present. Crystals of nitrate of silver when pure are transparent, and an impurity can usually be told by its giving a translucent appearance, and so causing them to somewhat resemble the crystals of chlorate of potash. The impurities in the above samples were estimated by precipitating the silver as chloride with hydrochloric acid, filtering, and evaporating the filtrate and weighing the residue.

The other salt of silver estimated was the oxide, most samples of which had been in stock for some time. Six samples furnished the following table:—

No.	Percentage of Silver.	Corresponding Percentage of Oxide.	Impurities.	Percentage of Impurities.
1	76	81	Carbonate and chloride of silver	19
2	70	75	Siliceous matter	25
3	81	87	Carbonate and chloride of silver	13
4	72	77	Carbonate and chloride of silver	24
5	78	83	Carbonate and chloride of silver	17
6	69	74	Carbonate and chloride of silver	26

The samples of oxide were estimated by dissolving in nitric acid, precipitating with hydrochloric acid, washing, fusing, and weighing the residue. The presence of carbonate and chloride with the oxide of silver seems to indicate that either solution of potash or soda is used in its preparation, instead of lime water as officially ordered, as carbonate and chloride are to be found in both of these solutions. The siliceous matter is undoubtedly an intentional adulteration.

The PRESIDENT, in proposing a vote of thanks, remarked that caustic points did contain nitrate of potassium, because nitrate of silver was too brittle to be used alone in the small cases. He believed that all makers put in some nitrate of potassium. Crystals of nitrate of silver certainly should not contain potassium or sodium nitrate or chlorate of potassium either. As for the oxide there could be no doubt that if precipitated with the common soda it might contain carbonate, but not if precipitated with pure soda.

Professor QUINLAN said the addition of potassium nitrate to pencils of nitrate of silver was perfectly recognized and necessary. Nitrate of silver of itself was too brittle, particularly when applied to the throat and parts where it would be liable to drop down. It was a great advantage to the practice of surgery to have these neat little points, compared to the trouble of grinding away with a wet cloth at a stick of nitrate of silver, which the surgeon used to have to do before the points were brought into the market. He need not say that nothing would justify the addition of extraneous matters to silver nitrate crystals.

Mr. MASON said he did not know whether Mr. Woodland stated the source from which he obtained some of these samples, but he did not think it possible that such nitrate crystals came into the hands of chemists and druggists. Photographers were in the habit of buying up waste from which they recovered nitrate of silver, and probably some dealers in photographic chemicals might be tempted to adulterate it in this way. Respecting the oxide of silver, he believed as a matter of fact it was not sold pure, for being in want of some absolutely pure some months ago, he wrote to a large manufacturer for it who replied that he should have to make it for him. He ultimately received a small quantity in a moist state, and was told that he could not be supplied with it dry.

Professor TICHBORNE said oxide of silver was a pharmaceutical preparation and there should be no difficulty in procuring it at any house, retail or wholesale.

Mr. WILLIAMS said the tough nitrate of silver, made specially for surgical purposes in points, contained as a rule nitrate of lead, not nitrate of potash, as the former toughened it much more than the latter. It was not put in as an adulteration and was allowed for in the price charged for the article. It was a special thing, known as toughened nitrate of silver, at least so he understood, for he did not make it himself. He was certainly very much astonished to hear of the impurities found in the crystallized nitrate of silver. He had had a great deal of experience in this article for many years and knew it was not always pure, and the commercial article was not as pure as it might be; but it could be purified, and was all the better for being recrystallized and purified again and again. Still he did not imagine that the impurity was above $1\frac{1}{2}$ or 2 per cent. at the most, and he did not believe any photographer would purchase an impure nitrate of silver; photographers knew perfectly well what nitrate of silver should be and would not purchase it twice if it were impure.

Mr. NAYLOR said he had examined commercial nitrate of silver by means of a standard solution of chloride of sodium on various occasions, but had not found it to contain more than $1\frac{1}{2}$ to 2 per cent. of impurity.

Mr. ANDREWS said that after the remark made about oxide of silver, which, to the dispenser, was of even greater importance than the nitrate, he was in hopes that some of the practical manufacturing chemists would say whether there was such an amount of impurity as was stated. It was a powerful remedy when used in small doses, and if adulterated to such an extent it would be a very serious matter. Mr. Williams said the oxide of silver in commerce generally contained a certain quantity of chloride. It was perfectly certain that pure caustic soda, absolutely free from chloride, was never used in practice for precipitating the oxide, and, therefore, as the caustic soda would contain a percentage, not very large, of chloride, so the oxide of silver would probably contain a little chloride too. That would explain why Mr. Mason could not obtain chemically pure oxide of silver except by special order. The idea of throwing it down by lime water, which was suggested in the paper, was one which was not recommended in any works on the subject, although of course it would be very effective. The difficulty was that the lime water held so small a quantity that it would take a large bulk of water to effect the object.

Professor TICHBORNE said the lime water was the Pharmacopœia process.

Mr. GROVES said on one occasion the presence of carbonate in oxide of silver was manifested to him by the swelling and effervescence of some pills that he was making. The oxide of silver became reduced to the metallic state, carbonic anhydride was given off and the pills became very large. On examining the specimen of the oxide he found it contained a large proportion of carbonate.

PLACE OF MEETING IN 1883.

The PRESIDENT said the next business before the Conference was to appoint a place of meeting for the year 1883. Usually the Committee had been able to announce that the British Association would meet in such and such a town, and it had been the practice for the Conference to meet in the same place. On this occasion, however, this could not be done, because Oxford, which was the place chosen by the British Association for 1883, had sent word to that body that owing to some unforeseen circumstances it would not be able to entertain the British Association next year, and it was not at that moment decided where the British Association would meet. A question might arise whether the Conference should necessarily meet in the actual town in which the British Association met, but unless it really was important to go into that question, he hoped it would not be raised. It was quite a distinct question, the Committee decided it a year or two ago, and for the present, at all events, it was undesirable to alter the rule of meeting where the British Association met. That practice had been carried out with one single exception, which was perfectly justifiable, ever since the Conference was formed. He held in his hand an invitation from the Oxford chemists which was everything the Committee could wish, but he would suggest that the members should leave it to the Committee to decide at an early meeting where the Conference should meet in 1883.

Mr. GROSE (Swansea) then moved that the place of meeting for 1883 and the selection of local officers be left to the Executive Committee.

The motion was seconded by Mr. DEAN and carried unanimously.

OFFICERS FOR 1882–83.

The Conference then proceeded to elect the officers for the ensuing year, Messrs. Robinson and Clark (York) being appointed scrutineers of the ballot papers.

The following officers were unanimously elected:—

President.—Prof. Attfield, Ph.D., F.R.S., F.I.C., F.C.S.

Vice-Presidents.—M. Carteighe, F.I.C., F.C.S., London; J. R. Young, Edinburgh; C. Umney, F.I.C., F.C.S.

Treasurer.—C. Ekin, F.C.S., Hounslow.

General Secretaries.—F. Baden Benger, F.C.S., Manchester; S. Plowman, F.I.C., London.

Other Members of Executive Committee. — Alexander Kinninmont, F.C.S., Glasgow; J. C. C. Payne, Belfast; W. A. H. Naylor, F.C.S., London; R. Chipperfield, Southampton; P. W. Squire, F.L.S., F.C.S., London; G. S. Taylor, F.C.S., London; J. C. Thresh, D.Sc., F.C.S., Buxton; F. W. Fletcher, F.C.S., London.

Auditor.—James Spearing, Southampton.

VOTES OF THANKS.

Mr. WILLIAMS said it was with great pleasure he rose to propose a resolution, which he was sure all present would cordially agree with. It was one proposed every year, and it would be almost impossible to find fresh language proper to such an occasion; but fortunately it was not necessary that much should be said. He was quite sure the gentlemen on whose behalf he was going to move the resolution would take his words as expressing the very cordial feeling which the meeting had towards them. It was—

"That the cordial thanks of the non-resident members of the British Pharmaceutical Conference be given to the Local Committee, and especially to Messrs. Randall, Chipperfield and Dawson, for the very successful manner in which the various arrangements connected with the Southampton visit had been carried out."

He would not add one single word, except to say that he considered the meeting had been an exceedingly good and successful one.

Mr. Giles seconded the motion with very great heartiness. He said the pleasure they had all felt in receiving the hospitality and attention of the local members had been greatly enhanced by the courteous personal attention they had received at the hands of those gentlemen who had been named. He and many others met an old friend in Mr. Randall, whom he was glad to see as Chairman of the Local Committee. He had had great pleasure in meeting Mr. Chipperfield and making his acquaintance, and he could not help saying, as a good many others felt, that he regretted that it should be necessary on these occasions to have a Treasurer at all, whose duties must be somewhat severe. They could not help feeling while they were receiving such friendly attention they were also imposing considerable liabilities on their friends, who so kindly and cordially entertained them; but these things could not be helped, and he only trusted that those gentlemen received some satisfaction from them, as they were told, on the highest authority, that it was more blessed to give than to receive.

The motion was carried unanimously.

Mr. Randall, in reply, said it was very common to say that one felt more difficulty in speaking on such an occasion than on almost any other, and it was perfectly true, but he might be allowed to say that the members of the Local Committee were greatly obliged to all the members of the Conference for the kind way in which they had received all their efforts and overlooked their shortcomings. When a thing of that sort had to be done just for once, no one could do it so well as if it had to be done frequently. Southampton could not say, as York said through its representative standing in the position he now occupied, that it was essentially a city of the past; it could not aspire to be a city at all and it would not wish to look back; if it could it would rather be an aspirant to future progress. Southampton burst its stone-bonds, of which they saw the relics in the gates and some of the walls, about the seventeenth century and went out into the open and had been going on increasing ever since. It was only that year that Southampton burst what they considered a very serious iron bond and was now looking forward to the north to help them by coming down more readily, as it would have two ways instead of one of doing so, and assisting by its enterprise and commerce and science too. He believed science nowaday did more to help commerce and enterprise than it ever did before. The pharmacists of Southampton, of course, hoped that they would participate in the general improvement in commerce, which they looked for as these things went on, and he heartily thanked the Conference for giving them some hints at least towards improving pharmacy as an art, and especially as a science. If, therefore, the visiting members had received a little hospitality in that which was material, they in the district had gotten a great deal more in that which was far better, which he hoped they would make use of in the future. In the name of the Local Committee he begged to express their high appreciation of the way in which their endeavours to promote the comfort of the visitors had been received.

Mr. Chipperfield said he was no orator or else perhaps he might express himself in such a manner as would startle the meeting. He was a bad hand at whistling and was especially disinclined to attempt whistling before he was through the wood, and they had still to look forward to the morrow. He was happy to believe that they were satisfied that the local chemists had been doing what Nelson told his sailors England expected them to do,—they had striven to do their duty. *A propos* of what Mr. Randall had said, he might add that he had felt very strongly indeed during the last twelve months the truth of the poet's lines which he learnt in his youth,—he had not read much of that author's poetry in his maturer years,—that—

"A man must serve his time to every trade,
Save censure; critics all are ready made."

His share of this work had been done during his apprenticeship, and the same with his *confrères*, and the shortcomings which no doubt had been noticed and would still be witnessed must be placed to that account. He felt that by the next night he should have thoroughly served his time at this business, and that if they could only persuade the Conference to come again next year they should then be able to do the work well; at any rate he believed he should do his part then perfectly. At present he could only say he had done it to the best of his ability.

Mr. Dawson also thanked the Conference for the acknowledgment which had been given for the slight trouble he had taken and the services he had been able to render to the gentlemen attending the Conference. When the matter was first mooted it was with considerable fear and trembling that he took the office of Local Secretary, but since then he had scrupulously attended to all the minor details he possibly could with the view of rendering their visit as pleasant and comfortable as possible. He hoped the gentlemen attending the Conference would carry away with them as pleasant reminiscences as the pharmacists of Southampton would retain of the visit of the Conference.

Mr. Chipperfield asked leave of the President to add a word or two which a sense of duty compelled him to utter. He hoped no one would go away and fancy that the hospitality they had received, and would still receive, came exclusively from Southampton. They had to thank almost every town in the county for its kind assistance, and also several gentlemen residing in other places, such as Salisbury, London, Redhill, Cheltenham, Shepton Mallet, and elsewhere. He mentioned this so that any town which perhaps might be as poor as Southampton and might, therefore, not be able to entertain the Conference, might follow the example of Southampton, and gain that extraneous aid which would enable them to do the same as had been done for seventeen or eighteen years.

Professor Tichborne said they would all feel that this was what might be termed in the annals of the Pharmaceutical Conference, a red letter meeting, and, individually, he should take this opportunity of thanking the local gentlemen for the reception they had given him as a stranger amongst them. The success of that meeting so far had been perfect, and although they felt deeply indebted to the local men for that success, they knew also that it was almost impossible, even for local men, to make these meetings successful, unless they had support from the authorities and other general assistance. Everybody who had been at the Ordnance Survey Office must have felt that it was a great treat; in fact, it was an unique exhibition. He was informed that the zinco-lithography, which was now so universally used, to which they owed cheap music and many other things, was chiefly due to the Ordnance Survey Office of that town, that it was invented and perfected there. It therefore possessed a peculiar interest, and very properly the people of Southampton were very proud of it. It would be wrong, therefore, if they separated without passing such a resolution as he was about to move, namely—

"That the best thanks of this Conference be given to Major-General Cooke, the Inspector-General of the Ordnance Survey Department, for his kindness in affording the members facilities of visiting the Ordnance Survey Office."

Dr. SYMES seconded the motion. He said every one who had visited the office and seen the processes employed would be impressed with the thoroughness of the work which was done there and the science which was brought to bear in carrying it out.

The motion was put and carried unanimously.

Mr. ATKINS then moved—

"That the hearty thanks of the members are due and are hereby tendered to the President for the courteous and very able manner in which he had conducted the business."

He said there was a danger that he might weaken the force of these well selected words by any ill selected words of his own, but he could not allow the resolution to pass without expressing his own personal feeling with regard to it. He had been most solicitous, coming from a neighbouring city which could hardly venture to hope to have the honour of a visit from the British Association or the Pharmaceutical Conference, that this Southampton meeting should be a great success and that desire had been amply met. He did not know that there had been the slightest thing to mar their enjoyment excepting a little wet weather; the room in which they had met, the admirably representative gathering of those assembled, and the character of the papers would all render the meeting memorable. It was an important thing to have a good President, and though he wished to make no comparisons he ventured to say they had never had a better. Professor Attfield had this disadvantage that he had a great reputation and a man who had a great reputation had to work up to it, as a beautiful woman had alway to keep up to the report of her beauty. Professor Attfield had excited great expectations and he had realized them. He had given an address of which he ventured to say yesterday that the highest compliment he could pay to it would be that it would excite attention and possibly criticism. Besides that there fell upon him in his office as President the duty of seizing the salient points of all the papers and presenting them in clear, accurate language to the meeting, and he need hardly say to do that required many gifts, large reading and much knowledge. In addition to the address and in addition to presenting the points of the paper he had, with all the courtesy and consideration possible (barring that one matter of the vital force), allowed the widest latitude to discussion. They would all look back with pleasure to this Southampton meeting, no small part of the success of which was due to the fact that Professor Attfield had been President.

Mr. STEPHENSON had much pleasure in seconding the motion. As a delegate, with Mr. Borland, from the northern division of the United Kingdom, he could only say that as far as he was concerned he had felt it was his part to listen rather than to speak.

Professor QUINLAN said it would not be fitting if no voice from Ireland were raised to support this resolution on an occasion when the Conference was presided over by a gentleman whose work on chemistry was the standard book in the Irish medical schools. This would be always regarded as a red letter meeting of the Conference, partly from the admirable way in which Professor Attfield had presided, and partly from the kind and generous hospitality received from the Southampton members, which none would ever forget.

The motion was put by Mr. SCHACHT, and carried by acclamation.

The PRESIDENT, in responding, thanked the members for the kind way in which they had shown their appreciation of his humble endeavours to fulfil the duties of President. The secret of his apparent success, and he must admit it had been a success, after what had been said, was chiefly that he had profited by the example of his predecessors, and not only his predecessors in that chair, but, Mr. Stephenson and Mr. Atkins would allow him to say, of other Presidents and other Vice-Presidents also, connected with the Conference and with the Pharmaceutical Society. He thanked his colleagues, the previous Presidents, for their kind support during this meeting, and he thanked all the other officers too, and he was sure the officers generally would excuse him if he especially thanked the Secretaries for their labours in carrying on the business of the sittings. He must also thank the authors of the numerous papers; they had seldom had a larger number of more practical papers. He must recognize, too, the kindness of so many gentlemen who had contributed to the discussion of the papers, and it was particularly gratifying to him to find amongst the authors of papers and the speakers so many of his old pupils. He was particularly pleased to have met them, and he thanked them for coming. He had been glad to meet at Southampton members whom he had not met before. He was particularly glad to have met so many of the friends he had made at the meetings of the Conference, during nineteen years, and including Newcastle, twenty consecutive years. He thanked the members very much for the kind way in which they had passed this resolution and, in conclusion, could assure them that he would do his best to promote the interests of the Conference during the coming year.

Reviews.

DICTIONARY OF ECONOMIC PLANTS. By JOHN SMITH. London: Macmillan and Co., 1882.*

Visitors to the Kew Gardens or to other botanical gardens, who notice in the economic houses the names of plants, of the uses of many of which they are entirely ignorant, would probably be glad of a handbook to which they could refer and in which they might find a short and popular account of the uses and native countries of the different plants. To help the inquiring mind seeking such information few are perhaps more competent than Mr. J. Smith, seeing that he was officially connected with the Royal Gardens at Kew for over forty years and that the economic collections which now fill the three museum buildings there were formed during the time that he filled the post of curator to the gardens. His son, who was the first curator of the museums at Kew, worked most industriously, until his death in 1865, with the view of writing a work on economic and commercial botany. From his arranged notes, which occupied no less than thirty octavo volumes, the materials for the present work have been selected by his father. To give some idea of the number of subjects treated of in the book, it is stated in the preface that 1600 are mentioned belonging to 1163 different genera.

The selection of material seems to have been carefully made with a view to throw light upon the names and nature of such economic objects as might be met with in commerce, in agriculture, in general reading, in gardens, and in museums. The character of the book may be compared with that of the 'Treasury of Botany,' but it is written in a more popular style, and as it forms one volume only it is more convenient for carrying and for reference. It also has the advantage that while the vernacular or commercial names are arranged throughout the work in alphabetical order, there is in addition an index of scientific or botanical names at the end.

Looked at from a pharmaceutical point of view, a large number of interesting products are mentioned, and the omissions are but few. Among the latter we observe that Goa powder does not receive any notice, although better known in this country than pituri, to

* Demy 8vo; pp. i.–ix.; 1–457. 14s.

which a paragraph is devoted, and although *Jacaranda* is mentioned no notice is taken of the medicinal value of the leaves. Ceylon and Bengal cardamoms, which are not unfrequently imported, are not described or noticed under the head of "Cardamoms."

The omissions, however, are evidently very few, and in another edition will doubtless be rectified, should it be revised by Mr. J. R. Jackson, the present able curator of the Kew Museums, to whom the author expresses his indebtedness in furnishing many new subjects and in correcting proof sheets.

Mr. Smith's complaint against popular names for plants, such as Adam's needle, Job's tears, Jacob's ladder, as being vulgar and undignified, may be almost regarded as a protest against the exercise of the imagination, a faculty too little exercised, probably, in this practical age. Certainly the term crane's bill instead of geranium and stork's bill instead of pelargonium can scarcely be more vulgar than the scientific names derived, as Mr. Smith informs us, from the Greek words *geranos*, a crane, and *pelargos*, a stork.

The difficulty in compiling a work like the present must have been in reducing the materials at hand into the small space of an octavo volume and to weigh the relative importance to the public generally of the kind of information to be given concerning each subject. Mr. Smith may be congratulated on having produced a work which will be found useful alike in the household library, in the day school, as a handbook of economic botany to the student visiting economic museums, and to the merchant who wishes to find out the value and uses of imported vegetable products.

New Commercial Plants and Drugs. No. 6. By Thos. Christy, F.L.S. London: Christy and Co. 1882.*

Most persons who are interested in materia medica are congnizant of the valuable services rendered during recent years by Mr. Thomas Christy, whose commercial instincts have led him in a direction where it is to be hoped he has secured personal advantages for himself as it has certainly enabled him to confer benefits upon the community. For directly a new drug from any part of the globe has been mentioned, or a plant that promised to be of economic value, Mr. Christy's energy has been exerted to place it with the least possible delay within the reach of those who wished to test it; indeed he has frequently done his best to create a demand for it by placing at the disposal of those likely to be interested the best available information upon the subject. Although this may be a form of advertising, it is of a very superior character, and is serviceable to more than the advertiser. To these efforts are due the publication of a series of reports on new commercial plants and drugs, the sixth of which is the subject of this notice.

The greater portion of the present number is taken up with a treatise on fibres, their botanical sources, the methods of examining them under the microscope, and their treatment by the Ekman process. The treatise is illustrated by six coloured plates, containing figures and sections of various fibres drawn by M. Vétillart, the French authority on the subject, who has assisted Mr. Christy with his experience, and it contains a large quantity of valuable practical information, although not as a rule put before the reader in the most elegant style. Whilst the work was being prepared, Mr. Christy became acquainted with Ekman's process for the separation of vegetable fibres, which seems likely to exercise an important influence upon the future at least of paper-making. It consists in boiling the substance containing the fibre under pressure in water containing sufficient magnesium or other soluble alkaline sulphite to prevent oxidation of the organic matter. The treatment completely dissolves the incrusted substances and the cellulose is said to be thus separated in a practically pure condition, retaining its fibrous form and uninjured in strength, whilst the dissolved incrusting substances form a by-product that should possess some value. The success of the process in the preparation of wood pulp for paper-making renders it useless, in Mr. Christy's opinion, to search for vegetable fibres to compete with it for that purpose. The reader has, however, an opportunity of forming an independent judgment, as the different sheets of the number are printed on varieties of paper made entirely from wood prepared by this process.

The latter portion of the number is devoted to notes on new plants and drugs and their uses.

* Royal 8vo; pp. i.–vi.; 1–86; plates I.–VI. 2*s.* 6*d.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Leeches.

Sir,—I am pleased to find that Mr. Hart and "Observer" coincide somewhat with my views, and I wish to relate my experience of leech keeping during my first year of apprenticeship, which is now eighteen years ago.

We had tried several methods of keeping them in a bell-shaped aquarium, various plants having been supplied by leech importers; we had to change the water every other day, sometimes oftener; the water would get quite a green tinge and very foul, the shingle at the bottom would have to be well washed to free it from smell. The loss of leeches was very great.

At my suggestion, we adopted a plan which succeeded fairly well, necessitating the water to be changed once only in two or three months. It consisted of a piece of perforated zinc, in the form of a half circle with a rim of the same, to the depth of 1 inch, which was filled with earth, and small ferns placed in the same with moss packed between to hide the earth and zinc. In the bottom of the aquarium was a layer of shingle and on this three stones about 5 or 6 inches in length, placed in such a position to support the zinc and its contents. Water was then poured in to just reach the zinc by a ¼ of an inch. In a few days the rootlets of the ferns found their way through the perforated zinc, and touched the water; I imagined that this kept the water good for the time mentioned. At this time I had little or no knowledge of leech breeding, and on going to the aquarium one day and on examining some of the ferns I was surprised to see something like a piece of wet sponge. I took it out and cut it open and found that it contained either four or six young leeches (I cannot quite recollect the exact number). We discovered several after this. I would also state that I have frequently noticed little insects darting about in the water, and at such times have found the leeches very healthy.

Devonport. J. A. Lamble.

Junior.—Certainly you did wrong. Liq. hydrarg. perchlor. is not a simple solution of hydrarg. perchlor.

Nectandra.—Use the ordinary tests for distinguishing between potash and ammonia.

A. B.—We cannot undertake to recommend particular houses of business.

F. J.—You are recommended to consult some technical work on the subject.

W. H. B.—Wild cherry bark, bruised, 2 ounces; proof spirit, 20 ounces: digest for fourteen days, express, and filter. Or the tincture may be prepared by percolation. See also a paper on *Prunus Virginianæ*, by Professor Bentley, in *Pharm. Journ.*, [2], v. 105.

Chemicus.—(1) The tincture prepared according to the formula given by Dr. Fleming in his treatise on *Aconitum Napellus* is nearly six times stronger than the official tincture. (2) "Dialysed iron" is ferric oxide in a soluble form.

Communications, Letters, etc., have been received from Messrs. A. H. Mason, J. G. Fowler, P. MacEwan, P. Davidson, W. Robertson, The Leeds Chemists' Association and the Chemists and Druggists' Trade Association.

INTRODUCTORY SESSIONAL ADDRESS

DELIVERED AT THE COMMENCEMENT OF THE FORTY-FIRST SESSION OF THE SCHOOL OF PHARMACY, *October* 4, 1882.

BY JOSEPH INCE, F.L.S., F.C.S., ETC.

Fifteen years ago the Annual Sessional Address to the students of the School of Pharmacy was inaugurated. The Council by whom the arrangement was made, and by whose immediate sanction it was carried out, met under the happiest circumstances.

It was not too late in the history of pharmacy to see gathered round the table as our representatives, men whose names have become household words, and whose memories will be for ever held in honour; nor was it too soon to recognize at the board, men of of a younger generation whose presence there was the best proof of the success of our educational system. Mr. George Webb Sandford was the President; and in view of actual and impending legislation he was chosen yet another year as Dictator; Mr. Daniel Bell Hanbury had just retired not without bequeathing to the Society a distinguished son, whose manner of work and conduct raised the dignity of our calling; there was Mr. Henry Deane of Clapham who taught by precept, and by example, that the one thing to be ashamed of doing, was a dishonourable action; the watchful intelligence of Mr. John Mackay removed all fear that the interests of Scotland might possibly be neglected; and specially is a speaker standing within these walls, bound to mention the name of Mr. Thomas Morson, to whose personal devotion so much of the prosperity of our Society is due.

Many of these foremost promoters of the cause of British Pharmacy have passed away, but of those who were on the Council during the historical year of the Act of 1868, two still remain; Mr. Peter Squire who last year renewed his youth, and held his own, at the deliberations of the London International Congress; and Mr. Thomas Hyde Hills who has contracted a habit of liberality from which he seems by no means anxious to be set free.

As regards the select band of councillors who were less advanced in years, they are now of age, and consequently can speak for themselves: if they had not as much experience, they had more of the spirit of the initiative than their seniors, and to them in the first place must be attributed the proposal which issued in the establishment of these pleasant anniversary rejoicings, the latest of which takes place to-night. The then President of the Council gracefully waived his indisputable right to address the students of that school of which he was the official head; and our elders did not feel themselves compromised by acceding to a project which though dictated by a generous impulse, was an innovation.

The time had long since passed when Pharmaceutical Education was in its infancy: the assistant who knew something of the contents of a book was no longer an object of suspicion to his master, or a source of anxiety to his friends: the teaching of the school was beginning to be a felt influence, and the idea was spreading amongst the most practical of business men that the best way to ensure the welfare of their children was to let them have a sound knowledge of those principles on which much of their trade, and the whole of its developments depended.

A fair number of students had exchanged the laboratory and the class-room for the activities of daily life; and, carrying with them the prestige of rewarded scholarship into new circles, became the centres of fresh educational endeavour.

It was thought therefore, and the assumption was not unreasonable, that a period had been reached when a more formal recognition of the re-opening of a session would be acceptable, and that no time could be more appropriate, than when legislation was about to change the framework of British Pharmacy. He would however be an incorrect chronicler of events who gave this as the sole motive for the creation of a sessional address.

Frequent representations had been made that London not only had the lion's share of executive administration, but the chief talk at the evening meetings, and generally floated at the surface of affairs. The country was left comparatively in the shade, and its interests were said to suffer in consequence.

Certain councillors held the opinion that geographical hindrances were not solely to blame for this inequality, and that if good men and true were invited from the provinces to address a London audience on some state occasion, it would be an excellent arrangement. At least one signal opportunity would be afforded for the country to be honourably represented.

So originated this ceremonial, and never shall I forget the eventful evening of October 7th, 1868. Would the thing prove a failure? It was to be a gala night: successful candidates were to receive their prizes: fathers and mothers were to rejoice over their sons' success: ladies were no longer to be excluded ftom the circle, but by sharing were to increase immeasurably the students' happiness. But would the fair sex fail to come and thus precipitate a collapse? or, would the lecture fall upon irresponsive ears? Everything went off brightly as sunshine, and the lecturer was quite himself—no higher praise can be imagined.

With occasional exceptions from that time forth, the address has fulfilled its double purpose. Mr. Brady led the way, and was followed by Mr. Deane of Clapham. To him succeeded a master of polite literature, Mr. Schacht, and next the regretted Mr. John Mackay. Then rose the western circuit to the occasion, bent on showing that its romantic neighbourhood was not to be confused with Nazareth:

many good things, particularly pharmacists, reached us from there, and the students listened with pleasure to Mr. Stoddart of Bristol; Mr. Giles of Clifton, and Mr. Ekin of Bath.

This would have been too much, had not a London man, Mr. George Webb Sandford, intervened in 1873 and equalized the pressure.

He was chosen because it was the unanimous opinion of his fellows that he could never be out of place.

Later on the list came Mr. Barnard Proctor, with his quaint originality and characteristic thought.

Mr. Southall passed in review the discoveries of modern science; while the reputation of Norwich was sustained by Mr. Corder.

The lot now fell, as it was fitting, upon two former distinguished students, Dr. Tilden and Dr. Langdon Down, and the discourse of Dr. Symes of Liverpool is still within your recollection.

I feel it no small honour to have been asked to follow men like these; and I thank those who hold the direction of our affairs, that I am permitted to say words of encouragement and advice to some who have gained distinction in this, the parent School of Pharmacy; and to such others as may desire to emulate their example.

In the name of the President and Council before whom I stand; in that of the Professors who will guide your studies, and in my own, we bid you hearty welcome.

You have come to London, that true metro-polis, the central city round which so many smaller towns have gathered, and by which they have been absorbed.

What will you do with your life here? You have been wise in coming, for supreme advantages are in the gift of this great place. While we rejoice that these are more and more decentralized, and that in different parts of the country facilities for improvement have been created, London presents them in such infinite variety as still to remain the wished-for haven of the student. Then, contact with this mass of people, with its innumerable interests, aspirations, and necessities, and the provision made for their promotion, is in itself an education. Men under such influences learn to estimate themselves aright; to make large allowances for others, and to drop the pettiness of spirit almost inseparable from a contracted sphere.

But we must not lose ourselves in generalities, and there is distinctly before my mind that to-night my business is with young men who have accepted Pharmacy as a vocation. Some have finished their first campaign and have been openly rewarded by the chief. Let me as myself an old student, congratulate them on their success. Let them take the good the Gods provide, without reserve or afterthought; and let the remembrance of past triumphs nerve them for fresh victories. Others are entering on the contest, overshadowed by the fond wishes of their relatives, and the earnest hopes in their behalf of every true-hearted pharmacist.

London has its splendid openings, but also its fell temptations—these have made or marred countless generations. What will you do with your life here? is a question we are bound to ask. Will you trim the lamp of science and keep it brightly burning; or will you kindle the unhallowed fire of passion, and run riot in its lurid light? One thing hold fast in your memory, and treasure it in your heart of hearts, that the time must come sooner or later when each one of us knows either in the joy of his soul, or in the bitterness of his disappointment, conduct is fate.

Fifty years ago Pharmacy as a corporate body had no existence. Here and there was an isolated light shining: such was William Allen in the hermitage of Plough Court; John Savory in the West End; midway between both, Thomas Morson; and my own father dwelling under the shadow of the Phenix; and there were a very great number of respectable individuals who honestly kept shop and aspired to nothing more.

A common danger drove the scattered ranks together, as a storm sends the most disunited to seek a common shelter. But no sooner was there a Society of some sort, a distinct and recognized community, than it was found imperative to have a stronger bond of union than mere aggregation of numbers. The grains of sand upon the seashore are numerous and form a distinctive class, but there is no cohesion among the particles; and from the first it was seen that numerical strength alone was destitute of vital power. Moreover provision had to be made for future exigencies, and it was vain for pharmacists to claim respect from the world outside, unless it were discovered that the claimants were men of trained intelligence and education. Hence necessity completed what threatened danger had begun: and so rose the School of the Pharmaceutical Society of Great Britain.

I have diligently searched the records of the period but I can discover no other English sources of instruction open at that date to the chemist and druggist, than the courses at our London and Provincial Hospitals in which Materia Medica, Botany, and Chemistry formed part of the curriculum. I learn from credible witnesses that none of these three branches were held in high estimation, but that they were subservient to purely medical studies, and tinctured with professional reference and allusion. The one subject that promised usefulness was that of Therapeutics which was not treated so as to be understood by the non-medical student. Pharmacy as a separate science had not risen into sufficient importance to have a teaching of its own or to rank as a distinct study, and I have listened to sorrowful details from druggists then engaged in business of the hopelessness of educational improvement.

At this crisis there appeared one who revolutionized the manner in which the once dry details of Materia Medica were elucidated: this was Jonathan Pereira. Endowed with a handsome person and commanding presence; having the gift of speech and a singularly buoyant temperament: clear in statement, and brilliant in illustration; he inspired his audience with enthusiasm for a theme which its nature hardly seemed to warrant. The dry bones lived—and from that moment an era in pharmaceutical education was begun. The genius of Mr. Jacob Bell saw at a glance that he had hit upon the right man with whose aid he should develop a new order of instruction.

Nearly as fortunate was the choice of Anthony Todd Thomson who was called to fill the chair of Botany. It would be difficult to find one who showed more unwearied diligence in a professional career. I have often been astonished whilst reading the acccount of his laborious activities; and it was no slight compliment that when our Society was in its infancy it should have been so effectually countenanced by men of a higher faculty, supposed sometimes, but erroneously to be antagonistic to the pharmacist. We had just acquired the right to be respected; a right which was immediately conceded.

Next in order came a young man, of keen susceptibilities and retiring habit; who wrote a successful essay for which he was publicly rewarded, and who had already begun to teach Chemistry not so much from books as by direct experiment and laboratory demonstration. This was George Fownes whose services it was no small gain to have enlisted. Lastly appeared upon the scene our own Professor, Dr. Redwood, of whom an old pupil can say nothing in his immediate presence. These were the pioneer exponents of the theory that education must be the lever by which to raise the druggist; to give him the command of circumstances, and to enable him worthily to fill the station which the framework of wise regulations and law might secure. So rose this School; and it was a bright day for British Pharmacy, and for the British public; for from that hour the reign of intelligence dethroned the rule of thumb.

Such amongst you as are the heirs of modern progress, are hereby informed that the word "rose" is metaphorical. Pharmacy like the bird of song had its nest upon the ground, from which like that bird it has risen skywards.

We were literally a foundation school, situated in the basement, which less euphoniously might have been termed the kitchen. From these subterranean regions evil smells ascended which discomfited the Council; and not unfrequently the students underground would receive visits from the powers above who expressed their sentiments in language which was not always guarded. A liberal bequest allowed more convenient arrangements to be provided; and it is clear that the conditions under which laboratory work was undertaken, were justified only by necessity. Sooner or later a change must have been made, for with increasing numbers those conditions had becoming impossible.

I believe that it is entirely due to the Professor whose praises have been left unsaid, that the school was shifted bodily to the topmost story, and was reconstructed according to the plans and with the appliances now open to your inspection.

As time presses, this brief historical sketch must end, and I propose with your permission, to say a few words to a beginner about the manner in which he may best pursue his studies.

Probably there is no time when encouragement, and even advice is less essential than at the commencement of a career of study. All is new, and novelty is a strong stimulant. There are fresh faces pursuits and associations; there is actual contact with persons whose names have been long familiar; and with places that have been known intimately by report. The dreams of imagination have become realities, and now they are clothed with visible shape and presence.

For a brief space there is no outward difference between one student and another: all alike are eager, confident and industrious. The tares are not distinguishable from the wheat.

But novelty must cease, and with it the influence of excitement, good in itself but evanescent. Here is the rock on which many a brave ship has foundered. When the sun shines it is easy sailing; and when the storm blows, every man is on the alert; but the calm is a perilous condition, for where there is little apparent progress, the most persevering are tempted to grow weary of well-doing.

This is doubly the student's danger,—his surroundings are no longer strange and no sooner has the stimulus of acquiring leading facts diminished, than a sense of lassitude springs up: the calm, most of all things to be dreaded, has set in.

At this critical point begins the differentiation between the good and the bad student. The first is sorely tried; but the second yields—unconsciously; to a great degree, imperceptibly; until a fatal carelessness becomes habit: until regret merges into apathy: until apathy itself runs through the transformations of inattention, recklessness and despair.

No man is suddenly a bad student—the phases of a downward path are generally as just described.

He who would win the race and wear the crown is warned that this period of stagnation will supervene. The better the student, the more quickly will it arrive; but it is the fourth month which frequently decides success or failure.

The student in chemistry knows his gases, acids, salts, metallic and non-metallic bodies, and theories of combination. In Pharmacy he knows the run of the preparations of the British Pharmacopœia; in Botany, the book-teaching of the subject, and he can both recognize and is acquainted with the history of the various products of Materia Medica. Then, either seeing the immensity of the field before him;

or far worse, not seeing it, and beginning to be content, the warmth of his ardour cools, and the fresh vigour of his energy decays. Would that he would allow an old student to be taken into his confidence, and listen while he tells him, that this state of passivity has afflicted countless generations of men who have triumphed over the narcotic influence; who have aroused themselves from a slumber fatal as the snow-sleep; and who have attained to what theologians call, final perseverance. Happy is the student, who feeling no pleasure in his work; with loss of appetite for study, and for a season indifferent to success; realizes that this is an illness of the mind produced by natural causes; and who quietly goes on his accustomed way certain that the fit will pass.

Poor humanity is not always in a crisis, nor exposed to overstrained emotion; three quarters of the student's work is of an equable and regular description. On an average it is all the better, should he be fortunate enough not to read alone. Two congenial friends having sympathies in common, and passing through the same curriculum, form a splendid mutual aid society. One cheers the other, and chaffs him pleasantly when inclined to loiter. Two, can talk over their mutual difficulties and question each other on the various subjects: two can examine each other's notes and point out deficiencies in the manuscript of either: two, to make the matter brief, are stated on high authority to be better far than one.

But should circumstances render this impossible, the best substitute is to read aloud, and unless this plan be adopted, a very large portion of the knowledge to be gained from books will escape the reader. Understandest thou what thou readest? is an ancient question; but the student who reads always to himself is not in a position to discover whether he understands or not. Forgive me if I insist upon this point. In cases innumerable an abstruse sentence becomes intelligible solely by this method; and it is the daily experience of every constant reader that words travelling through the air and coming back upon him as a listener acquire a meaning and a distinctness which previously they did not possess.

May I to-night repeat what I have insisted on for more than twenty years, that the regular consecration of a fixed portion of time, to any branch of learning, pharmaceutical or otherwise, will surmount whatever difficulties may be presented. Thus the enforced, consecutive and continuous devotion of one hour a day to a given purpose, is omnipotent. I know full well that the idea has been deemed romantic, but it never will be by those who venture on the attempt.

We read of genius—and in truth there is a species of divine intuition vouchsafed to a few. A street boy takes a piece of chalk and with it traces lines which command the admiration of the world; a rude miner in the bowels of the earth solves problems in mathematics; and an untaught lad makes music out of pots and pans—music destined to be the delight of after ages. For this there is no law—but next to genius there is something which marvellously simulates its effects, and that is uninterrupted perseverance. So great is its power that some have even mistaken its identity and declared that genius itself was but the faculty of unremitted application. Let us not quarrel about definitions—try it under whatever name; and should you inadvertently turn out a genius, your friends will be quite pleased.

The wise king said that of making books there was no end, and in the days of Solomon there were no second editions. There are now more books than ever, but it must be granted that many of them are extremely good. No man need hunt for an admirable treatise on any technical subject; and it is specially characteristic of the age that professors of acknowledged excellence devote their full powers to the literary explanation of their own science. Their works are correct, lucid and arranged with charming simplicity. They are no longer written to display the profundity of personal erudition, but lovingly, as if to beg the student to understand the contents of the manual.

He acts wisely therefore who is not a man of one book, but who is catholic in his selection, and who consults two or more standard authorities in each department of information.

But whatever text-books be adopted, they should not be blindly followed, or be permitted to supplant original thought. An author himself is the first to condemn such *literatim* study, for his wish is to instruct others in the lore which he has himself acquired, and to lead those who accept his services, into fresh fields and pastures new.

I am bound most unwillingly to advert to a peculiar cause of weakness which should not be suffered to continue. It has been to myself and others a matter of astonishment that there should exist in young Pharmacy such a dread of examinations. I am not alluding to those prescribed by law, for I have rigidly set myself the task of speaking only of the School of Pharmacy as such. I have designedly left untouched the broader questions of education, such as the proposed curriculum; the creation of recognized official centres, and the politics of our Society. We turn to the pages of the Journal and see that at the end of a session one student enters into competition (if the term can then be permissible,) for a prize: or two present themselves for an examination. Reports of former years confirm the statement that often the number of candidates is in inverse proportion to the number of the class. Some possibly argue that the reward is likely to pass into other hands, and it is therefore useless for them to compete, a notion which is confusion worse confounded as to the whole bearing of the subject.

If the value of the teaching here is represented by the medals, prizes and certificates which can only fall into the hands of a restricted few, the sooner the place shuts its doors the better. The expenditure, and the machinery employed would both be infinitely out of keeping with results. The system of giving prizes is the best at our disposal, and it contemplates two objects;—first, it directly promotes the activity of study, and is a public sign on the part of the authorities that certain students have distinguished themselves in a more than ordinary manner. Secondly, it is an inducement to persuade young men to accustom themselves to an examination, and thus to ascertain for themselves from time to time the exact position in which they stand. They will find no plan more useful, or more satisfactory: and, just as a merchant undergoes a perpetual examination of his affairs by consulting his accounts, and thus sees where he is weak, and where he is strong: where the source of failure by being anticipated may be prevented; and also sees the exact moment when he may stand before the world with confidence; so the student may both ascertain his deficiencies, and know when calmly to rely upon his strength.

I implore the students of the opening session to be guided in these matters by common sense; and I ask them to court every chance of class examination—a process salutary beyond description, and one which will rob the official compulsory examinations of all their terrors.

Having reached this pleasant elevation let me not close my note-book without showing you a little sketch which I have made of a flower by the wayside: it is hardy in character; indigenous to Great Britain, and should be carefully cultivated by every student: the flower is called, Cheerfulness. You may think it a minor virtue, and an anti-climax to other gifts, but it is wonderful what it will do for a man as a mental, physical and moral safeguard. A cheerful heart doeth good as a medicine and puts its possessor in full pleasurable exercise of all his faculties. Cheerfulness will dissipate a thousand grievances real and supposed; it will smooth the rough angles of many an awkward corner, and it will open a myriad avenues of contentment.

It is so invaluable to the student: so tinges and changes the current of his life: makes him such a fine companion, and centre of happiness to others, that I cannot omit the gift from the catalogue of things essential.

And I knew once upon a time a master spirit of the art of cheerfulness, dear to Michael Carteighe, and to an examiner from Newcastle-upon-Tyne—in the person of John Cargill Brough.

It would be treason to long friendship not to bear one in loving memory this evening, who took so deep an interest in the establishment of these inaugural addresses.

There was within him a never-ending spring of pleasantry which rippled and bubbled over his correspondence, his conversation, and his life. His cheerfulness was contagious and found expression in quaint fancies and exquisite turns of thought. I am thankful to have been under such an influence, and many amongst us can make the same confession.

In his companionship our President would sometimes forget his bye-laws; and even the strictest of the sect of the students resident at Plough Court, remarked, "I like to hear Jack talk."

These are some hints which may aid you in turning to the best account your London life. I would have you bear in mind that you can make or mar the reputation of this historic School. From its walls have gone forth men whose success while here has added lustre to the place; and whose after-career has exalted British Pharmacy. Most of these continue to this hour to endow Pharmacy in a way which no Government, no grant of money, and no patronage, can do.

May I ask you to join their ranks and to hand down to your successors the fair fame which you have inherited. There is joy in harvest when the yellow sheaves are gathered; joy in the vintage when the grape is pressed; and there will be joy in many a near and distant household when you return laden with the spoils of successful learning. Well may the home be glad, when he who came to this great city as a trembling student, has finished his course bravely, and goes back—a man.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 7, 1882.

THE OPENING OF THE SESSION.

It will be admitted by all who have been privileged to attend an Evening Meeting of the Pharmaceutical Society in October that it constitutes one of the most pleasant of *réunions*. The students of the past session, with their hearty greetings of their former professors as well as of their successful fellow pupils; the new students, just buckling on the harness; the presence of ladies; the distribution of prizes; and last, but not least, the words of wise counsel which on such occasions are spoken by some one held in honour by pharmacists;—all conspire to create an enthusiasm which may be expected to produce good effects reaching far beyond the immediate occasion. We are glad to be able to report that the meeting on Wednesday last proved no exception to the general rule.

The reports of the Professors were, as they have been for many years past, eulogistic of the intelligence, application, and conduct of the students, and it was satisfactory to hear that, although the number of students in the School of Pharmacy had been rather smaller than usual, there were among them those who are likely to become men of mark in the future. Once more the silver medals of all three classes have been carried off by the same student, and the awards of the Professors have found confirmation in the decision of Dr. CLARK and Mr. GIBSON that this gentleman was also entitled to the Pereira Medal. In distributing the prizes the President spoke a few kindly words of encouragement to each recipient, and in handing the "blue riband of pharmacy" to Mr. SHORT, he appropriately reminded the audience that he also is a Pereira medallist.

Not the least successful event of the evening was the delivery of the Introductory Sessional Address by Mr. JOSEPH INCE. Mr. INCE's piquant literary style is now well known to pharmacists, and it may be fairly said that the address was most characteristic and one of his best efforts. A brief historic sketch of the origin and object of the "Annual Sessional Address," and an enumeration of the honoured names of those to whom in successive years the delivery of it has been confided, led up to a hearty welcome to the new students. Once more becoming historical he went back to the period, little more than forty years since, when pharmacy was not represented by a corporate body in this country, and recounted the steps by which the School of Pharmacy rose from the basement of the Society's premises to its present lofty quarters, interspersing here and there personal sketches of the early professors, and raising a frequent laugh by sly quips which gained in point by the dryness with which they were delivered.

Then turning to the real task of his address he cautioned students against giving way to the stagnation of the fourth month, advised them not to be men of one book, to cultivate companionship in their studies and gave them other advice which commanded the approval of all who heard it. When at the close of the address a vote of thanks was passed with acclamation it was felt that seldom had such a compliment been more richly deserved.

ELECTION OF BENEVOLENT FUND ANNUITANTS.

It is a subject for congratulation to learn from the official report that the Council at its meeting on Wednesday last, acting upon the recommendation of the Benevolent Fund Committee, decided that six annuitants shall be elected in December next. This will raise the amount disbursed annually in annuities to nearly £1400, a sum more than twice the income derived from funded property, which theoretically regulates the amount of responsibility incurred in this direction. It will be seen, therefore, that the Council relies upon the continued liberality of the subscribers and donors to the Fund, and it is hoped that a large proportion of those who have not yet renewed their subscriptions for the present year will be induced to do so at once by this action of the Council. That the relief afforded, great as it is, is unfortunately not yet commensurate with the distress existing, is evident from statements made by members of the Committee, as well as by the fact that for the six fresh annuities there are already nine approved candidates.

SUSPECTED LEAD POISONING.

The case of suspected poisoning by water contaminated with lead, reported in this week's Journal, has excited considerable interest in the neighbourhood where it occurred, and it is to be regretted that the circumstances connected with it have not been more clearly made known and less eclipsed by opinions tending to support opposing views. Thus as regards the cause to which the presence of lead in the water is ascribed, we only find it referred to incidentally, without any statement as to what mineral acid was present in the water in a free state. The account of the medical evidence given to disprove the alleged poisoning is equally unsatisfactory. It is difficult to understand on what grounds Dr. Tidy stated that though lead poisoning had preceded death it was not the actual cause of death in this case, but that the probable cause was granular disease of the kidneys, that being, however, as he admitted, a consequence of lead poisoning. We are not surprised to learn that the condition of the water in question is to be thoroughly investigated, for the doubts raised by this case are such as to make inquiry indispensable.

AUSTRIAN PHARMACEUTICAL SOCIETY.

The twenty-first General Meeting of the Austrian Pharmaceutical Society was held on the 17th of September, in the large building of the National Museum in Agram. The "Directorium" was represented by Messrs. Schiffner, Waldheim and Kwisda, from Vienna; the Pharmaceutical Gremium of Croatia by all the pharmaceutical chemists of Agram and some visitors and guests from Croatia, Slavonia, Istria, Styria, Moravia and Bosnia.

After the regular business affairs of the Society had been transacted, different motions proposed by the Directorium came on for discussion, the most important, brought forward by Mr. v. Waldheim, in reference to pharmaceutical education, was adopted unanimously. Mr. v. Waldheim also made a statement as to the progress made in carrying out the "International Pharmacopœia." It is only necessary to add to our recent note on this subject (before, p. 247), that the Italian representatives have now sent in their revised and amended lists to the President of the Commission.

For the guests and visitors of this meeting the Pharmaceutical Gremium of Agram and Croatia arranged a splendid banquet in the Hotel "Kaiser von Oestreich," which the Burgermeister (Lord Mayor) from Agram, Dr. Hofman, the President of the Police in Agram (Stadthauptman), the Landes Sanitals Referent, Dr. Rakovan, and Mr. Dezelic, Senator of the Municipium of Agram, honoured with their presence. The project to pay a visit to Banjaenka, in Bosnia, was not carried out, the weather not being favourable.

EARLY CLOSING.

A vigorous attempt is being made in different districts in the South of London to promote what is known as the Thursday half-holiday movement. A meeting has recently been held in the Masonic Hall, Camberwell New Road, under the presidency of Mr. W. Dodd, chemist and druggist, when a resolution was passed in favour of closing shops at five o'clock on Thursday afternoons. We hope that this movement may, as far as possible, receive the countenance of chemists and druggists, and would recommend those in the district of Camberwell desiring concerted action to communicate with Mr. Dodd, whose address is 169, Southampton Street.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The first meeting of the above Association will be held at 32a, George Street, Hanover Square, W., on Wednesday, October 11, at 9 p.m. precisely, when the President, Mr. W. A. Wrenn, will deliver his inaugural address. We understand that a complete and attractive programme is ready for circulation, and a most successful session is confidently anticipated.

EDINBURGH CHEMISTS' ASSISTANTS' ASSOCIATION.

The Edinburgh Chemists' Assistants' Association will commence a new session on Wednesday next, when an address will be delivered by the President, Mr. Peter Boa. We notice that in connection with this Association two prizes are offered to apprentice members for competition in the form of a written examination in Latin, English, Arithmetic, Elementary Chemistry and Pharmacy.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, October 4, 1882.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Hampson, W. Hills, Radley, Richardson, Robbins, Savage, Schacht, Symes, Williams, Woolley and Young.

The minutes of the previous meeting (August) were read and confirmed.

The PRESIDENT said the instructions given by the Council in August, with reference to the repairs and alterations, had been carried out, as far as practicable; but there were one or two alterations still incomplete, and he must ask for indulgence if the ventilation in some of the rooms was not yet as perfect as he hoped it would be.

ELECTIONS.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Loam, James Gilbert ....Reading.

Modified.

Hulbert, Samuel James ....Glastonbury.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Gaskin, John Henry ....Wolverhampton.
Gatward, Oswald ....Hitchin.
Jackson, William Moses.........Ayr.
Longtoft, William ....Bedale.
Ransom, Francis ....Hitchin.
Reade, John Edmonds............Wolverhampton.
Weddle, William ....Gateshead.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society :—

Bing, Charles ....Canterbury.
Cooper, George Thomas ....Market Bosworth.
Dyer, William Bury ....Halifax.
Evans, Robert ....Bala.
Gilbert, Joseph Anthony.........Manchester.
Greenhalgh, William Henry ...Rotherham.
Lamplough, James William ...London.
Notcutt, William Brighty ......London.
Oxen, David Hunter ....Tynemouth.
Powell, Samuel R. ....Scarborough.
Rees, Charles Joseph ....Swansea.
Rigden, George.....................Folkestone.
Smith, Arthur Llewellyn ......Sidcup.
Topham, Thomas ....Mirfield.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

RESTORATIONS TO THE REGISTER.

The names of the following persons, who had made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

Robert Coulson, 3, Vicar Terrace, Cranmer Road, Forest Gate, Essex.
Francis Charles Rawlings, Barmouth, Merionethshire.

APPOINTMENT OF SECRETARY TO THE NORTH BRITISH BRANCH.

Mr. Peter MacEwan was reappointed Secretary to the North British Branch until June next, it being considered desirable that in future the appointment of this officer should be made at the same time as that of the other officers of the Society.

Mr. RICHARDSON, having recently visited Scotland, had great pleasure in saying that he heard everywhere a most excellent account of the present Secretary, showing that he was thoroughly appreciated in Scotland.

Mr. BORLAND was very pleased to hear such an expression from a gentleman south of the Tweed. He might add on behalf of the Members of the Board of Examiners in Edinburgh, that they were thoroughly satisfied with the manner in which the work of the office was conducted.

ADDITIONS TO THE REGISTER.

The Registrar reported that the following:—

James Coley, 5, Chapel Terrace, Derby Road, Bootle, Liverpool,
Ebenezer Gibb, New Byth by Turriff, N.B., and
Henry Thompson, 105, Hither Green Lane, Lewisham,

having made statutory declarations that they were in business before the passing of the Pharmacy Act, 1868, and these declarations having been supported by duly qualified medical practitioners, their names had been placed on the Register. In each case he had made inquiries and was satisfied that these persons were entitled to have their names put on the Register.

Mr. ROBBINS inquired if the chemists in the neighbourhood were satisfied also.

The SECRETARY said he could not say; he had adopted the usual course of writing to the medical gentlemen who had given the certificates.

Mr. SYMES said that as a matter of fact inquiries had been made of him, by the office, with regard to the gentlemen in the neighbourhood of Liverpool.

REPORTS OF COMMITTEES.

FINANCE.

The report and recommendations of this Committee were received and adopted, and several accounts were ordered to be paid.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants :—

£20 to a member from 1853 to 1878, and also a subscriber to the Benevolent Fund. Applicant is now paralysed.

£20 to the widow of a former member and subscriber to the Fund.

£15 to the widow of a member and subscriber to the Fund. Applicant has had a former grant of the like amount.

£10 to a former member, aged 69.

£10 to a registered chemist and druggist, aged 72.

£5 to the widow of a former member.

One case had been postponed, and another application the Committee had declined to entertain.

The SECRETARY had presented the following statement for the current year:—

Income.

	£ s. d.	£ s. d.
Dividend on £18,600 . . .	556 10 0	
Subscriptions to end of September	1421 17 4	
		1978 7 4
Donations to end of September		377 11 0
		2355 18 4

On deposit . . . . . £500.

Expenditure.

	£ s. d.	£ s. d.
Annuitants:—		
22 at £35	770 0 0	
14 „ £30	420 0 0	
		1190 0 0
Casual grants up to October, inclusive		396 0 0
		1586 0 0

Thirty-six annuitants now on list:—

4 over 80.
14 „ 70 under 80.
14 „ 60 „ 70.
4 „ 50 „ 60.

The Committee recommended that certain names be placed on the list of approved candidates for annuities, and that six annuitants be elected on Friday, December 15.

The Secretary reported that three hundred and twenty four persons had not renewed their subscriptions during the present year.

The Council went into committee to consider the details of the report.

On resuming, it was moved that the report and recommendations of the Committee be received and adopted.

Mr. Bottle said it quite accorded with the views he had previously expressed that the Council would be perfectly safe in electing annuitants on the money coming from subscriptions, as well as on the interest of the invested capital. He found that prior to the election in 1872 only fourteen annuitants had been elected, thirteen of whom were alive at that time. The Benevolent Fund was not then in the condition in which it was now, for he did not know that in all his experience at that Council table he had heard anything more satisfactory than the statement now made. Up to the present moment there had been received something like £200 more in subscriptions than in the previous year, and on the previous evening the Committee had had an unexampled list of applicants for relief. He did not know that he ever remembered applications from people whom the Committee had felt so much desire to relieve,—persons who had been in good circumstances, and who, from causes beyond their own control, had come to poverty. He had much pleasure in supporting the election of six annuitants, believing that the subscriptions would come in amply sufficient to make the required payments.

Mr. Richardson desired it to go forth that continued efforts should be made to increase the Fund, so that more might be distributed in casual grants as well as in annuities. He had no doubt that if some energy were shown, not merely by members of the Council, but by influential chemists in every centre of Great Britain, the amount raised could be increased considerably. He feared that in future years there would be a painful accession of numbers in the applicants and of a character which all must much deplore. There had been several instances on the previous evening of persons who had lived in affluence, but who had been brought to poverty. As had been said, in nine months there had been an increase of subscriptions amounting to £210, and he believed if the year were taken it would be considerably more.

Mr. Hampson said he occasionally got letters from members of the Society objecting to the want of the spirit of adventure at the Council table in the distribution of the Fund. It had been said that there were two ideas as to the distribution, one being that only the interest on the money invested should be expended. But these correspondents objected to contribute to the Fund, because they felt that their money was not likely to be used in the way in which they wished. If they thought it would be spent almost to the utmost farthing it would give that kind of impetus that would compensate for any want of caution in the distribution. He thoroughly sympathized with that spirit and believed it only needed a statement that the Council was almost absolutely without funds in order to get an ample response. He was extremely gratified to find that new spirit had been infused into the administration of this Fund and he hoped next year it would evoke a hearty response throughout the trade, and lead to many more contributions being received. He felt sure there was plenty of money amongst chemists in the country, notwithstanding their poverty, to support all the poverty incident to the trade; it only required to be got at.

Mr. Robbins said it was very gratifying to see the present state of the Fund. He remembered when he first made the proposal that four candidates should be elected it aroused almost a consternation at the board, and it was said it could not possibly be done, because there was no money to pay for it. At that time the whole expenditure of the Benevolent Fund was something under £600, although there was an income of more than double that sum. The Council was then funding all that it could, but was only able to put by a small sum annually. Happily the Council was persuaded to add more annuitants, trusting to the benevolence of the general body, and from that time the funds had been increasing, whilst the sum expended annually had been doubled, trebled, and was now almost quadrupled. There were at that time thirteen annuitants on the books, and in a few weeks there would be forty-two, which was more than he, at that time, anticipated. He was also pleased to see the names selected as approved candidates, for he had never seen a a better list. Many of them were persons who had been members and had subscribed to the Society; who had held a good position and by some misfortune had been brought to seek help of this kind. He was quite sure it was a wise policy to spend the greater part of the money which was subscribed, and he hoped, before long, to see fifty annuitants on the list.

The Vice-President said he believed the necessity for the Fund was not likely to decrease but to increase, but he also believed in the statement made by Mr. Hampson, that the money was somewhere if it could only be got at. It appeared to him some sort of organization was wanted for getting at this money, some better devised system of collecting. The extra support that had recently been given was simply the result of extra efforts which had been made in various parts of the country, but he did not think that London had yet grappled with the problem. There was a huge population of four millions in the Metropolis, amongst whom there must be a large number of chemists who did not contribute, and it seemed to him that what was needed was a method of organization for going round and asking for contributions, and in that way he believed that a large revenue could be obtained. It was very seldom that charitable contributions were sent; they were always called for. He should be very glad if the Council would put its shoulder to the wheel and take up this matter.

Mr. Symes had no wish to damp the spirit of satisfaction which seemed to pervade the Council in regard to the state of the Funds, but he should like to call attention to the fact that, although the Committee was then in the proud position of proposing to elect six candidates, there were nine down on the list, all of whom were eligible, and he should like it to be recorded that notwithstanding the special efforts made this year, still three hundred and twenty-four persons had not subscribed this year who did last. Putting those facts together, it showed that whatever satisfaction might be felt there was still room for considerable accession to the Fund, and still a large number of cases which could not receive the amount of aid the Council would like to give.

Mr. WILLIAMS said he had just glanced through the books and he was quite certain that of the three hundred and twenty-four persons who had been mentioned as not having yet paid the subscriptions for this year, a large number only required to be reminded of it; he was sure a great deal of that money was not lost to the Fund.

Mr. BOTTLE could not allow the discussion to close without expressing his dissent from the view which the Vice-President seemed to entertain, that London had not been properly attacked, if by that it was intended that London did not subscribe as it ought to do. He found that out of fifty columns of names of subscribers to the fund for the whole Great Britain nine were filled by London, which was, he thought, a very fair proportion.

Mr. SAVAGE asked if any efforts were made to remind those who had not paid the subscriptions that were due.

The SECRETARY said that two written applications had been sent and another would be.

Mr. SAVAGE suggested that if someone in a locality, well acquainted with the subscribers, would call it would be more likely to be efficacious. If there were any in his neighbourhood he should be happy to call upon them.

Mr. ANDREWS said he had said the same with regard to any gentleman in his district.

Mr. ROBBINS thought it would not be advisable to pester too much.

The SECRETARY said he did not think there were many subscriptions lost for want of their being asked for.

Mr. HAMPSON thought the residue of the London subscriptions might be gathered in if a list were furnished to a clerk for collection; it would be better than merely sending a circular.

The report and recommendations of the Committee were then received and adopted.

Legacy from the late Mr. Howden.

The SECRETARY announced that since the last meeting of the Council, Mr. Robert Howden, of Gracechurch Street, who had been a subscriber and also donor to the Fund, had died. A communication had been received from one of the executors, saying that Mr. Howden had left a bequest of £100 free of legacy duty to the Benevolent Fund, which he should have the pleasure of forwarding as soon as probate was granted.

GENERAL PURPOSES.

The report of this Committee was, as usual, considered in committee. It included the usual letter from the Solicitor giving particulars of cases which had been placed in his hands. It stated that in the case of Sinton Michael Honan, 90, King Street, Hammersmith, the defendant had confessed judgment, and judgment had been entered for the penalty and costs.

Several other cases had been considered by the Committee, and in some cases it was recommended that the Solicitor be instructed to commence proceedings.

A memorial had been received from a person at Derby, praying that his name be restored to the register; but after going at length into all the circumstances of the case, the Committee had seen no reason for altering the decision arrived at in May, 1881.

The report and recommendations were received and adopted.

COMMUNICATION FROM THE PRIVY COUNCIL.

THE SOCIETY'S EXAMINATIONS.

The following communication from the Privy Council Office was received:—

"Council Office,
"16th August, 1882.

"Sir,—I am directed by the Lords of the Council to transmit to you, to be laid before the Pharmaceutical Society for their information, a copy of the report upon the examinations held by the London Board of Examiners of the Society in 1881, by Dr. Greenhow, the officer appointed by their Lordships to attend such examinations.

"I am, Sir,
"Your obedient Servant,
(Signed) "C. L. PEEL.

"The Secretary,
"The Pharmaceutical Society,
"17, Bloomsbury Square."

"*Report on the Examinations held by the London Board of Examiners of the Pharmaceutical Society during the Year* 1881.

"During the year 1881, the London Board of Examiners of the Pharmaceutical Society held twenty-five meetings for the examination of candidates for registration under the Pharmacy Act, 1868. This is exclusive of the first or Preliminary examination, which continues to be conducted by the College of Preceptors.

"*Preliminary Examination.*—During the year 1881, 1187 candidates offered themselves for the Preliminary examination in English, Latin and arithmetic, 512 of whom passed and 675 were rejected, being at the rate of 56·8 per cent. The proportion of failures was, therefore, unusually large.

"Of the rejected candidates 20 who had obtained the minimum passing number of marks, viz., four-tenths of the allotted number, in each of the three subjects of examination, failed because they did not obtain half the aggregate number of marks on the whole examination; 86 failed in all the subjects; 77 in English; 53 in Latin; 195 in arithmetic; and 244 in two of the subjects.

"*Major Examination.*—Only 100 candidates presented themselves for the Major examination during last year, 51 of whom passed and were registered as pharmaceutical chemists, and 49, being at the rate of 49 per cent., were rejected. Of these 7 failed, although they had gained the minimum number of marks in each separate subject, because they did not obtain half the number of marks allotted to the whole examination; 32 failed in chemistry and practical work, and 10 in botany or in botany and either materia medica or chemistry.

"*Minor Examination.*—During last year 567 candidates for the Minor qualification were examined, 278 of whom passed and were registered as chemists and druggists, and 289, or in the proportion of 50·6 per cent., failed; of the latter, 51 failed in the whole examination, although they had gained the minimum passing number of marks in each separate subject; 81 failed in chemistry; 44 in materia medica; 13 in botany; 25 in reading Latin prescriptions; 18 in practical dispensing; 23 in pharmacy, and 34 in two of these subjects.

"*Modified Examination.*—Only 9 candidates came up for the Modified examination last year, 3 of whom passed, and 6 were found incompetent.

"I have, on former occasions, pointed out the probable causes of the very large number of rejected candidates at the pharmaceutical examinations. They are, as regards the first or Preliminary examination, the very inadequate early education of the large majority of the candidates; and, as regards the technical examinations, their very defective training during the three years passed in a chemist's shop previous to admission for the Minor examination.

"I learn that many of the candidates for this examination have had only scanty opportunities for practically learning to read prescriptions written in Latin, or to dispense and compound medicines; as a rule, it is only in large towns that there is much demand for dispensing physicians' prescriptions, and when a young man is apprenticed to a master who has not much dispensing work, he can neither acquire the intimate acquaintance with the physical characters of drugs and chemicals, nor the practical skill in dispensing, which he requires to fit him for carrying on business on his own account, and which he is expected to manifest in the examination room.

"The large number of rejections at the examinations of the Pharmaceutical Society has naturally attracted much attention on the part of the Council of the Society. A Special Committee was accordingly appointed by that body in 1882 to inquire into and consider the relation to each other of pharmaceutical education and pharmaceutical examinations.

"A first report was presented to the Council in August, 1881, and being generally approved, was referred back to the Committee for the consideration of details.

"The final report was brought up in April of the present year and, with the exception of a clause recommending that the Minor examination should be divided into two parts, with an interval of not less than six months between the first and second portions, was adopted by the Council, and subsequently by the Annual Meeting of the Society.

"As, however, the recommendations contained in that report will still need some consideration before they are carried out, and further, as it is not proposed that they shall come into force until January, 1886, I defer offering any detailed comments upon them until further steps have been taken by the Council with a view to their practical adoption. I may, nevertheless, say that the two first recommendations are accordant with views I have expressed in previous reports.

"They are, first, that candidates for examination be required to produce evidence of having passed an apprenticeship or pupilage of not less than three years with some duly registered chemist and druggist; and, secondly, that the Preliminary examination or its equivalent be passed prior to apprenticeship or pupilage.

"In conclusion, I am glad to be able to express my opinion that the examinations of the Pharmaceutical Society held in London, as at present conducted, afford a sufficient guarantee that the candidates who pass them are competent to be registered under the Pharmacy Act, 1868.

"(Signed) E. H. Greenhow."

Mr. Hills said he considered the Preliminary examination one of the most important parts of the qualifying process, and he was disappointed to find the percentage of failures was on the increase. He had obtained from the office the percentages for the last five years. He found in 1877 there were 46·7; in 1878, 52·4; 1879, 46·88; in 1880, 48, and in this Report there were 56·87 failures. One point which especially struck him as very disappointing was that in such a subject as arithmetic about one in six failed to pass. He did not think the arithmetical questions were of such a nature as to cause this result, for in a chemist's daily business questions quite as difficult often occurred, so that one unable to pass in arithmetic would scarcely be fit to dispense prescriptions. He saw, moreover, that only half the full number of marks were required to pass, and it would be very interesting to know how many of those who did pass obtained 70 or 80 per cent., for after all those were the men to whom they should look for the future. It could not be too strongly insisted upon, that this Preliminary examination was very important, and it was very desirable that parents and guardians and those interested in the future of young men should make it a subject of thought, and see that those under their care came up in some way fitted for their future career.

Mr. Richardson quite agreed with Mr. Hills, and said the results now shown entirely bore out the arguments he had adduced before, that the young men, before being apprenticed, had not had a sufficient education; in fact he thought that the young men now coming forward were not of the same calibre as were those some time ago. It was all very well to say that parents should be told of this, but he was afraid that, in country places especially, chemists were induced to take young men as apprentices without having sufficient regard to the future requirements of their position, and it had been his duty frequently to advise parents and guardians on this point that the better plan would be to see that the candidate was tested as to his educational powers before being apprenticed. He hoped that as soon as possible that portion of the curriculum would become law.

Mr. Symes said the greater part of this Report was very properly a historical record of the facts connected with the examination, and it was only towards the conclusion that Dr. Greenhow drew any deductions. The paragraph which interested him most was the final one, which seemed to him to cut at the foundation of much of the work the Council had been doing. Whether Dr. Greenhow was under a misapprehension or not he did not know, but reading the Report a person not conversant with the discussions in the Council would say that an exceedingly good case was proved for this concluding remark. The Report showed that a large number had been examined, and that a large proportion was rejected, and if the examinations were sufficiently stringent to sift out a large proportion who presented themselves they accomplished all that could be desired at the present moment. If that were so the inference might also be drawn that the direction in which the Council was working was the making of examinations more stringent, or placing further difficulties in the way, and, therefore, it was a pity the paragraph should pass without some notice being taken of it. It could not be too frequently stated that the sole object of the Council was to increase the facilities for passing the examinations, and to reduce the percentage of failures. So that when future reports were presented it would be found that properly trained young men would come up so thoroughly prepared that, instead of there being 60 or 65 per cent. of failures, there would be only 10 or 20 per cent. That was really the object of the changes it was proposed to introduce. The deduction which appeared to be drawn was that if a young man passed the examination as at present conducted it was in itself a guarantee that he was a thoroughly qualified young man, but in certain cases it was thought some passed the examinations who were not thoroughly qualified.

Mr. Williams said the statement was that the candidates who passed were competent to be registered under the Pharmacy Act. He thought Mr. Symes was rather misreading the paragraph.

Mr. Symes said if that was the statement of a simple fact he could only say that what the Council was doing was something which was undesirable.

The Vice-President hardly thought that was so. He agreed with Mr. Symes that it was a matter of regret that there was such a large percentage of failures, and no doubt the action of the special Committee on the subject was to endeavour to reduce the percentage. But he differed with him on the interpretation of this last clause of the Report. It seemed to him that Dr. Greenhow, in representing the public interest, had simply stated what was important as an endorsement of their work—that he believed the examination was a true and honest one, and that the men who passed it were competent to go into pharmacy. To come back to the important matters raised by Mr. Hills, it could not be too much impressed on all young men's minds, that to succeed well in the future they must start well. This matter of the Preliminary examination, although it might seem to some but the smaller matter, because it was a scholastic examination and not a technical or scientific one, was of the highest importance. It was very desirable to start with an educated class of men, and he had always urged that the qualification should exist before the apprenticeship commenced. He held the strongest convictions on that point, as he did ten years ago; but the awkward fact constantly came up that a very large number of young men entered the calling who were perfectly incompetent, from the want of an early education, to pass the examination. In fact children who were successful in the sixth standard under the Elementary Education Act were far better prepared than a large number of young men who entered the trade. But having entered it a man naturally said, "What am I to do? I have been at it some time, and I cannot turn to anything else." Without raising the question of elevating the standard, it ought to be insisted that those who commenced work should come in with a good sound liberal education.

Mr. Robbins agreed with the views of several speakers that these rejections were not a small question. It was important in many respects, not only to the young men who were rejected and the Society, but to the public also. All young men who went into the trade should by proper perseverance be able to pass the examinations, but the great objection to the present state of things was that about half of the candidates were rejected after they had commenced to be pharmacists and had learnt something of the business, and then what could they do? He understood that a great number of them went to grocers and introduced the chemists' business into the grocery shop, and this it was which had caused so much mischief throughout the country. The great object of the Society should be to get young men to pass the Preliminary before learning any of the technicalities of the trade. If they were not up to the proper standard they would not enter the trade, but if they were they would be able afterwards to pass the subsequent examination if they only properly applied themselves.

Mr. Savage thought on the whole this was a very satisfactory Report. It was not only the Preliminary examination that had to be looked to, but the paragraph which related more particularly to the masters ought to be strongly impressed upon them. Dr. Greenhow said that he learnt that many of the candidates had had only scanty opportunities for practically learning to read prescriptions or to dispense and compound medicines, and that as a rule it was only in large towns there was much demand for dispensing physicians' prescriptions. These were really important matters which were not so much dependent on the Preliminary as they were on the masters themselves. He knew that many masters much neglected to impart that information which they themselves possessed to the young men under their care.

Mr. Hampson said the difficulty in this respect, which was no doubt very unfortunate, was almost insurmountable in the present condition of pharmacy. The majority of chemists in this country really did not get prescriptions to dipense; the dispensing was done by the medical practitioner, and that was the key to the whole question with respect to the pharmacy of the future. If pharmacists had the pharmacy of the country in their hands they would have no difficulty in training the young men, because during their apprenticeship they would be brought into contact with prescriptions and would have to dispense them and handle drugs, and in many cases would have to make preparations themselves, and thus pharmacy would be constantly progressing. But what was the prevailing state of affairs? Even in London, which was supposed to be the centre of the universe, dispensing was not done by chemists and druggists, and yet it was expected at the same time that young men would enter the profession with zeal and almost with acclamation; and that they would feel a deep interest in their own education. They did not do so, and the reason was quite palpable. They saw that the prescriptions did not come into the shop of the chemist, who was already qualified and established, and perhaps a member of the Society, and consequently there was little or no interest taken in pharmacy. In other countries there was no difficulty. In France, Germany, and even in democratic America, there was no difficulty about the educational question, because the prescriptions gravitated in the proper direction. They reached the chemist's shop, and the student of pharmacy was interested, because he was surrounded with pharmaceutical matter. Until that matter was settled and pharmacists had the dispensing of the country in their hands there would be always this difficulty with respect to education. When even the highest qualification of the Society was obtained, the student knew he had to begin business under most adverse circumstances; he had to establish a business or join another and to deal in all kinds of things to make a living. But unfortunately all this miscellaneous trade was gravitating away from him and there was nothing but bare pharmacy, which unfortunately scarcely existed at all, left to him to depend upon.

Mr. Schacht wished to express his gratification that this Report, to a great extent, coincided with the results arrived at by the Committee which had devoted a large portion of time and consideration to this subject. The Report itself and the tone of the discussion had gone to show the wisdom at any rate of the first two of the recommendations submitted to and adopted by the Council; so distinctly and deliberately was that done that, although he was pleased to hear the repetition of the same opinions, he hardly thought it was necessary. But he could not help thinking that Mr. Symes was to a great extent correct, when he said that if this last paragraph was absolutely true there was no occasion for a large portion of the labours through which the Committee had been going. That was how he understood him; not that he objected to the expression as a legal opinion, but that it did not contain what he should like to have seen Dr. Greenhow finish his Report with. He should endorse that view exactly, for, although it might be perfectly true that the Society only registered such persons as were legally qualified to be registered, and, in that sense come up the legal requirements, still he was bold to say that many of those who were placed on the list were not up to the standard of pharmaceutical requirements that he should like to see them arrive at; and what was more, he thought that the examiners felt that in the present condition of affairs, they were not themselves quite competent to gauge the qualifications of the candidates. It was for that reason the Council had come to a unanimous conclusion that, in addition to an examination test of a man's qualifications, there should be a curriculum established. All educationalists had pretty well come to the conclusion that an examination test was not in itself sufficient. No examination test, applied in the fashion in which the Society's examinations were applied, could possibly be a real test of the qualifications of the candidate, and, therefore, the Council had come to the conclusion that the examination must be supplemented by a curriculum, in order to secure the registration of only those who were competent to conduct a responsible occupation. The last part of the Report seemed to assume that the examination alone had been proved to be sufficient to guarantee all that was required; but all agreed that it was not, and that, in addition to a curriculum which should train a man to pass the examination, the examiner should be strengthened in declaring a candidate to be competent because he knew that he had been trained up to the examination by a certain course, and that he had carefully followed the course of instruction prescribed by the Council before he came up for the final test of the examination. He thought the Council was quite justified in expressing a regret that no allusion was made to this point by Dr. Greenhow.

Mr. Young said he came to the conclusion, reading this Report, that the last paragraph merely referred to the opinion entertained by Dr. Greenhow as to the high character of the gentlemen who conducted the examinations, and expressed his satisfaction as to the manner in which they were carried out. He quite agreed with what had been said with reference to the importance of preparation for the Preliminary examination. Beyond that Dr. Greenhow referred to the defective training of the candidates during the three years passed in the chemist's shop, and so on, and further down where he reported as to what had been done by the Council, he adverted merely to the first two resolutions, omitting altogether any reference to the curriculum, as Mr. Schacht had pointed out. That appeared to be the one thing which was wanting in order to give some kind of indication as to what his views were, and so far he thought it was a defect, because without that it appeared to him the Council would be left much in the present condition of things. The candidate had merely to show that he had been apprenticed for three years, and unless the curriculum was brought to bear, matters might go on just as they did now.

Mr. WILLIAMS said he disagreed entirely with Mr. Schacht's remarks on one point, namely, that the Council had unanimously agreed on certain questions which had been brought before it on more than one occasion. On one occasion the Council was so far from being unanimous that it was the casting vote of the President which carried the proposition, and in other cases there was certainly a majority against the Committee's recommendations. Therefore he could not see, himself, that there was any right to assume unanimity on the part of the Council at present, until these matters had been further considered, for he denied that they had as yet been fully considered. There had been certain reports presented which the Council could not understand, and which were rejected on some occasions; on another occasion, the Council agreed to the principle. On the last occasion another report was agreed to, not unanimously, but simply under protest, it being referred to another Committee for further investigation.

The PRESIDENT said that the three resolutions referred to in the Report were passed unanimously on the motion of Mr. Williams.

Mr. WILLIAMS said the resolution was carried under such circumstances and conditions as made it very different from what was assumed. He thought Dr. Greenhow in this paper really gave the proper and right view of the matter.

Mr. SYMES said he in no way complained of the Report, which he had no right to do. In fact, when he first read it he thought it was almost intended as a compliment. Mr. Schacht had thoroughly interpreted his meaning. What he wished to point out was, what the Council had already agreed to, that certain young men neglected their training and got posted up in examiners' questions rather than got educated, and then came there to pass the examinations. The fact broadly stated in the Report was that the man was qualified, whilst the Council by its action had said that many of these men, although legally qualified, were not properly qualified for the business they went into. That was the ground of the action of the Council. First, to reduce the number of failures, and secondly, to secure that all those who passed the examination were thoroughly qualified. The question of the curriculum was before the country and presented itself in different aspects to different people; in some cases no doubt it met with opposition, and he feared this Report might be used as an argument that no curriculum and no further restrictions were required. He should be sorry if such were the effect produced.

The PRESIDENT said that he thought this discussion might now terminate. This Report was a very important document, but he thought more weight had been attached to the last paragraph than the writer intended, and he feared some of his colleagues looked at it partially, as members of the Education Committee. Looking at it as an individual he saw nothing whatever to find fault with, and he believed he had as much interest in the subject referred to as anyone. He considered this was a strictly accurate report; there was not even a tacit disapproval of certain of the recommendations, which might be said to be more or less incomplete at present. With regard to the curriculum, the Council had not yet laid down the basis on which to act with regard to the recognition of schools; and with regard to the examination itself, it had not yet decided what form that should take. He was not sure that Dr. Greenhow, in reporting as he had, was not quite right in taking those two resolutions which were clear and decided, and making his comments on them, and leaving the other matter for further information and consideration. This Report was for the year 1881, and he took it to be distinctly encouraging to the views held by that Council. He believed the writer simply intended to mean what he said, that those who passed the examination were competent to be registered under the Act. Dr. Greenhow had had large experience in every department of the medical profession; he knew the wants of pharmacists extremely well, and simply required to have all the facts put before him and to consider his own experience in connection therewith before coming to a conclusion. He believed that when the proper time came Dr. Greenhow would be found to agree entirely with the views of the practical men who had been consulted on this subject.

LEEDS CHEMISTS' ASSOCIATION.

The SECRETARY reported the receipt of a letter of thanks from the Leeds Chemists' Association for copies of the Journal.

PHARMACY IN GUERNSEY.

The PRESIDENT said Mr. Crossley, of Guernsey, an Associate of the Society, had written to inform the Council that an Act had been passed for one year placing the law in that island on a moderately satisfactory basis with regard to the sale of poisons and enclosing a copy of the following "Ordonnance" which had been passed:—

"*Ordonnance provisoire au Sujet du Débit de Poisons.*

"Vu les dispositions des lois du Royaume Uni à l'égard du débit de poisons attendu qu'il est expédient que des provisions analogues à ces dispositions soient introduites en cette Ile:—La Cour en amendant les provisions de l'Ordonnance provisoire à ce sujet passée aux Chefs-Plaids d'après Noël, tenus le 17 Janvier, 1881, ouïes les conclusions des officiers de la Reine, a ordonné et ordonne.

"I. Il est défendu à qui que ce soit autres que les pharmaciens et chimistes dûment autorisés à exercer leur profession dans cette Ile de débiter des poisons.

"Il est défendu aux dits pharmaciens et chimistes de débiter des poisons sans que la bouteille, boîte ou enveloppe contenant le poison débité ne soit marquée avec le nom du poison—le mot 'poison' en grandes lettres—et le nom et l'addresse du vendeur.

"III. Il leur est défendu de garder les poisons dont les noms sont insérés dans la première partie de la liste contenue dans l'article 6 de la présente Ordonnance à moins que les dits poisons ne soient déposés dans des armoires, boîtes ou autres lieux fermés à clef.

"IV. Il leur est aussi défendu de débiter les dits poisons insérés dans la première partie de la dite liste à des mineurs âgés d'au-dessous de quatorze ans ou à des personnes inconnues au vendeur.

"V. Ils sont tenus de garder un livre spécial dans la forme suivante:—Nom de l'acheteur; Nom et quantité de poison vendu; Pour quel objet; Signature de l'acheteur; Date.

"Et d'y insérer ou faire insérer le faits ci-dessus applicable à chaque vente de poisons dénommés dans la première partie de la dite liste.

"VI. Sont comprises sous le nom de poisons les substances suivantes leur désignation dans la langue Anglaise.

"Partie I.

"Arsenic and its preparations.
"Prussic acid and its preparations.
"KCy and all metallic cyanides and preparations.

"Strychnia and all poisonous vegetable alkaloids and their salts and preparations.
"Atropine and preparations.
"Aconite and preparations.
"Emetic tartar.
"Corrosive sublimate.
"Cantharides.
"Savin and its oil.
"Ergot of rye and its preparations.
"Chloral hydrate.
"Essential oil of almonds undeprived of prussic acid.
"Opium.
"Corrosive sublimate, sol. of.
"Corrosive sublimate, yellow potion of.
"Morphia acet., sol. of.
"Morphia hydrochlor., sol of.
"Morphia.

"Part II.

"Oxalic acid.
"Chloroform.
"Belladonna and preparations.
"Opium, the preparations of.
"Poppies, the preparations of.
"Red oxide of mercury (red precipitate of Hg).
"Ammoniated mercury (white precipitate of Hg).

"Every compound containing any of the poisons above mentioned, when prepared or sold for the destruction of vermin.

"The tincture and all vesicating liquid preparations of cantharides.

"VII. Toute personne, qui enfreindra un des articles ci-dessus sera passible d'une amende qui ne sera pas moins de £2 stg. et n'excédera pas £20 stg., la dite amende applicable moitié à Sa Majesté et moitié au délateur.

"VIII. Sera rappelée l'Ordonnance des Chefs-Plaids d'après Noël, tenus le 18 Janvier, 1730, au sujet de l'arsenic.

"IX. Et sera cette Ordonnance en force jusqu'aux Chefs-Plaids d'après Noël prochain."

Mr. Radley said he knew one case of a young man who had failed to pass the examination here who had gone to Guernsey to set up in business, and he believed that had not been an uncommon occurrence.

The Council then went into committee to consider a complaint with regard to the appointment of a deputy superintendent of written examinations in the country, and upon resuming adjourned.

EVENING MEETING.

Wednesday, October 4, 1882.

The first Evening Meeting of the Session was held on October 4, the chair being taken at 8·30 by the President, Mr. Michael Carteighe.

After a few words from the President, explanatory of the programme of the proceedings, Professor Redwood was called upon to give his—

Report on the Chemistry and Pharmacy Class.

Professor Redwood said his report was not less satisfactory than it had usually been on previous occasions. Although the attendance of students in the School might not have been so numerous as could be desired, there was distinct evidence of an improvement in that respect, and both he and his colleagues could give a very good account of the way in which the students had acquitted themselves during the last session, not only with regard to their general conduct, but to the proficiency in the prosecution of their studies, of which they had given evidence. Acting in accordance with the desire and intention of the Council, the Professors had endeavoured to make the system of education there the means of laying a solid foundation for the qualification of those who were about to engage in the practice of pharmacy. Their programme was, as it had been for years past, that which the Council, aided by the best advice and assistance it could obtain, had recently given its approval of, and even intimated its intention of making ultimately compulsory as a curriculum. They had no faith in and did not encourage in any way the lath-and-plaster system of giving a semblance of a qualification, which, although it might sometimes pass current at a review, nevertheless lacked that solidity which alone would give it permanence and enable those who had it to bear the brunt of what was required in a professional life. One of the most important and encouraging features of the last session of the School was that a large proportion of those who entered as students did so at once for the whole session, thus giving palpable evidence that they at least were not advocates of the lath-and-plaster system. It was only natural to expect that students of such a class would prove to be a good sort, and this expectation had not been disappointed. They had been regular and punctual in attendance, well conducted and assiduous in their attention during the lectures, and had, moreover, given evidence at the after lecture examinations, that they were carrying away and digesting that which had been supplied to them. The result had been that when they came to the final examinations for the distribution of prizes and certificates, it was found that a goodly number had acquitted themselves with very great credit, and he must briefly submit the names of those in his class whom he had recommended to the Council for distinction. The session was divided into two courses of five months each. At the end of the first course an examination took place, when he who had acquitted himself most creditably was awarded a bronze medal, whilst others who reached a certain standard received certificates of merit, it being necessary for the candidates to give answers equivalent to 75 per cent. of the total number possible in order to obtain these certificates. At the end of the second course, a sessional examination was held, when a silver medal and certificates of honour and of merit were awarded. Having mentioned in complimentary terms the names of the successful candidates, which will be found below, Professor Redwood concluded by expressing his entire conviction that all these gentlemen were fully entitled to the honours which were about to be conferred upon them.

The President then presented the prizes and certificates awarded to members of this class, as follows:—

Five Months' Courses.

first course.

Bronze Medal ....Fredk. Wm. Short.

Certificates of Merit .... Thos. Goddard Nicholson. Richd. Augustus Cripps. Edward Marsh. Walter Clark Drew.

second course.

No award made.

Session. Ten Months.

Silver Medal ....Fredk. Wm. Short.

Certificates of Honour .... Walter Clark Drew. Edward Marsh.

Certificates of Merit .... Richd. Augustus Cripps. Thos. Goddard Nicholson.

The following are the questions which were set for these examinations:—

FIRST COURSE.

BRONZE MEDAL AND CERTIFICATES.

Hours—Eleven till Three.

1. Describe the forces of *cohesion* and *adhesion*, showing the difference in the meaning of these terms, and the essential characters of the forces to which the terms are applied. Give illustrations of the action of these forces.

2. Describe the physical condition of gases as distinguished from liquids and solids, and explain the meaning of the term "critical condition" in relation to gases.

3. Give examples of good and of bad conductors, radiators, absorbers, and reflectors, of heat.

4. Describe the hydraulic press, the principle of its action, its advantages, and also its defects.

5. Describe the production of oxygen gas, and point out any precautions that you think ought to be observed in conducting the process.

6. Give the formulæ for representing the compositions of hypochlorite and hypophosphite of calcium.

7. Describe the composition and mode of production of chromic acid, and point out a possible source of failure in conducting the process for its production.

8. Point out the distinction between the atomicity and basicity of the organic acids derivable from alcohols of the fatty group, and show their relation to the respective aldehydes.

9. Give the formulæ for representing *cane sugar, grape sugar, alcohol, aldehyde, lactic acid, oxalic acid, natural salt of sorrel, artificial salt of sorrel.*

SECOND COURSE.

BRONZE MEDAL AND CERTIFICATES.

Hours—Ten till Two.

1. Describe the construction, the mode of action, and the principles involved in the action, of the syphon.

2. Describe the essential characters and properties of an emulsion, and the conditions most favourable for the formation of emulsions of oils, resins, and oleo-resins.

3. What is the mode of action of charcoal as a decolorizing and also as a deodorizing agent?

4. Explain the term "dimorphous."

5. What are the principal sources of iodine, the method by which it is obtained in a free state, and finally purified?

6. What are the distinctive characters of the metals?

7. Describe cyanogen, its production, properties, and some of its compounds.

8. What are the conditions under which alcohol may be obtained from cane sugar? Describe the various changes that occur, and the means by which the alcohol may finally be rendered anhydrous.

SESSION.

EXAMINATION FOR SILVER MEDAL AND CERTIFICATES.

Time allowed, 3 *hours.*

1. What is the weight of an ounce of *spirit of nitrous ether* of the Pharmacopœia?

2. Explain the principle of action of the *hydraulic press,* and the means by which Bramah succeeded in rendering the application of this principle available in the production of great pressure.

3. What is the physical condition of the luminiferous ether in the production of light, both as common light and as polarized light? How is polarized light produced, and what are its peculiar properties? What is a *Nicol's prism,* and how is it constructed?

4. Describe the Pharmacopœia process for the production of hydrochloric acid, and explain the objects for which the several parts of the process have been adopted.

Time allowed, 3 *hours.*

5. Describe Lablanc's process for the production of carbonate of soda. Point out the impurities usually present in the product obtained by this process, and means by which it may be freed from such impurities.

6. What are the natural sources of zinc, and the method by which the metal is obtained from its ores in this country? What is the melting point of zinc, and what are its properties at temperatures below its melting point?

7. Describe the constitutions of alcohols, aldehydes and ketones; their respective relations and their sources.

8. What are the natural and artificial sources of benzoic and salicylic acids, their compositions, and the methods by which they are prepared?

Professor Bentley was then called upon to give his—

REPORT ON THE BOTANY AND MATERIA MEDICA CLASS.

Professor BENTLEY said his senior colleague always relieved him of a great deal of that which he could not say half so well, and his observations would therefore be as brief as possible, but it would not be doing justice to the Council or to the students if he did not cordially reiterate that which had been said by Professor Redwood, in saying that on no previous occasion had he ever been able to speak in higher terms of the regularity, diligence, and progress generally, than he could with regard to the past session. It might be said that this was the tale which was always told, and so it was, for he had never had occasion to speak otherwise, but that which he had said in former years he might repeat with still greater emphasis on the present occasion. Professor Bentley concluded by mentioning the names of the successful candidates in his class.

The PRESIDENT then presented the prizes and certificates awarded to the members of this class as follows:—

BOTANY AND MATERIA MEDICA CLASS.

FIVE MONTHS' COURSES.

FIRST COURSE.

Bronze Medal .... Thos. Goddard Nicholson.

Certificates of Merit .... Fredk. Wm. Short. / Richd. Augustus Cripps. / T. Staddon Waymouth. / Walter Clark Drew.

SECOND COURSE.

Bronze Medal .... Henry Hamilton.

SESSION. TEN MONTHS.

Silver Medal .... Frederick Wm. Short.

Certificates of Honour .... Equal: George F. Callaway. / Thos. G. Nicholson. — Walter Clark Drew. — Equal: Rd. Augustus Cripps. / Fredk. Jas. Yeatman.

Certificates of Merit .... Edward Marsh. / T. Staddon Waymouth. / Edgar Haward.

The following are the questions which were set for these examinations:—

FIRST COURSE.

BRONZE MEDAL AND CERTIFICATES OF MERIT.

Hours from 10.30 *till* 2.

1. Describe the structure of pitted vessels, scalariform vessels, sieve tubes, and laticiferous vessels.

2. Describe the structure of the bark in a Dicotyledonous plant.

3. Explain the terms superior, inferior, simple, and

compound, as applied to the ovary. Define the following terms as applied to fruits:—Apocarpous, syncarpous, legume, follicle, drupe, achenium, capsule, and cremocarp.

4. Give a general sketch of the changes which the crude sap undergoes in the leaves. What is metastasis, and what are degradation products?

5. What are the botanical and geographical sources of Cusparia bark? Describe its physical and chemical characteristics, and mention what barks have been substituted for it, and how they may be distinguished.

6. Describe the botanical and geographical sources of Asafœtida. Describe its chemical characters, and enumerate its official preparations.

7. Describe the botanical characters of chamomiles. Show how they may be distinguished from the capitula of other plants. What are their chemical characters, and what are the official preparations of chamomiles?

SECOND COURSE.

BRONZE MEDAL AND CERTIFICATES OF MERIT.

Hours from 10.30 *till* 2.

1. Distinguish between parenchyma, prosenchyma, and vascular tissue.

2. Define the following:—Epiphyte, parasite, saprophyte, rootcap, rhizome, tuber, corm and bulb. What are the distinctive characters between roots and leaves?

3. Define the following terms as applied to leaves:—Primordial, decussate, fascicled, palmate, pinnatifid, crenate, runcinate, pedate, retuse, ovate, cordate, reniform.

4. What is an acropetal inflorescence? Define an amentum, corymb, panicle, umbel, capitulum, and verticillaster.

5. Enumerate the official plants of the Menispermaceæ. Describe the botanical and geographical sources of Calumba Root, its general characters and chemical composition, and enumerate its official preparations.

6. What are the botanical and geographical sources of Colocynth Pulp? Describe its mode of preparation, general and chemical characters, and enumerate its official preparations.

7. What are the geographical and botanical sources of Balsam of Peru? How is it obtained, and what are its general and chemical characters? Enumerate its official preparations.

SILVER MEDAL AND CERTIFICATES.

Hours from 10 *till* 1.

BOTANY.

1. What is a Primordial cell? Describe the chemical and general characters of the cell-wall and of Protoplasm.

2. Give a sketch of the general distinctive characters between Plants and Animals.

3. Define the following terms as applied to leaves:—Amplexicaul, decurrent, verticillate, equitant, pinnate, palmatifid, serrate, hastate, decompound, pulvinus, tendril, and phyllode, and illustrate by examples.

4. What do you understand by Determinate and Indeterminate Inflorescences? Define a cyme, fascicle, spike, raceme, spadix, and locusta, and illustrate by examples.

5. Define the following terms as applied to the andrœcium and gynœcium:—Innate, versatile, gynandrous, exserted, synantherous, didynamous, simple pistil, gynophore, apocarpous, and syncarpous, and illustrate by examples.

6. Give the essential characters of the following natural orders, and enumerate their official plants:—Cruciferæ, Rosaceæ, Labiatæ, Solanaceæ, Polygonaceæ, and Liliaceæ.

Hours from 2 *till* 5.

MATERIA MEDICA.

1. Mention the botanical and geographical sources of Guaiacum Resin. Describe how it is obtained, its physical and chemical characteristics, and the means of detecting it when employed to adulterate Scammony.

2. Describe the general and chemical characters of official Myrrh; mention its botanical and geographical sources, the substances used to adulterate it or which are substituted for it, and enumerate its official preparations.

3. What do you understand by Balsam? Describe the botanical and geographical sources, and the general and chemical characters of Benzoin, and enumerate its official preparations.

4. What are the botanical and geographical sources of Nux Vomica? Describe the general and chemical characters of these seeds, and give the doses of Nux Vomica and Strychnia, and of the official preparations in which they are contained.

5. Describe the characters of the Mealy and Non-Mealy Sarsaparillas of Pereira. What kind of Sarsaparilla is official, and what are its botanical and geographical sources, and official preparations?

6. What is Saffron? Describe its characters, and mention the substances which are used in its adulteration, and the means by which they may be detected.

The PRESIDENT then called upon Professor Attfield for his—

REPORT ON THE PRACTICAL CHEMISTRY CLASS.

Professor ATTFIELD said his report respecting the Class of Practical Chemistry would, as usual, be based on the two reports which it was his duty to present to the Council at the close of the session, one giving the general statistics of the class, and the other setting forth the result of the examination for prizes. With regard to the former he might condense all that he had said to the Council in one sentence, and that was, that comparing the session with perhaps the last five previous years, they had had, as regards numbers and period of study, a good average session. He was happy to report that of the whole number of students fully 40 per cent. were with him for the whole of every day of the whole session of ten months. The attendance was very good, the diligence of the students was unquestionable, and their progress very satisfactory, whilst with regard to their general behaviour it was, as he had been glad to say on every occasion, that of gentlemen. At the close of the session an examination was held, extending over two days, when fourteen students competed, six of whom obtained sufficient marks to qualify them for medals or certificates. The standard number was 100, and the gentleman who stood first on the list obtained the full number, whilst the next in order obtained 85, 80, 65 and 60. Before sitting down he should like to allude to two incidents which had given him great pleasure, and which would, he felt sure, please the Council, under whose supervision the School of Pharmacy was conducted, and his colleagues and the assistants in the School. The first was the receipt of a letter from one of the past year's students, a gentleman who had taken several prizes, a portion of which he would read. He said, "By the spirit which is infused into the students at the Society's school, one feels as if knowledge is introduced to us not as a mere acquaintance who will be forgotten after having carried us over the examination, but as a friend who will accompany us along the path of life, always ready to bring willing aid in professional and other difficulties, and perhaps coming to help us unawares by introducing us to her colleague, discovery. A mere acquaintance is soon forgotten, but if we are taught to love knowledge we generally remain faithful to her, and are sure to receive the reward in after life. Thus the true object of education is gained. Believing these to be the feelings not only of myself, but of my fellow students, I remain," etc. And then followed the name, which he was asked not to mention. The other matter he wished to allude to related to the present session, and it was that they had a larger number of students than had entered in October for several years; in the laboraties there were very few benches to spare.

The PRESIDENT then presented the prizes and certificates awarded to members of this class as follows.—

SESSION. TEN MONTHS.

Silver Medal	Frederick Wm. Short.
Bronze Medals	Fredk. Jas. Yeatman. Richd. Augustus Cripps.
Certificates of Merit	Edgar Haward. Walter Clark Drew.

The President also handed to Mr. Frederick William Short a copy of the 'Pharmacographia,' and one of 'Science Papers,' presented by Mr. Thomas Hanbury, in memory of his brother, Mr. Daniel Hanbury, to students taking a silver medal.

The following are the questions which were set for this examination:—

PRACTICAL CHEMISTRY.

July 17th and 18th, 1882.

Hours 10 to 5 each day.

(*Books and Memoranda permitted.*)

Standard number of Marks, 100.

FIRST DAY.

1. Ascertain what salts are present in the "Saline" medicine handed to you.
2. How much real Hydrocyanic Acid is present in the "Diluted Hydrocyanic Acid" supplied to you?

SECOND DAY.

3. Examine the accompanying sample of "Urine" and state the results.
4. In the specimen of "Reduced Iron" given to you how much free iron is present?

NOTE—*Manipulation as well as results will be scrutinized.*

Professor Bentley was then requested to report with respect to the result of his examination of the herbaria sent in by competitors for—

THE HERBARIUM PRIZE.

Professor BENTLEY said if time had permitted he should have liked to say a good deal on the advantage of the study of practical botany which the Herbarium prizes offered by the Council were intended to stimulate, because the time for studying practical botany was when students were engaged in the country during their apprenticeship. He was very pleased to report that this year there had been a very good competition; last year there was only one collection sent in, but he was glad to notice that the gentleman who forwarded it had won several honorary distinctions during the past session. This year there were five collections, all of which were worthy of notice. It entailed a good deal of labour to examine them, but it was a labour of love. The first one, which obtained the silver medal, contained over six hundred specimens, and he thought the best thing he could say about it was to ask everyone present to go and look at it and judge for themselves. The next two, to which bronze medals were awarded, were also very good, and the next two well deserved the certificates of merit which were awarded to them. He hoped that many of those who inspected these collections would be stimulated to do similar work on a future occasion.

The PRESIDENT then presented the prizes and certificates awarded in this competition as follows:—

HERBARIUM PRIZE.

Silver Medal	Henry Hamilton.
Bronze Medals	Equal. F. V. Butterfield. Thos. G. Nicholson.
Certificates of Merit	Henry Edward Skyrme. Edward Henry Farr.

THE COUNCIL EXAMINATION PRIZES.

The PRESIDENT next stated the result of the competition for the Council Prizes, which were awarded to those who passed the best examination for the higher qualification in each year in the three subjects of Pharmacy, Botany, and Practical Chemistry, irrespective of where they had studied. The first and highest award was the silver Pereira medal, with books value £5, presented by Mr. Hyde Hills; the second was the Council medal, with books value £3; and the third a bronze medal, and books value £2. The examination was conducted in July last by Mr. Gibson and Dr. William Inglis Clark, members of the Edinburgh Board of Examiners, and as neither of these gentlemen was present, he would briefly state the result. The standard number of marks for the three subjects was 1000, and the first candidate obtained 829, the second 756, and the third 689. It was satisfactory to find that, although this examination was conducted by two gentlemen residing north of the Tweed, their report was confirmatory of the conclusions arrived at by the Professors in London, since Mr. Short, who had already taken the silver medal in each class, had been recommended as most worthy to receive the Pereira medal. He might remind the meeting that Mr. Short had been the "Bell Scholar" for the past year.

The President then presented the Council Examination Prizes as follows:—

Pereira Medal (*Silver*); *and Books value £5, presented by Mr. T. H. Hills.*

Frederick William Short.

Pharmaceutical Society's Medal (*Silver*); *and Books value £3, presented by Mr. T. H. Hills.*

William Kirkby.

Pharmaceutical Society's Medal (*Bronze*); *and Books value £2, presented by Mr. T. H. Hills.*

Frederick James Yeatman.

The following are the questions which were set for this examination:—

BOTANY AND MATERIA MEDICA.

Time: 10 *a.m. to* 1 *p.m.*

In framing Answers, Candidates should not enlarge upon the Questions, but should confine themselves to giving, as briefly and clearly as they can, the information required.

BOTANY.

1. Describe the processes of Cell formation, and show how these processes are involved in the reproduction of the lower Cryptogams.
2. What gases commonly exist in Plants? Describe the circulation process, and how it is affected by external influences.

3. Describe the inflorescence of the Oat; and explain how fertilization is effected.

4. Mention the official orders of the sub-class Calycifloræ, and give the distinguishing characters of such of them as yield indigenous medicinal plants.

MATERIA MEDICA.

1. What are the botanical sources and distinguishing characteristics of true and false Pareira Root? Name the principle of true Pareira, and mention any other plants in which an analogous substance is to be found.

2. State the official process for the preparation of Morphia and give the tests for its recognition and purity. What is Apomorphia? How does it differ from Morphia in constitution, and in physiological action?

3. What is Araroba? State its composition, and in what tissues of the plant it occurs, and give your opinion as to how it may be formed.

4. What is the botanical source, and natural order of the plant yielding Papaw-Juice? State clearly what you know regarding its properties, and how the active principle may be isolated.

CHEMISTRY.

Time: 2 *to* 5 *p.m.*

In framing answers, candidates should not enlarge upon the questions, but should confine themselves to giving, as briefly and clearly as they can, the information required.

1. Explain what is meant by the ortho, meta, and para series of Benzol compounds, and give the relations of Salicylic and Benzoic Acids.

2. A mixture contains Aldehyde, Alcohol, Cane Sugar and Glycerine. How would you (1) detect the presence of these substances, and (2) approximately estimate the proportions present?

3. A sample of vinegar contains Sulphuric and Hydrochloric Acids, Sodium Carbonate has been added so as to neutralize these acids and part of the Acetic Acid. How would you estimate the Acids present, free and in combination? Working details should be given.

4. What is dissociation? How is it proved,

a. In the case of Water,

b. In the case of Ammonium Chloride?

5. Syr. Ferri Iodidi is suspected to contain Hydrochloric and Phosphoric Acids. How would you prove this?

6. Explain (by means of equations) the action of (1) Nitrous Acid on Ammonia, (2) Zinc on dilute Nitric acid, (3) Ammonia on Chlorine, (4) Chlorine on a cold solution of Caustic Potash.

The Bell Memorial Scholarships.

Mr. Ekin, being called upon to state the result of the competition for the Bell Scholarships, said that twenty candidates had presented themselves, eight from London and twelve from other centres, and he was glad to state that the papers generally were decidedly satisfactory. The Council had fixed the proportion of the total marks as being necessary for the award, and six of the candidates obtained that number; the papers of the two successful men being eminently satisfactory. These were—

William Edward Crow.
Edward Baily.

The President congratulated the new "Bell Scholars," and handed to each books of the value of £2 10*s.* presented by Mr. Thomas Hyde Hills.

The following are the questions which were set for this examination:—

Time allowed: Three hours (12 *to* 3).

In awarding marks the neatness and legibility of the writing will be taken into account.

LATIN.

1. Translate into English:—

"Diverso interea miscentur mœnia luctu;
Et magis atque magis, quanquam secreta parentis
Anchisæ domus arboribusque obtecta recessit,
Clarescunt sonitus, armorumque ingruit horror.
Excutior somno, et summi fastigia tecti
Ascensu supero, atque arrectis auribus adsto;
In segetem veluti quum flamma furentibus Austris
Incidit, aut rapidus montano flumine torrens
Sternit agros, sternit sata læta boumque labores.
Præcipitesque trahit silvas; stupet inscius alto
Accipiens sonitum saxi de vertice pastor.
Tum vero manifesta fides, Danaumque patescunt
Insidiæ."

2. Parse the concluding sentence of the above quotation.

3. Translate the following prescription into full Latin:—

"Take of—
Strychnia, one grain.
Disulphate of quina, two scruples.
Dilute hydrochloric acid, fifty minims.
Tincture of orange peel, one ounce and a half.
Compound infusion of gentian to one pint.

Mix and make a mixture. Let the patient take two tablespoonfuls three or four times a day."

4. Decline the Latin substantives employed in your translation of the above prescription.

ENGLISH.

1. Write a short essay on Courage.

2. Parse the following lines:—

"I wish thy lot, now bad, still worse, my friend;
For when at worst, they say, things always mend."

ARITHMETIC.

1. Divide the product of $5\frac{2}{7}$ and $4\frac{6}{9}$ successively by their sum and their difference.

2. What weight added to ·278 of a pound will equal ·729 of a kilogramme? Express the weight in grammes.

3. A collier working ·645 of the week and spending $\frac{13}{14}$ of his earnings, saves 2*s.* $10\frac{1}{2}$*d.* per week. What will be the sum of his annual savings should he work $\frac{6}{7}$ of every week, and spend ·562 of his earnings?

4. The melting point of stearic acid is 69·2° C. Convert this into degrees Fahrenheit and Réaumur; and also state how many degrees C. and R. correspond with +52° F. and −17° F.

FRENCH OR GERMAN.

The candidate is at liberty to choose either French or German, and is not required to show a knowledge of both. Marks will only be awarded for one.

FRENCH.

Translate into English:—

"A quelque temps de là, un pêcheur qui avait tendu ses filets non loin du pied de cette tour, fut tout étonné, en les retirant, d'y trouver quelque chose de lourd: c'était le plat d'argent du Masque de fer; comme cet homme simple ne savait pas lire, il pensa que ce plat était tombé par megardé dans les flots, et se hâta de le reporter au gouverneur, dans l'espoir d'une récompense."

And:—

"Mettez l'huile dans un flacon d'une capacité telle qu'il en soit presque entièrement rempli; introduisez le phosphore, et faites chauffer pendant quinze à vingt minutes, au bain-marie, en ayant soin d'agiter vivement de temps en temps."

GERMAN.

Translate into English:—

"Der Freiheitskampf der Deutschen gegen Napoleon.

"Diese Geschichte umfasst einen Zeitraum von nicht mehr als drei Jahren; aber das Gemüth fühlt sich wunderbar gehoben, wenn es die Ereignisse berschaut, die sich in der Spanne von Zeit zutrugen. Wir sahen ganz Europa und einen grossen Theil Asiens in Bewegung für die Sache der Freiheit. Deutschlands Fürsten, durch der Ränke des Auslandes auf immer, wie man meinte aus einander gerissen, boten sich von neuem redlich die Hand. In den Völkern erwachte eine Begeisterung wie in den Tagen der Kreuzzüge."

Time allowed: Two hours (4 to 6).

In awarding marks, the neatness and legibility of the writing will be taken into account.

CHEMISTRY AND PHARMACY.

1. In making Extract of Henbane, the directions are to heat the juice to 130° and filter, and again heat to 200° and filter. What is the nature of the substances left on the filter in each case, and why are they separated?

2. Give the composition and mode of preparation of Glacial Acetic and Glacial Phosphoric Acids, and explain the meaning of the word Glacial.

3. Why is Sodium Acetate used in making Syrup of Phosphate of Iron and Chloride of Ammonium in making Solution of Perchloride of Mercury?

4. How much Iron is required to make 100 grammes of Ferrous Sulphate?

5. Give the formulæ for Sodium Hydrate, Arseniate, Bicarbonate, Carbonate, Nitrate, Phosphate, Chloride, and Sulphate.

BOTANY.

1. Describe from memory, as nearly as you can, the flower, leaves, etc., of the common Buttercup, and enumerate other plants belonging to the same family.

2. Describe an Apple, Strawberry, and Gooseberry.

Inaugural Sessional Address.

Mr. Joseph Ince then delivered an address to the students, which will be found on p. 281, *et seq.* At the conclusion of the Address—

Professor Chandler Roberts, F.R.S., proposed a vote of thanks to Mr. Ince for the instructive address and rich literary effort all had heard with so much pleasure. At first he was at loss to see why a metallurgist was permitted to propose this motion; but he thought he saw the reason for the President's selection. Metallurgy and pharmacy certainly had a common origin, for at the time when Paracelsus was attempting to introduce order into medicine, Biringuccio was building up the science of metallurgy. Perhaps another reason was that an early volume of the 'Philosophical Transactions of the Royal Society' contained an admirable paper giving a description of work done by Mr. Carteighe, not in pharmacy, but in metallurgy. Mr. Ince had told them that conduct was fate, and the whole public must feel very strongly that the fate of every one must depend in great measure on the accuracy of the chemist's knowledge. Any body of students was very fortunate in beginning its career under such sympathetic influences as those of Mr. Ince, and he had much pleasure in proposing a vote of thanks to him.

The Vice-President (Mr. Atkins) seconded the motion with very great pleasure. He thought this address was the crown of all Mr. Ince's previous performances, and he could not find a phrase which would more aptly express the perfection and beauty and the exquisite symmetry of that address than the one applied by Mr. Ince to Dr. Pereira, where he said that "having the gift of speech and a singularly buoyant temperament, he was clear in statement and brilliant in illustration." No words of his own could so fully express the beauty of the historical *résumé* of pharmacy and the admirable advice given to those who were entering on their studies. His own feeling, as one who had passed the meridian, was, "Oh! that he were just entering on his career, looking forwards instead of looking backwards, and that it had been his privilege as a young man to have been inspired, as he felt he should have been, and go forward on the path of work, he trusted successfully."

The vote of thanks having been carried by acclamation,

Mr. Ince, in reply, expressed his appreciation of the compliment, and said it was often a matter of regret with him that he was separated so much from the public work of pharmacy, and he was therefore very glad of this opportunity of renewing his connection with it.

Parliamentary and Law Proceedings.

Prosecution under the 17th Section of the Pharmacy Act.

At the Borough Police Court, Halifax, on Friday, September 22, before Messrs. Barstow and Buller, John Gledhill, of 90, Gibbett Street, was charged with having unlawfully sold to George Revill Templeman, of 23, Burlington Chambers, New Street, Birmingham, Assistant Secretary to the Chemists and Druggists' Trade Association of Great Britain, a certain poison, to wit, laudanum, the same being a preparation of opium, and not labelled with the name and address of the seller, contrary to the statute in such cases made and provided.

Mr. Henry Glaisyer, Solicitor of the Association, conducted the prosecution, and Mr. Storey appeared for the defence.

Mr. Glaisyer said this was a case under the 17th section of the Pharmacy Act, 1868, which enacts that it shall be unlawful to sell any poison, either by wholesale or by retail, unless the box, bottle, parcel or wrapper, in which the poison is contained, be distinctly labelled with the name of the article, the word "poison," together with the name and address of the seller of the same. He then proceeded to quote from the case of Templeman *v.* Trafford, which was heard before Mr. Justice Grove and Mr. Justice Lopes, in October last, who held that the seller within the meaning of the Act was the person who had actual control of the business where the sale took place. At the time of such sale the defendant was not a registered chemist, and had no right to sell poison at all.

Mr. G. R. Templeman said he was Assistant Secretary of the Chemists and Druggists' Trade Association, and resided in Birmingham. On Monday last he went to the shop of the defendant, at 90, Gibbett Street, and there purchased from him personally twopennyworth of laudanum; the bottle containing the laudanum was labelled, "Charles Brierly, Chemist, Raglan Street and Gibbett Street, Halifax. Poison. Laudanum." He saw several other parcels in the window labelled with the name and address of the defendant; the defendant's name also appears on a sign over the front of the shop.

Cross-examined by Mr. Storey: He purchased a halfpennyworth of linseed meal at the same time, and stated that he required it to make a poultice, and the laudanum was required to sprinkle on it and not to be taken inwardly.

Mr. Storey said his client would plead guilty. He had never sold any poison previous to this case; he was a young man about twenty years of age, who had purchased the business in question, and was endeavouring to pass his examination as a chemist, and it was not until he had ascertained from the complainant that he required it for an outward application, and from his appearance he thought him a person whom he might safely trust with that quantity of poison that he had sold it; after taking these facts into consideration he trusted the bench would deal very leniently with him, and only inflict a small fine, and he would promise not to again repeat the offence.

The Chairman of the Bench: The sale of poisons to the public by unqualified persons was a very serious offence, as they could never tell what consequences might ensue; they had decided to deal very leniently with him this time, and trusted he would take care not to offend again. He would be fined 20*s.* and costs 7*s.* 6*d.*

Alleged Death from Lead Poisoning.

The adjourned inquest touching the circumstances attending the death of Wilson Riley, mechanic, of Keighley, who died on August 26, from the supposed effects of lead poisoning, was held on Tuesday, September 26, in the Keighley Police Court, before Mr. J. P. Brown, Coroner.

Considerable interest was manifested in the inquiry.

The Keighley Local Board was represented by Mr. Tindal Atkinson, barrister, of Leeds (instructed by Mr. George Burr, clerk to the board).

There were also present Messrs. R. L. Hattersley (Chairman of the Board), B. S. Brigg, John Gledhill, Dr. A. Roberts (Medical Officer of Health), Dr. Dobie, Dr. Jack, and a number of other medical gentlemen.

Mr. Tindal Atkinson, on behalf of the Local Board, said he had a very important witness whom he should like to call—that was Professor Tidy, of London, who had considerable experience in chemistry and cases of the kind they were inquiring into. He was, however, away in Scotland, and he should ask for a further adjournment after the additional witnesses had been examined.

The viscera of the deceased and a sample of the town's water from the mains and tap of the deceased's late residence had been submitted to Mr. Alfred H. Allen, of Sheffield, for analysis, and following is an extract from his report supplied to the Coroner:—

"A doubtful trace of lead was found in the kidneys, but in the liver and spleen a notable quantity of lead and copper was found. There was $\frac{1}{8}$ of a grain of lead in one-half of the liver. That amount was smaller than they might expect to find in the liver of a person who was poisoned by lead, but he had not unfrequently noticed very insignificant amounts of lead in the viscera of cows and other animals that had undoubtedly met their death by lead poisoning. He attached no importance to the finding of copper, as he had met with it in several other instances. He had examined a sample of water from the tap in the deceased's dwelling-house, and found that it contained $\frac{3}{5}$ of a grain of metallic lead per gallon. The proportion was amply sufficient to produce poisonous effects, but some persons appeared to be more sensitive to the influence of lead than others. Speaking generally, anything over $\frac{1}{10}$ of a grain of metallic lead per gallon of water was a dangerous contamination. He had known $\frac{1}{5}$ of a grain of lead produce severe symptoms of lead poisoning. On examining a sample of the water taken direct from the mains he did not find any trace of lead, but it contained a distinct trace of mineral acid. The water, by remaining in contact eighteen hours with a strip of clean lead, became contaminated with lead to the extent of 0·56, or over $\frac{1}{2}$ a grain per gallon. A repetition of the experiment showed that 0·45 of a grain of lead was taken up in fourteen hours. Those proportions of lead would render the water highly injurious to a person who drank it regularly. When the water in question was rendered faintly alkaline with lime water, and left in contact with lead over one night, it took up the smaller quantity of 0·14 grain of lead per gallon. From the experiments he considered it was the free acid in the water that gave it so great a tendency to act on the lead. He found that Sheffield water took up a small trace of lead during one night, but Rotherham water took up no trace of lead after two nights' contact with metal."

Mr. Allen was called, and said he arrived at the conclusion, when he found no lead in the heart, that it had been eliminated by medical treatment. On good authority he believed that a person under medical treatment could be freed from lead in a fortnight, but the organs would show deterioration.

By Mr. Tindal Atkinson: One-fifth of a grain was not sufficient to cause death, but it would cause paralysis.

Dr. William Dobie was then called. In examination by Mr. Atkinson, he said that disease of the kidneys generally accompanied lead poisoning. They might find symptoms of paralysis without lead poisoning, but in aggravated cases of lead poisoning paralysis was generally found.

By the Foreman: The deceased might have died from granular disease, caused by lead poisoning. (1) Lead poisoning was a very common cause of granular disease. (2) During life there were unmistakable signs of lead poisoning. (3) Lead was found in the tissues after death.

By Mr. Atkinson: Witness had treated deceased for lead poisoning about two years ago. Lead might be eliminated from the system after ten days of medical treatment. He accounted for the absence of lead in other organs of the deceased from the fact that it was being rapidly eliminated from the system by medical treatment.

Dr. William Jack, who attended deceased up to the time of death, gave his opinion that the cause of death was lead poisoning.

Further evidence having been given, the case was adjourned for a week to allow Professor Tidy, of London to be present to give evidence as to the quality of the water supplied by the Local Board.

The adjourned inquest was held on Tuesday last at the Court House, Keighley, before Mr. T. P. Brown, Coroner.

Charles Meymott Tidy, M.B., Master of Surgery, and medical adviser to the Home Office, was examined. He said he had had great experience in cases of poisoning. He had been called upon to make analyses in several cases of lead poisoning. He had never had before him a case of death resulting from chronic lead poisoning. Lead poisoning was not the actual cause of death, but it had preceded death. Deaths caused by lead poisoning were very rare occurrences. When lead poisoning was very advanced, he invariably found paralysis of the muscles—especially the muscles of the wrist. He did not know of any case of lead poisoning but what was attended by paralysis of some kind, but during his experience he never knew of an actual death from lead poisoning. Granular disease of the kidneys resulted in some cases from lead poisoning. He had read Mr. Allen's report, and he was astonished to see the small amount of lead found in the system, for in one case, which had not resulted in death, he found 5 grains of lead in the spleen and 4 grains in the liver. Iodide of potassium was a remedy against lead poisoning, but it was difficult to get it from the system. The effect of iodide of potassium on the system was to render the lead insoluble and inert. It was very difficult to say in this case what was the cause of death, because he was not present when the *post-mortem* examination was made. There was very little lead found, and that led him to suppose that death had probably been caused by granular degeneration of the kidneys. There was no evidence of disease of the nerve centre.

Dr. Jack, who attended the deceased, was recalled and make additional remarks. He said the deceased vomited, but the vomit had not the appearance of being caused by disease of the kidneys. The deceased was never above the natural heat. The temperature always rose from inflammation. The deceased's breath had a peculiar fetid odour, which he had never noticed before except in cases of severe lead poisoning. He also complained of pains in the arms and legs, which constantly shifted. Shortly before death convulsions set in, and the deceased was attacked by severe pains. All the medical men were of opinion at the *post-mortem* examination that the deceased had died from lead poisoning.

The Coroner, in summing up, said the jury need not attach any importance to the small quantity of lead found in the deceased.

Mr. Atkinson, addressing the jury, said whatever the result of the inquiry might be, he was instructed by the Local Board to say that the most searching investigations would be made with regard to the town's water.

The Jury retired to consider their verdict, and after being absent for two hours, the Foreman handed in the following verdict:—"We are of opinion that the deceased, Wilson Riley, died from granular disease of the kidneys, but how caused we are unable positively to say; but death was accelerated by lead poisoning."—*Leeds Mercury.*

Poisoning of a Chemist and Druggist by Prussic Acid.

Mr. Carttar, West Kent Coroner, held an inquest on Tuesday, October 3, at New Cross, on the body of Joseph Quinlan, aged 43, chemist, 457, New Cross Road.

Annie Quinlan, the widow, identified the body, and said deceased for twelve months had suffered from depression and nervous debility. On Sunday morning last he left home, and returned with some chloroform, which he was in the habit of taking. He went upstairs, and finding him taking some she tried to take the bottle from him, but could not. He went out again twice, but returned without any chloroform, and went upstairs. She again followed him on his knocking on the floor with his foot, and found him drinking something from a bottle, which she knocked out of his hand, and he then fell backwards. She then sent for Dr. Gordon, who immediately attended, but her husband shortly afterwards expired. She had never seen him take any drug as an antidote to chloroform, or heard him threaten to commit suicide.

Dr. Gordon, of 10, Amersham Road, New Cross, said he spoke to Mr. Quinlan professionally on Friday last, when he was suffering from the effects of chloroform and intoxication. About four years ago witness discovered him insensible in his own shop from chloroform. When he recovered witness found he had been in the habit of taking chloroform to produce oblivion and drown care. Witness had attended him professionally, but within the last year he took chloroform to such an extent, and became so violent under its influence, that witness declined to have anything more to do with his case. Witness told him he would be one day found dead, and there would be a coroner's inquest, and he replied that he did not care how he died. He took enough chloroform to kill an ordinary person over and over again, and witness believed at times he took as much as a pound in twenty-four hours. On Sunday morning witness was called to his house, and found him lying down, and Mrs. Quinlan with him. She said "Oh, Mr. Quinlan has taken prussic acid," and added that when she went upstairs, he said "I have done it at last." The bottle produced had contained prussic acid three times as strong as the Pharmacopœia solution.

After some further evidence, the Jury returned a verdict that he died from an overdose of prussic acid taken by misadventure to produce relief.—*Standard.*

Correspondence.

Liq. Ferri Iodidi.

Sir,—I have just received this day's Journal and note the discussion on my paper on the above subject. I do not wish to make any personal defence of the position I took or of the correctness of any of my observations. My position was sufficiently indicated in the paper itself, where, towards the end I say, "I do not suggest the propriety of adding any foreign matter as a preservative. I have not even suggested the impropriety of such a course," but the pharmacist "had better at least know what he is doing." And regarding the correctness of my observations, I have no respect for an argumentative reply; those who are interested in the subject can very easily try the reactions, and if my reputation suffers, scientific pharmacy at least will be benefited.

Perhaps it is due to scientific accuracy that I should state that the solution of iodide of iron, which I spoke of as pure and free from acid, was of that degree of purity which the B.P. process readily yields, and that degree of freedom from acidity which is indicated by the testing which I describe. The B.P. sample, which was accepted as a standard, was made by one of my apprentices in the ordinary course of trade, and I do not think that any manufacturing chemist can complain that he "had not had a very good time of it at the Conference" (as Mr. Fletcher expresses it), if his preparations have a less close approximation to purity than those made by the pharmacist's apprentice.

I do not think the specific gravity an important test, if purity is doubted. If the gravity were not correct the preparation must be at fault, but if the gravity were all right the preparation might still be all wrong.

I do not know that sulphurous acid makes a muddle of ferrous salts, and I do not know that phosphoric acid always precipitates ferric salts, though the manuals of analysis tell us how to throw down phosphoric acid as ferric phosphate.

It must not be supposed that I suggest adding iron wire to syr. iod. iron. I spoke of liquor and did not recommend anything being added. The iron wire is a very old suggestion, as pointed out by Mr. Fletcher, and I believe often used in preserving the liquor, though I was not aware of its being used in the syrup. If the discussion leads to the more general following of the pharmacopœial process, with attention to the points emphasized by Professor Tichborne (which are not deviations from the official formula), my object will have been attained. I may just add that, though it formed no part of ths object of my paper, I do recommend the exclusion of air as the most important point to be adopted by the pharmacist towards the preservation of the liquor or the syrup of the iodide of iron.

Grey Street, Newcastle. Barnard S. Proctor.

Erratum.—In "The Month," p. 265, col. i., line 20, *for* "$\frac{1}{100}$ gram" *read* "$\frac{1}{100}$ grain."

Inquirer.—The quantity of borax is too great for solution. Shake the mixture until a saturated solution is produced and leave the excess in the bottle.

W.—Mixtures containing quinine and iodide of potassium have on several occasions been the subject of comment under "Dispensing Memoranda."

N. M. G.—*Funkia subcordata.*

Country Chemist.—We do not think that the subject is quite suited for discussion in these pages. It must be evident that, to say the least, the so-called "system" is open to a great deal of abuse.

J. G. F.—Any person whose name is on the Register may carry on the business of a chemist and druggist, whether he is a member of the Society or not. A person who has passed the Preliminary and Minor examinations is entitled to have his name placed on the Register and may then be elected an Associate of the Society. If in addition he passes the Major examination he is registered as a Pharmaceutical Chemist and is then eligible as a Member.

Communications, Letters, etc., have been received from Messrs. Dodd, Abraham, Bedford, Mason, Wilkes, Hall, Bennett, Richardson, Dyer, Baines, Elliott, Minor, Guerra al Cuetiella, F. W. E. S., W. J. S.

THE "TAMBOR," A TREE YIELDING A PURGATIVE OIL, WITH DESCRIPTIONS OF TWO SPECIES OF OMPHALEA.

BY W. BOTTING HEMSLEY, A.L.S.

Some twenty years ago, Dr. Dorat, of Sonsonate, San Salvador, Central America, sent to the late Daniel Hanbury dried specimens of a tree called tambor, that was said to yield a valuable purgative oil resembling castor oil in its properties, with the advantage of having a more agreeable flavour. Mr. Hanbury sent one specimen to Kew Herbarium, where it was recognized as a species of *Omphalea*, near, if not identical with specimens collected by Sutton Hayes, at Acajutla, not far from Sonsonate, but apparently different from any described species. Nothing further seems to have been done with the plant. Having to deal with it for the botany of Godman and Salvin's *Biologia Centrali-Americana*, I lately wrote to Mr. E. M. Holmes, the Curator of the Pharmaceutical Society's Museum, asking whether the specimens in the collection under his charge afforded any information beyond those at Kew. He obligingly communicated a copy of a note by Dr. Dorat, together with some particulars of the specimens which were found in the Hanbury Herbarium. Although the material is by no means so complete as one could wish, it is sufficient to show that the plant does not belong to any described species. I have, therefore, described it as far as it goes, as well as Sutton Hayes's specimen alluded to above, which I take to be a second species; and the publication of these descriptions and what is known of the plants, in this Journal, may serve to draw attention to them and be the means of eliciting further information. The genus *Omphalea* comprises about eight known species, one of which is endemic in Madagascar, whilst all the others are restricted to tropical America. This peculiarity in distribution is shared by some other genera of plants, *Ravenala* for example; and it also finds a parallel in the animal kingdom, according to Wallace. The most striking distinctive character of the genus is in the male flowers, or rather in the stamens, of which there are two or three in each flower. They are united and form together a body shaped like a mushroom. The columnar portion is short, and the cap consists of the thickened dilated connectives of the two or three stamens, so that the two cells of each anther are distant from each other, and two cells of different anthers close to each other. In my *O. cardiophylla* the number of stamens is usually two, but there were three in one flower that I examined. All the flowers I examined, both male and female, had a calyx of four decussate sepals, yet it is likely that in these species, as in the others, the number may vary from four to five.

Concerning the "Tambor," Dr. Dorat sent the following note to Mr. D. Hanbury:—"The fruit about the size of a pear, contains three beans, jet black, which, by pressure, yield a very fine oil in large quantity, rather pleasant to the taste, and resembling castor oil in its purgative effect, with the advantage that it does not gripe. The leaf is large (I send a small one), and is used here for packing cheese, on account of its strength. Flowers in December; fruit ripe in February or March. The seeds are covered with an exceedingly hard, black, thin epidermis, with a white soft pulp containing the oil, which, besides its purgative quality, burns well. Seeds [seed-vessels] grow in large bunches."

This I propose naming *Omphalea oleifera*, and the following is a description of the species as far as the material will permit:—

OMPHALEA OLEIFERA, Hemsley, species nova. *O. foliis amplis fere orbicularibus profunde cordatis stellato puberulis, paniculis brevibus ramosis, bracteis paucis infra pollicaribus, ovario glabro.*

Arbor? ramulis ultimis inflorescentias gerentibus crassocarnosis. Folia (*unicum circiter* 5 *poll. diametro a nobis tantum visum*) *petiolata, tenuia, papyracea, sparse stellatopuberula* (*pilis deciduis*), *suborbicularia, profunde cordata* ("*ampla, lenta*" *Doratius*), *venis primariis lateralibus utrinque* 5 *vel* 6 *conspicuis; petiolus in spec. Kewens. omnino deest. Flores monoici, paniculati; paniculæ terminales, latæ, ramosæ, puberulæ; bracteæ paucæ, petiolatæ, angustæ, oblongæ, vix* 1 *poll. longæ, venosæ, puberulæ; calycis sepala in fl.* ♂ *ut in fl.* ♀ 4, *decussata, orbicularia, ciliolata; antheræ* 2; *ovarium glabrum.* "*Fructus magnitudine pyri,* 3-*spermus; semina nigra, oleam gratam purgativam copiose præbentia.*" —Dorat.

This and the following differ from all the previously described species in having thin, strong, papery leaves, and perhaps also in their very stout ultimate branchlets. This differs too from the common *Omphalea diandra* in having a glabrous, not hairy, ovary; and it differs from *O. cardiophylla* in its leaves being sparsely furnished with stellate hairs, in its short branching, narrow panicles, and in its smaller bracts. These differences are possibly all due to different conditions under which the plants grow; but rather than confuse two species under one name, I will risk making a bad species.

Here is a description of Sutton Hayes's plant numbered 617:—

OMPHALEA CARDIOPHYLLA, Hemsley, species nova, *O. foliis amplis fere orbicularibus profunde cordatis glaberrimis, paniculis angustis elongatis, bracteis oblanceolatis ad* 2 *poll. longis.*

Arbor 30—40 *pedalis* (*fide Hayesii*), *ramulis* . . . *Folia* (2 *tantum visa*) *longe petiolata, tenuia, papyracea* (*in vivis subcarnosa?*), *glaberrima, suborbicularia, basi profunde cordata, apice acuminata, obtusa* (*majus fere pedem diametro*), *undulata; venis primariis lateralibus utrinque* 5 *vel* 6, *conspicuis; petiolus* (*perfectus deest*) *saltem* 4 *poll. longus, apice* 2-*glandulosus, crassus, carnosus, in siccis infra medium crassior. Flores* (♂ *tantum visi*) *paniculati; paniculæ angustæ, graciles, terminales* (*pendulæ?*), *pedem vel ultra longæ, obsolete puberulæ; bracteæ oblanceolatæ ad* 2 *poll. longæ, venosæ, graciliter petiolatæ, petiolo* 2—4 *lineas longo, apice* 2-*glanduloso; calycis sepala* 4, *decussata, orbicularia, ciliolata; antheræ* 2 *vel interdum* 3.

THE INFLUENCE OF GUM ARABIC IN CERTAIN CHEMICAL REACTIONS.*

BY J. LEFORT AND P. THIBAULT.

It is known that the presence of certain organic substances in saline solutions may prevent the formation of a large number of precipitates. In this respect, the influence of tartaric acid is familiar to chemists. The researches it is proposed to describe warrant the statement that some neutral bodies, and gum arabic in particular, also enjoy this property.

* *Journ. de Pharmacie et de Chimie*, [5], vi., 169.

Upon this principle is based the therapeutic employment of soluble sulphide of mercury, as described by M. Lambron in a communication to the French Academy of Medicine. M Lambron pointed out that when an aqueous solution of bichloride of mercury is added to the ulphuretted Luchon water a precipitate of sulphide of mercury is rapidly formed which falls to the bottom of the vessel as a black powder. But if instead of introducing the bichloride of mercury directly it be previously mixed with syrup of gum or sarsaparilla, beef tea, albumen or apple jelly, and then poured into the Luchon water, in proportion a little in excess of the sulphur strength of the water, no precipitate is formed even after several weeks of contact. This observation induced M. Lambron to suppose that when bichloride of mercury is dissolved and mixed with gummy and albuminous substances and then poured into the sulphuretted Luchon water, the chemical action is suspended, *i.e.*, no sulphide of mercury is formed. The authors believe that although the experiments of M. Lambron may be correct his interpretation is not admissible.

At first, it might be supposed that the viscosity of the solution was the cause of the non-precipitation. But this is not the case, for if the syrup of gum be replaced by simple syrup or glycerine a precipitate is formed. It would therefore appear that the prevention of the formation of the precipitate is due to the gum or vegetable extract contained in the precipitate, and this was confirmed by the authors' experiments. The reaction is not peculiar to Luchon water and solutions of sulphuretted hydrogen or monosulphide of sodium may be substituted without sensibly modifying the results.

The authors therefore thought it would be interesting to ascertain whether gum equally prevented the precipitation of the different metallic sulphides, using solutions suitably diluted. For this purpose a titrated solution of monosulphide of sodium was prepared containing 1·7 gram of sulphydric acid per litre; on the other hand, a certain number of solutions each also containing a corresponding quantity of a metallic salt per litre; finally, a clear solution of 1 part of gum arabic in 2 parts of water. The observations were made in the following manner:—

Two quantities of 10 c.c. of the solution to be examined were run from a graduated pipette into two glasses of equal volume; with one of these 3 c.c. of solution of gum was incorporated by stirring and to the other 3 c.c. of distilled water was added; finally 10 c.c. of sulphuretted solution was added to each and rapidly mixed. The following table represents what was observed both after a few minutes and some weeks:—

	Without Gum.	With Gum.
Lead acetate	Black precipitate.	Clear brown solution.
Silver nitrate	Black precipitate.	Clear black solution.
Ferrous sulphate	Black precipitate.	Clear black solution.
Manganous sulphate.	Rosy flesh-coloured precipitate.	Clear light-brown solution.
Mercuric chloride	Black precipitate.	Clear dark-brown solution.
Copper sulphate	Black precipitate.	Clear dark-brown solution.
Zinc sulphate	White precipitate.	Clear colourless solution.
Antimonous chloride in solution acidified by HCl.	Orange precipitate.	Clear orange solution.
Arsenous acid	Citron-yellow precipitate.	Clear citron-yellow solution.

It will be seen, therefore, that under the conditions stated gum prevented the precipitation of metallic sulphides. In concentrated solutions, or when the proportion of gum was very small, more or less incomplete precipitations were observed.

It next appeared interesting to ascertain whether gum has also the power to stop the precipitation of metallic oxides and of alkaloids by the ordinary reagents. The following were the results obtained.

As to the metallic oxides it is unnecessary to enter into details of the experiments, it will be sufficient to say that they behaved like the sulphides in the presence of solution of gum. But since the oxides are, as a rule, much more soluble in water than the corresponding sulphides, metallic solutions of double the strength were used, and a corresponding solution of caustic soda.

The action of gum upon the formation of certain other precipitates was also studied, the following being the results observed:—

	With Gum.	Without Gum.
Neutral phosphate of ammonia and calcium chloride.	White gelatinous precipitate.	Clear colourless solution.
Uranium nitrate and potassium ferrocyanide.	Chocolate brown precipitate.	Clear brown solution.
Very dilute solution of ferric chloride and ammonia.	Brown gelatinous precipitate.	Clear light brown solution.

In a like manner no precipitates were produced in the presence of gum in solutions of 1 in 1000 of the following alkaloids, quinine, cinchonine, morphia, strychnia, brucia, and veratria, by the usual alkaloidal reagents,—phosphomolybdate of ammonia, double iodide of mercury and potassium and tannin. If it be remembered that the separation of alkaloids by their reagents has to be effected in the presence of various organic matters that accompany them either naturally or accidentally, these researches acquire for toxicology an unmistakable importance.

It is necessary also to note that certain vegetable infusions—among others, that of tea—are opposed to the precipitation of sulphide of mercury. The liquid only acquires a darker colour, consequent upon the presence of sulphide of mercury formed; this, however, is the same as happens with gum solutions.

Notwithstanding the numerous instances that have been quoted the non-precipitation of dilute solutions in the presence of gum is not absolutely general. The iodides of lead and mercury, sulphate of barium and carbonate of lead are precipitated in solutions containing gum more slowly, but nearly as completely as in distilled water.

The question arises whether in the presence of these facts it is necessary to conclude that the ordinary reactions undergo modification. Contrary to the opinion of M. Lambron, the authors think it is not. Although precipitation does not take place, it is evident from the intense coloration of most of the gummy liquids, as compared with that of the liquids floating above the precipitates, that the compounds are formed, but that they remain, if not in solution, at least in such a state of division that they pass through any filter; and the microscope, even with the strongest powers, does not reveal any trace of solid matter in suspension. Under these conditions it might be asked whether gum does not possess the property of dissolving metallic sulphides and oxides. Such an interpretation would be inexact, because recently formed precipitates are not redissolved when submitted to the action of a very concentrated solution of gum.

Although the phenomenon has not the generality that might be expected, the authors publish these results as affecting not only therapeutics, but also analytical chemistry and toxicology. It is also suggested that they are worthy of the attention of physiologists, since most of the organic liquids contain gum or analogous substances, and it is therefore possible to conceive the simultaneous existence in the soluble state in animal or vegetable cells of compounds reacting chemically upon each other.

THE OLEATES AND OLEO-PALMITATES IN SKIN DISEASES.*

At the thirty-third annual session of the Medical Society of the State of Pennsylvania, Dr. J. V. Shoemaker, of Philadelphia, read a paper on the above subject, which is reported in full in the *Med. and Surg. Reporter*, May 13, 1882. Dr. Shoemaker claims to have introduced, for the first time, the use of *chemically true* oleates, in contradistinction to those introduced by Mr. John Marshall in this country, which are here described as simply solutions and not true oleated compounds. Shoemaker's oleates are prepared by the double decomposition of sodium oleate with solutions of neutral salts, the former being prepared by saponification of oleic acid, with a solution of sodium hydrate. A solution of the sodium oleate in eight parts of water is precipitated by a neutral salt, and the precipitate, washed and dried, is the oleate required. The oleates of mercury, atropia, quinia and antimony, with their therapeutical action, were considered, and Dr. Shoemaker claimed to have first introduced the oleates of lead and bismuth in 1879, before the Society. The following oleates were also brought forward and shown for the first time.

1. *Oleate of Zinc*, made by decomposing a sodium oleate with a saturated solution of zinc sulphate, boiling out and drying the precipitate and reducing it to an impalpable powder. One part of this powder, melted with three of a fatty vehicle, makes a suitable ointment. Zinc oleate is a fine pearl-coloured powder, with a soft soapy feel, very much like powdered French chalk. The very best results are obtained from using it simply as a dusting powder, as in cases of excessive sweating of the feet, hands, or other parts, and in seborrhœa oleosa affecting the face; it is the most reliable remedy in eczema vesiculosum, in erythema about the groins and axillæ, and in herpes.

2. *Oleate of Copper*, obtained by double decomposition with a saturated solution of copper sulphate. The washed precipitate melted with either 4 or 9 parts of cosmoline, fat, or lard, gives respectively a 20 or a 10 per cent. of oleate of copper ointment. Applied to the unbroken skin the oleate of copper rapidly penetrates deeply into the parts, particularly into the follicles, and will produce slight stimulation; applied to the broken skin it acts as a stimulant, and an insoluble albuminate is formed, which coats over the surface and supplies the place of the abraded skin. This oleate is specially useful in cases of ringworm, the ointment being lightly rubbed in night and morning; the parts should be well washed with soap and water to start with, but afterwards only every ten or twelve days. Epilation is not always necessary in this method of treatment. This ointment is also a useful application for indolent ulcers, warts, corns, and bunions.

3. *Oleate of Aluminum*, prepared by decomposing sodium oleate with aluminum sulphate; the washed precipitate mixed with equal parts of lard gives the ointment the author uses. This ointment is semi-solid, dark brown in colour, and has a most powerful astringent action. It very rapidly checks mucopurulent discharges in eczema. The author also recommends it as a dressing in foul ulcers, abscesses, sinuses, burns, and scalds; in these cases it coagulates albumen, constringes the vessels, and has an antiseptic action.

4. *Oleate of Iron*; the precipitate thrown down on adding ferrous sulphate to sodium oleate is converted, by boiling, into ferric oleate, and this may either be used pure or made into an ointment with an equal part of a fatty base. "When prepared in the above manner it occurs in a reddish-brown paste, inodorous, leaving a styptic taste and readily soluble in fats, which hold in combination about 30 per cent. of oxide of iron, forming a powerful and important therapeutic remedy." Used topically it is non-irritating; applied to an ulcerating surface it is mildly astringent. The author recommends it for its constitutional, as well as its local effects, advising that a small piece should be rubbed into the axillæ and inguinal regions two or three times a day; from its use in this way he reports "excellent constitutional (systemic) results" in those who had a weak pulse, a pale and flabby condition of skin, and deranged digestive organs, unable to bear the ordinary chalybeates. In scrofula also he has used it with marked effect.

5. *Oleate of Arsenic* obtained by making arsenious chloride by the cautious saturation of hydrochloric acid with metallic arsenic; the solution thus obtained precipitates the oleate required from the sodium oleate. Twenty grains of this with 1 ounce of a fatty base form the author's ointment, which is soft, yellowish, having no action on the skin except when this is abraded, or in wounds, ulcerating and granulating surfaces, in which conditions it will excite active inflammation and destroy the tissues to some depth. It is of value in lupus, especially the ulcerating variety, and also in the tubercular variety after the parts have been thoroughly scraped. It may be applied also in ulcerating epithelioma, in warts, condylomata, nævi, corns, etc.; opium, belladonna, hyoscyamus, and arnica may be combined with it.

6. *Oleate of Silver* is prepared by precipitating sodium oleate with a saturated solution of silver nitrate, washing the precipitate with boiling water, drying it, and reducing it to fine powder. Of this an ointment may be made; strength, one drachm to the ounce. The salt is brownish-yellow in colour, the ointment dark brown, soft and pliable. The simple oleate may be sprinkled over old chronic ulcers, old sores, and exuberant granulations, when it will set up a healthy condition in the parts. The ointment coats over an abraded surface by combining with the albumen, and causes contraction of the blood-vessels; it is valuable, in the strength 10–20 grains to the ounce, as an application in erysipelas, a stronger ointment being used at the margin to prevent extension of the disease. It has been used also in superficial lupus, boils, and carbuncles.

The oleates of magnesium, lithium, calcium, antimony, tin, and others, have been prepared by similar processes, but are at present of little therapeutic value.

The author claims for these oleates the following advantages: their deep penetration; their freedom from rancidity; their cleanliness of application; their great economy; and their antiseptic action.

* From the *Glasgow Medical Journal*, October, 1882.

SPICES OF THE STRAITS SETTLEMENTS.*

Cloves and the Clove Tree.—People that labour under the opinion that cloves do well only in the Moluccas and on the island of Zanzibar are simply mistaken. It thrives splendidly in the Straits Settlement—this wonderful, lovely tree. Many years ago enterprising men on the island of Penang introduced and cultivated the clove tree, and it proved a decided success. It is to be found in some of the gardens of Europeans and wealthy Chinese in the Straits Settlements, producing flowers liberally; and it is a subject for wonder why no one cultivates it more largely, not to serve as an ornament only, but to derive benefit from it. In Penang it was planted for that purpose, and "Penang cloves" have the reputation, like the nutmegs, to be the best in the market, commanding a higher price than Amboyna (Moluccas) and Zanzibar cloves. But the consumption of this spice among the natives throughout the colony (and all India and the East in fact) is so large that the quantity left for export is very limited. It is the bud of the flower just before

* From the *Weekly Drug News*, Aug. 11, 1882

opening that constitutes the spice, and in this lies the difficulty that prevents many from planting cloves for export. One having a quantity of trees will find himself busy about the time the buds (white in colour, and strongly resembling snowdrops) begin to made their appearance. It must not be gathered before it, the bud, is well formed, just before opening; and as on a full-g own tree the number of buds is exceedingly large, the planter must have plenty of hands ready to gather them as quickly as possible, because the bud after opening—becoming a flower—loses much of its strength. Boys and girls from ten to fourteen years old answer best for this purpose. The bud-gathering time lasts a few days only, and whoever does not "make hay while the sun shines" will lose his crop of buds. The buds after being gathered are spread on large sieves or mats of loose texture, and dried under the shade of trees, or in sheds with palm-leaf covered roofs, and are then ready for the market. To dry them in the sun causes them to turn black and shrivelled, and to evaporate much of their strength. A properly dried clove is of light-brown or tan colour. The shipments of cloves from Singapore to the United States have, last year excepted, never amounted to much, and supplies were obtained chiefly from Amboyna.

Pepper Cultivation.—Black and white pepper grow on the same vine; the green pepper-berries, just before maturity, after gathering, turn black and make "black pepper," while "white pepper" is obtained by gathering the berries—fire-red in colour—when fully ripe, and through long soaking in water and subsequent stirring and shaking, relieving the berries of the outer skin; after which, on being dried, they become "white." In what country the pepper-vine originated, the writer is unable to say; but Eastern history shows that the northern half of Sumatra, the once mighty old sultanate of Acheen, when the Portuguese, Dutch and British (in rotation) came to that country, was far famed for that spice, which drew, at Acheen Busar, in North Sumatra (near the entrance of the Straits of Malacca), the native traders from many Eastern countries and islands, who there exchanged the products of their countries or purchased for cash. After the British East India Company, during the last century, acquired the island of Penang from the Rajah of Quedah, a Siamese souzerain, so favourably situated for commercial purposes, and made it a very important factory and place of residence for a sub-governor, the great Acheen trade gradually drifted to Pulo-Penang (Prince of Wales Islands), and with it the pepper trade principally. At that time Singapore had not been acquired by the British, and not before 1819, when the island was covered with a dense trackless jungle. After the acquisition of Penang the natives on the peninsula of Malacca, especially in the province of Frang, a Siamese souzerain province, commenced to plant pepper, and with excellent success; and now it is extensively planted by Malays and Chinese in many places on the peninsula of Malacca, also in Siam, Cochin-China, and in Sarawak, Borneo. That grown in the southern part of the peninsula and on the island of Singapore, known in the market as "Singapore pepper," is by far the best, commanding a higher price than Acheen pepper. Penang maintained the Acheen pepper trade until the Dutch commenced their war of conquest in Acheen in 1873, blockading the coast and preventing the exports of all Acheenese products. At that time, owing to the spread of wild rumours about the destruction of the pepper gardens in Acheen, etc., pepper reached the figure of 14 dollars per cwt., for a short time. It was feared, the supplies from Acheen being cut off, that the spice would become scarce, and as a consequence many Chinese planters increased its cultivation; in fact, to such extent that the Acheen war was no longer looked upon as the cause of influence in prices. Later some of the chiefs of certain Acheenese provinces having submitted to Dutch rule, were allowed to send pepper to Penang on vessels having a permit from the Dutch Consul in Penang to supply them with rice and other needed goods. Then it appeared that some of the Rajahs who had submitted to the Dutch, after having been pretty well supplied with the necessaries of life, turned truant again, and, as a consequence, their coasts were again blockaded. The Dutch are now making efforts to make "Ole-Seh," the old port of Acheen Busar, in fact well protected by a fort and man-of-war, a trading port, and to export "Acheen pepper from Acheen" themselves. As to the pepper-vine it presents a very handsome appearance; a pepper garden at a distance looks like a "hop-yard." Some planters, however, trellis the vine, and the writer thinks that is the best plan. It grows everywhere round about Singapore very easily and luxuriantly on fair upland soil, not liking low heavy soil, and, like the grape-vine, needs occasional pruning, weeding and fertilizing. With a little care and attention it yields abundantly and proves a good source of income. The quantity of pepper exported annually from the Malay peninsula and ports in Dutch India is simply immense, and is almost exclusively planted, gathered, and brought to market by natives, Malays and Chinamen chiefly.

Nutmegs and Mace.—Nutmegs and mace belong together, the latter being the inner covering of the nut. This most interesting, and, in its natural fresh state, lovely spice, seems to be an especial favourite with the American people, since the export thereof, of the nut especially, to the United States, exceeds that to all Europe combined. The home of the nutmeg in reality is New Guinea (Papua), where it grows wild, and it is possible that in times past (and now) the famous and daring Bugistraders, who alone obtained the most noted products, by way of barter with the extremely barbarous and hostile inhabitants, brought away certain quantities thereof. The most reliable place of production of obtaining them, agreeably with the demands of the market, has ever been the island of Banda and probably other islands, among or near the Moluccas, while the island of Penang and the Straits Settlements furnished also their quota, the quantity increasing gradually. The nutmeg thrives well, also, with a little care, on certain parts of the peninsula, and if the Colonial Government had given hitherto a little more fostering care to its cultivation, a much larger quantity might have been produced. In Deli, Sumatra, nearly opposite Penang, where the tobacco planters labour under the idea that their rich soil, after having produced one crop of tobacco will not produce a second sufficiently good to pay, and that the land must lie fallow for six years (grow up in jungle again), some of them a few years ago became happily possessed of the idea whether during those six long years the tobacco lands might not possibly produce something else "that would pay," and a few of these intelligent tropical husbandmen concluded to plant nutmegs. Six good coolies, at 20 cents wages per day each, with a hand cart, could soon plant a large piece of fallow tobacco land in nutmegs. In the meantime, the tobacco planters, who looked upon this as an experiment that would not cost them much, and paying little attention to it, went on tobacco planting, looking upon that as their object and actual source of profit, as it takes about five years until the nutmeg trees commenced to bear. Some of the planters had crops of fine nutmegs to send to market at the end of that time, in addition to all the tobacco they produced and shipped during the same period. The nutmegs being good and large could enter the market as "Penang nutmegs"—an innocent, cheap enterprise that turned out well, the nutmegs being worth about 70 dollars per picul, unselected, and mace, if slowly and neatly dried, not scorched, about from 40 dollars to 50 dollars per picul. It takes 110 fair-sized nutmegs to make one pound (1 picul = $133\frac{1}{3}$ pounds at 80 dollars) worth 60 cents; and since a good full-grown nutmeg tree in full bearing can produce several bushels of nuts with the hulls on, it can be easily seen that the "experiment" turned out well. Such of the planters as had their wits about them, the price of Deli tobacco having fallen during the last two or three years nearly 50 per cent. against former years, and yielding little or no profit at the present time, can now stop tobacco planting and find old tobacco prices in their nutmeg groves until the price of tobacco rises again. The number of the "successful," however, is not large; but will, after such a demonstration, become larger, it is supposed. The nutmeg tree will grow well on the coast of Borneo and adjacent islands, as well as in the Malayan States on the peninsula, under British and Siamese rule; and, as we have very advantageous treaties with both countries, the United States buying more nutmegs than the whole of Europe taken together, some of our enterprising young men might perhaps spend some time profitably in reflecting upon this.

ARALIA SPINOSA.*

BY JOSIAH KIRBY LILLY, PH.G.

Noticing the great differences in the results of former investigations of aralia bark, the writer performed a series of experiments, in hopes of determining the nature of the principles to which the drug owes its slightly aromatic odour, bitterish and acrid taste.

The odour of the bark proved to be due to a volatile oil, present in very minute quantity. By distilling 8 ounces of the ground drug with water a few yellowish-green globules of the oil were separated. It possessed an aromatic, somewhat camphoraceous odour, and gave with litmus an acid reaction.

On continuing the distillation, with the addition of solution of potassa, no other volatile principles were observed.

The bitter taste resides in an amorphous, extract-like mass, soluble in ether, alcohol and water, insoluble in petroleum benzin, and not precipitated by neutral or subacetate of lead. The process by which it was obtained is as follows:—The drug was exhausted with alcohol, this removed by distillation until the residue assumed the consistence of syrup; this residue was then precipitated in water, the resinous precipitate separated by filtering, and the filtrate evaporated to a soft extract, which was treated repeatedly with stronger ether. The ether solution on being allowed to evaporate spontaneously left a yellow mass, which, when dissolved in water and allowed to stand, separated crystals; the mother-water from the crystals, upon being evaporated, yielded the bitter mass already described.

It was also separated from an extract, resulting from the evaporation of a decoction, by treating it with stronger ether, and proceeding with this ether solution as with the one above.

The crystals that were separated from the bitter principle possessed a taste which was at first saline, then developing a slight astringency; they were freely soluble in ether and alcohol, less so in water, and were entirely volatilized at a red heat.

The acrid principle is a resin, which I obtained in the form of a grey powder, possessing a strong and persistently acrid taste, insoluble in ether, soluble in alcohol. It is the resin remaining after treating with stronger ether the resinous precipitate yielded by the alcoholic extract in water.

The portion of this resinous precipitate which was soluble in ether consisted of a tasteless resin and much green colouring matter, undoubtedly chlorophyll.

In distilling for volatile oil, preparing decoctions, infusions, etc., much trouble was experienced through the formation of a dense and persistent froth. Steps were taken to separate this saponaceous principle with the result of obtaining it in the form of a nearly white powder, inodorous, possessing a slightly acrid taste, freely soluble in water and dilute alcohol, almost insoluble in alcohol, and entirely insoluble in ether and chloroform. A process by which it was isolated is as follows:—The extract procured by evaporating a cold infusion was treated with stronger ether to remove the bitter principle, and the residue thoroughly washed with dilute alcohol; this solution was evaporated to an extract and dissolved in water. The aqueous solution yielded with a solution of lead acetate a scanty precipitate, which was separated by filtration. The filtrate gave with solution of subacetate of lead a copious precipitate, which was collected, well washed, the lead removed by suspending in water and passing hydrosulphuric acid through the solution, and the filtrate evaporated. The product of this evaporation proved to be this saponin-like substance; it was much improved in colour by dissolving in a small quantity of hot alcohol, from which it reprecipitated upon cooling, the alcohol holding much of the coloring matter in solution. This principle may also be obtained by exhausting the ground drug with boiling alcohol, from which it separates upon cooling. On boiling this body in a very dilute solution of hydrochloric acid it proved to be a glucoside, yielding glucose and an insoluble white substance.

To this principle I think the name "araliin" could be very properly applied. The araliin of Holden (*Am. Journ. Pharm.*, August, 1880) is described as "a yellowish substance in scale, foaming excessively upon agitation," and is very probably this substance incorporated with some foreign matter.

The alkaloid announced by Elkin (*Am. Journ. Pharm.*, August, 1880) as existing in aralia bark could not be found. No precipitates were formed when Mayer's test, or a solution of iodine in iodide of potassium, was added to an acidulated infusion or decoction, nor to the solution resulting after treating an alcoholic extract with acidulated water.

No reactions were given indicating the presence of tannin. A green colour was produced by ferric chloride, but a solution of gelatin caused no precipitate with a somewhat concentrated decoction. Glucose was indicated by Trommer's and Fehling's tests, as was starch by iodine. Milk of lime precipitated pectin from an acid decoction. Albumen was not coagulated upon boiling a cold infusion.

* From the *American Journal of Pharmacy*, September, 1882.

THE LACQUER INDUSTRY OF JAPAN

BY JOHN J. QUIN,

Her Majesty's Acting Consul at Hakodate.

(*Continued from page* 268.)

Various Kinds of Lacquer and Mixtures used.

(*a.*) *For Plain Work.*

Ki-urushi (crude lacquer) is the generic name by which all lacquer obtained from the trunks of live trees is known. It forms the basis of nearly all the various mixtures used in making lacquer ware.

Seshime (branch lacquer).—This kind is obtained from the branches of the trees, as described above; but the yield is only about 1 per cent. in comparison with other lacquer. As, however, in working the proportion of nearly 90 per cent. is required, the lacquer manufacturers sell a mixture which is stated to be a compound of true branch lacquer, the best crude lacquer, *Ura-me* and *Tomê* lacquer, *funori* (seaweed jelly), and sweet potatoes grated fine, the whole coloured, as may be necessary, with soot. The proportions in which these materials are used cannot be ascertained, and, indeed, each manufacturer uses his own special mixture, but the extraneous additions are believed not to injure the quality of the whole.

True branch lacquer becomes extremely hard when once dry, but used alone will not dry under some twenty days, so that now, when time is an object, the pure sap is but little used. Previous to the Revolution of 1868, branch lacquer of a very superior quality, and which would dry quickly, was obtained by using the young shoots which sprouted yearly from the roots after the trees had been cut down. This kind was called *Ki-seshime* (crude branch lacquer), and was made under directions from the Government, who received it as taxes; but the practice has been discontinued of late. The price of pure branch lacquer is, owing to the difficulty in drying, only 70 per cent. of ordinary good lacquer.

Rō-urushi (black lacquer).—This is made by adding to crude or branch lacquer about 5 per cent. of the tooth-dye used by women (*Haguro*), a liquor formed by boiling iron filings in rice vinegar, and exposing it to the sun for several days, stirring the mixture frequently till it becomes a deep black.

In preparing all lacquer, from the crude lacquer to the various mixtures, the principal object is to get rid of the water that exudes from the tree with the sap. To effect this, it is exposed in broad flat wooden dishes, and stirred in the sun. This, however, alone will not cause the original water to evaporate, so from time to time—ordinarily about three times in the day—a small portion of clean water is stirred in, say 1 per cent. each time, for a couple or three days, according to the heat of the sun. All the water then evaporates together. No lacquer will dry until this process has been gone through. If the lacquer is old, *i.e.*, has been tapped a long time before using, it is much more difficult to dry. In such cases a portion of fresh lacquer is added to the old by the wholesale dealers, or else the manufacturers, instead of water, sometimes mix *saké* (rice beer) or alcohol to "quicken" it.

A very remarkable property of lacquer should be mentioned. If crude lacquer, which is originally of the colour and consistency of cream, is exposed to the sun for a few days without adding water, it loses its creamy colour, and becomes quite black, or nearly so, but also becomes thinner and transparent, or rather translucent, as can be seen when it is smeared on a white board. It will not now, however, dry if appplied to an article, even if kept a month or more in the damp press. But if water is mixed with the lacquer which has thus been exposed and become black, it at once loses the black colour and its transparency, and becomes again of a creamy colour, though slightly darker, as if some coffee had been added, than at first. After evaporating this water, it can then be used like any ordinary lacquer, either alone or in mixtures, and will dry in the damp press, during which process it again turns black. What lacquer workers have found their greatest stumbling-block is the difficulty of obtaining a clear transparent varnish. What is called transparent varnish is really black to the eye, and requires grinding and polishing after application before it presents a brilliant surface, becoming also much lighter after a little time. It would be a new era in the manufacture of lacquer ware if a method could be discovered of rendering the lacquer varnish perfectly clear and light coloured when so desired, without depriving it of its drying qualities, and also if colours could be used with it other than those hereafter mentioned.

Nakanuri-urushi (middle painting varnish).—This is merely the crude lacquer. After having been exposed for some time to the sun to darken it and to get rid of all water, it is used for under coats in making first-class lacquer ware.

Nuritate-urushi (finishing lacquer).—This is a mixture of crude lacquer and a little terpentine with *Tō-midzu* (whetstone water)—being the mixture obtained from whetstones on which blades have been sharpened. In it there is some 7 to 8 per cent. of iron, and after mixing, the whole is exposed to the sun, both for the purpose of getting rid of all the water and to darken the colour. This is used for final coats of cheap lacquer, which is not polished afterwards.

Jō-hana-urushi.—This is a mixture of the above kind. with oil obtained from the *Ye* plant (*Perilla ocymoides*), This is used for still more common kinds requiring no after polishing, and the lacquer does not present a hard surface.

Jō-chiu, called in Kioto *Chiu-hana; Jō-tame*, called in Kioto *Ge-hana.*

These contain more and more oil, and are used for the commonest articles, such as for varnishing clogs, clothes baskets, etc. These three last kinds give a high polish, but the lacquer does not last.

Shu-urushi (vermilion lacquer).—This is the best crude or transparent varnish mixed with *Ye* oil (*Perilla ocymoides*), sometimes as much as 50 per cent. being added. It is then exposed to the sun and water added, which is afterwards evaporated. This kind is only used for red (whence its name) and coloured lacquers, the colours being added at the time of application. It requires no after polishing.

(*b.*) *For Lacquering with Gold.*

Nashiji-urushi (pear basis lacquer), or *Suki-urushi* (transparent lacquer).—The first name is that best known in the trade, as indicating that it is required for using over gold, silver or tin powdering. It consists of the finest crude lacquer obtained from old trees. As stated previously, the lacquer is allowed to stand till all dirt and foreign matter has sunk to the bottom, when the best is skimmed off, and after being exposed to the sun to evaporate the water in the usual manner, and carefully filtered, it is ready for use. Except when used for the highest class of gold powdering, a certain proportion of gamboge is mixed with the lacquer to give the dust a fine yellow colour.

N.B.—The above ten kinds are all bought by the lacquer workers ready prepared from the manufacturers. Any further mixtures used by them are made as required, colours added, etc.

Seshime-urushi (branch lacquer) and *Rō-urushi* are used also in making gold lacquer.

Yoshino-urushi.—This is crude lacquer from the district of Yoshino in the Province of Yamato. It dries quickly, and closely resembles transparent varnish. It is used when giving the final coats before polishing.

Yoshino-nobe-urushi (Yoshino spreading lacquer).—Same as above, with the addition of about one-third of camphor to render the lacquer thinner and more easy to spread.

Seshime-nobe-urushi (spreading branch lacquer).—This is merely branch lacquer with the same proportion of camphor as above; when cheap work is required more camphor is used till the proportions are reversed. This renders the mixture very soft, and a small quantity can be spread over a large surface.

Shita-maki-urushi (under coat lacquer).—A mixture of branch lacquer and *Benigara* (red oxide of iron) in equal parts by weight.

Ke-uchi-urushi (inside line lacquer).—This is the same as above, but it is allowed to stand for about six months after mixing before it is used. By this time it has got thicker, and the very finest lines can be drawn without fear of their running, and they moreover stand out better.

Shita-maki-nobe-urushi (under coat spreading lacquer).—Same composition as above, with the addition of a little camphor to make the lacquer thin. It thus goes much farther, and causes a great saving when lacquering with powdered gold-leaf (*keshi-fun*), for which it is best suited. As in the other mixtures, the more camphor is used the thinner it renders the lacquer, and less gold is required.

Taka-maki-urushi (raised lacquer).—To make this a certain quantity of *Rō* or *Nuritate* is taken and divided into three parts. To one part is added lampblack and camphor in equal portions of bulk. These, after being well mixed, are boiled together; then the other two portions are added, and the whole stirred together, and afterwards filtered through paper. It is boiled more or less according to the season. In summer when lacquer dries quickly, it is boiled for a longer period, while in winter, or during cold weather, when lacquer naturally takes longer to dry, the mixture is boiled for a shorter time. The reason why *Takamaki* is thus purposely rendered soft is explained by the fact that otherwise the upper surface would harden at once, while the under portion (*Takamaki* being applied thickly) being excluded from the upper air, would not be able to dry, and later the top surface would crack and show fissures, whereas the introduction of camphor renders it soft and much slower to dry, and the whole has thus time to harden equally. Camphor being volatile is gradually lost, and the composition becomes quite hard.

Ro-se-urushi (a mixture of black and branch lacquer).—This is used for the lacquer coating upon which gold, silver, or tin powder is scattered, except in such cases when the grain of the wood is to be shown, when *nashiji* lacquer is used instead.

Kuma-urushi (shading lacquer).—A mixture of *Johana* lacquer and lampblack, used for final shading in the feathers of birds or animals, or for drawing hair, etc., on flat and raised gold lacquer.

It should be noted that whenever lampblack is mentioned as a mixture it is used for the superior kinds, wood or coal soot being used for inferior articles.

Implements and Materials used in the Manufacture of Plain Lacquered Ware.

Hera.—A spatula made of *Hinoki* (*Chamæcyparis obtusa*), used for applying the under or priming coats and for mixing the lacquer.

Haké.—A flat brush made from human hair, used for laying on the lacquer.

Kokuso.—Finely chopped hemp. Mixed with lacquer it is used for covering joints.

Nuno.—Hempen cloth, used for pasting over the wood to prevent it splitting and to strengthen corners, etc. For very fine work and small articles silk is used.

Ji-no-ko (burnt clay).—Afterwards reduced to a very fine powder. Pounded bricks are often used.

To-no-ko.—A fine kind of clay, which is procured from Mount Mari, near Kioto. This is likewise burnt, and reduced to a fine powder.

Sumi.—Charcoal made of *Hōnoki* (*Magnolia hypoleuca*), used for smoothing down the under coats; it has rather a rough grain. Also charcoal made from *Hiyakujikkō* (*Lagerstrœmia indica*). This is very soft and of a fine grain, and is used for the final smoothing before hand polishing. This kind is called by the trade *Rō-iro-sumi* (black coloured charcoal).

To-ishi.—Whetstones of four different qualities of fineness: *Ara-to* (rough), *shiro-to* (white), *awo-to* (green), and *nagura*, the last being the finest. These are used for smoothing down the priming coats.

Tsuno-ko (horn powder).—This is made of calcined deer's-horns, reduced to a fine powder, and is used for the final polishing with the finger.

To-kusa (*Equisetum*).—A kind of scouring rush, used for smoothing the lacquer.

Kaki-no-shibu (Persimmon juice).—This is used when no ground lacquer is required, as in the Aidzu lacquer, or when the grain of the wood is shown.

Nikawa (glue).—This is used to mix with the groundwork for cheap kinds of ware, instead of lacquer.

Yuyen-sumi (lampblack).—Used for groundwork of cheap articles, mixed with Persimmon juice. For still more common ware, soot of any kind is used.

Gofun (whiting).—Made from burning old shells, such as are obtained from the ancient kitchen middens; used for mixing with glue to make the groundwork of common lacquer.

Shō-no (camphor).—Used for mixing with lacquer, to make it thinner and spread more easily.

Hōchō (knife).—Used for scraping off all inequalities of the hempen cloth after it is pasted on the article, etc.

Yoshino-gami.—A very thin kind of paper, made at Yoshino; used for filtering the lacquer before using it.

Jō-ban.—A box with a very hard lacquered lid, usually containing drawers for the various pencils, etc. The lid is used for mixing the lacquer on while working.

Tsuno-ko-ban.—Board for mixing and powdering the deer's horn ashes before using: generally made of cherry wood or oak.

Muro.—A cave or cellar underground is used, where practicable; otherwise, an air-tight case, made of wood, with rough unplaned planks inside. These are thoroughly wetted before the lacquered article is put in to dry, which occupies a period varying from six to fifty hours, according to the time of the year or style of the lacquer. Lacquer will not dry or harden properly in the open air; it absolutely requires a damp closed atmosphere to do so, otherwise it would run and always remain sticky.

The following are mixtures made by the workman as required:—

Kokuso.—A mixture of finely chopped hemp, with rice starch and branch lacquer sufficient to make a thick paste.

Jino-ko (No. 1).—Powdered burnt clay and branch lacquer, mixed together in the proportion of 1 part of clay to 2 parts of lacquer.

Jino-ko (No. 2).—The same, mixed in the proportion of 10 parts of clay to 13 of lacquer, and a little water.

Jino-ko (No. 3).—The same, mixed in the proportion of 10 parts of clay to 8 parts of lacquer and 2 parts of thin rice starch. This mixture is known in the trade as *Han-dan-ji* (half-step basis).

Jino-ko (No. 4).—The burnt clay powder mixed with liquid glue only in such proportions as will resemble the consistency of lacquer.

Kiri-ko.—A mixture of *Jino-ko* and *Tōno-ko* in equal portions with 1½ of branch lacquer. This becomes very hard.

Sabi.—A mixture of 2 parts of the burnt clay from Mount Mari to 1½ of branch lacquer, with just sufficient water to mix the clay into a paste.

An inferior class of *Sabi* is made by putting in less lacquer—as little as 8 parts of lacquer being used to 20 parts of the clay. Less lacquer cannot be used, as it would not stand polishing after having been dried.

Mugi-urushi.—Wheat lacquer; being a portion of wheaten flour mixed with branch lacquer to such consistency as may be required. It is used to paste the hempen cloth on to the wood.

Shin.—A mixture of rice flour with branch lacquer, used for the same purpose as wheat lacquer. Wheaten flour is the best, but being more difficult to blend with lacquer it is not so much used.

Ka-no-ji.—A mixture of whiting and liquid glue, used for under coats or cheap articles.

Shibu-ji.—A mixture of lampblack and Persimmon juice, used for under coats in inferior ware.

The following are the modes of applying the lacquer:

(*a.*) *Honji* (real basis). The article to be lacquered is first carefully smoothed, and the wood is slightly hollowed away along each joint, so as to form a circular depression. The surface of the whole article is then given a coating of branch lacquer (this is called *Ki-ji-gatame*—hardening the wooden basis), and the article set to dry in the damp press, or *Muro*, for about twelve hours. The hollowed portions are filled with prepared *Kokuso*, which is well rubbed in with a spatula made of the wood of the *Chamæcyparis obtusa*, and the article is enclosed in the drying press for a period of at least forty hours. Over the *Kokuso* a coating of *Sabi* is applied, and set to dry for twelve hours. The next process is to smooth off with a white whetstone any roughness or inequalities of the *Kokuso* and *Sabi*. The article is then given a coating of wheaten lacquer, over which is stretched hempen cloth, great care being taken to spread it smoothly and leave no wrinkles or perceptible joinings, and it is then again enclosed in the drying press for about twenty-four hours. After taking the article out of the press all inequalities in the cloth—which has now under the influence of the lacquer become harder than wood—are smoothed down with a knife or with a plane. Next, a coating of *Sabi* is applied with the spatula, to hide the texture of the hempen cloth, and the article is again put in the press for twenty-four hours. Next, a coating is given of No. 1, *Jino-ko*, applied with the spatula, after which the article is enclosed in the drying press for twenty-four hours, and this process repeated. Next, the article is given a coating of *Kiriko*, likewise applied with the spatula, and the drying process is repeated for twenty-four hours; there is then a repetition of the same process, after which the article is set to dry for at least three days. The surface is next ground smooth with a fine white whetstone, and a hardening coat of branch lacquer is given with a spatula, and set to dry for twenty-four hours. A fresh coat of *Sabi* is applied with the spatula, and the article is put to dry in the press for twenty-four hours. When thoroughly hardened the surface is ground smooth with a white whetstone, as before. Next, a thin coating of branch laquer is applied with the spatula, and the article is set to dry in the press for twelve hours. A coating of *Naka-nuri* is then applied with a flat brush (*Haké*), and the article set to dry again for twenty-four hours. On being taken out the surface is ground smooth with charcoal made from *Hōnoki* (*Magnolia hypoleuca*). A thin coating of branch lacquer is given with cotton wool—old wool being chosen because less likely to leave hairs behind it—and rubbed off again with soft paper, after which the article is set to dry for twelve hours. A coating of *Rō* (black lacquer) is then applied, and the article is set to dry for twenty-four hours. The surface is rubbed smooth with a piece of charcoal made from *Hiyakujikko* (*Lagerstrœmia indica*). The surface is partly polished with finely-powdered *Lagerstrœmia* charcoal, applied with a cotton cloth. A coating of *Rō* is applied very thinly with cotton wool, and this is rubbed off again with soft paper, after which the article is enclosed in the drying press for twenty-four hours. The surface is now polished with an equal mixture of powdered burnt clay from Mount Mari (*To-no-ko*) and calcined deer's-horn ashes, applied with a cotton cloth and a little oil (made from *Sesamum orientale*), till a fine polish is obtained. A coating of branch lacquer is next given, applied with cotton wool very thinly, and the article is enclosed in the drying press for twelve hours. The workman dips his finger in oil and rubs a small quantity of it over the surface, which he then polishes with deer's-horn ashes, applied with a cotton cloth, till a bright surface is obtained. A coating of branch lacquer is applied thinly with cotton wool, wiped off with soft paper, and set to dry for twelve hours. Oil is again applied, and then a final polishing with deer's-horn ashes given with the finger to the surface, which now assumes the most brilliant polish of which it is capable.

For articles that are liable to get rubbed, such as scabbards, these last two processes are repeated seven or eight times, the surface getting harder at each repetition, but this is not necessary for other articles even of the best quality. In describing the above processes the *minimum* time for drying has in each case been given, but for the first twenty-five processes the longer the article is kept in the press the better. From the twenty-eighth process to the finish it is better not to greatly exceed the times mentioned.

(*b.*) *Kata-ji* (hard basis); (*c.*) *Handan-ji* (half-step basis); and (*d.*) *Manzo* (after a lacquer worker of that name), modifications of the first process.

(*e.*) *Ka-no-ji* (inferior basis). In this class the joints of the article to be lacquered are frequently not hollowed away, a strip of paper being merely pasted over them, and even this precaution being often omitted. A coating of *Ka-no-ji* (whiting and glue) is applied with a spatula twice or thrice, and dried in the sun. The article is then wiped over with a wet brush and rubbed smooth with a white whetstone, and afterwards given an extra smoothing with the spatula. Sometimes a thin coating of *Nakanuri* or of branch lacquer is given to the article, but more frequently a coating of glue and lampblack, or of glue and soot mixed together, is applied. A final coating of either *Jō-hana* or *Jōchiu* finishes the process without any subsequent polishing.

(*f.*) *Shibu-ji* (*Persimmon*)—(juice basis). The joints of the article are prepared in the same manner as for (*e*), but, instead of *Ka-no-ji*, four or five coats of *Shibu-ji* (Persimmon juice and lampblack) are applied with a brush; these dry very rapidly and the last coating is smoothed with *To-kusa* (*Equisetum*). A final coating of either *Jō-hana* or *Jō-chiu* is given. This kind of article is chiefly made in Aidzu, and, indeed, goes by the name of "Aidzu Ware." It has not such a good appearance as *Ka-no-ji*, for the grain of the wood is easily traceable under the lacquer, but being made without glue, it stands water much better, and is in general request for rice bowls and *zen* (small dinner trays with legs, one of which is set before each guest).

(*g.*) *Sabi-Sabi* (double Sabi). In this class of goods the joints are generally hollowed out, and a basis-hardening coat of branch lacquer given. Paper is also pasted over the work after filling in the joints with *Koku-so*. Three coats of inferior *Sabi* are then applied, and after drying for about twelve hours in the press, the article is ground smooth with a white whetstone. Next comes a coating of branch lacquer, applied with cotton wool, and then one of *Nakanuri*, which is ground smooth with *Magnolia* charcoal. Another coating of branch lacquer is followed by one of *Jō-hana* or *Jō-chiu*, and the article is finished without further polishing. Drying in the damp press is requisite between each process for this class of lacquer. It is manufactured only in Tôkiô, though the processes for the under coats of *Wakasa* lacquer are identical. Rice bowels, drinking cups, and luncheon boxes, etc., are the usual articles manufactured. In this, as in Aidzu ware, the grain of the wood is traceable, and its common appearance constitutes the reason for classing it so low, but in actual excellence and durability it ought to rank fourth next to *Handan-ji*.

(*h.*) *Kaki-awase* (mixture), or *Kuro-shunkei* (black Shunkei), from the name of its inventors. In this class of goods the wood is given a basis-hardening coat of branch lacquer mixed with lamblack, over which is laid a final single application of *Jō-hana* or *Jō-chiu*. This ware is made at Tôkiô, and is used for cheap rice bowls and boxes. For the commonest kind of work a mixture of glue and lampblack or Persimmon juice and lampblack is used, instead of branch lacquer, as a ground coat.

(*i.*) *Aka-shunkei* (red Shunkei).—This kind also derives its name from the inventor. For making articles of this class, which show the natural grain of the wood, a mixture of *Yoshino* lacquer and gamboge is rubbed on with a hard brush, after which they are inclosed for a day in the press to dry, and then a coating of *Shu-urushi* (transparent lacquer, containing a proportion of *Perilla ocymoides* oil) is applied. When dry it presents a polished surface, and it appears dark when at first finished, but in a few months becomes much lighter. A cheaper quality of *Shunkei* is made by using glue and gamboge or Persimmon juice and oxide of iron for the under coat, but though the colour has a better appearance at first, it gradually deteriorates. The best is made in the Province of Dewa, at Akita. For the most part soft woods are used in making this ware.

(*j.*) *Kiji-ro* (colour of the grain of wood). Well seasoned wood is selected, and the article having been carefully smoothed, a thin coating of *Yoshino* lacquer is applied with a brush, after which it is set to dry in the press for twelve hours. A coating of best *Sabi* is then applied with the spatula, and set to dry in the press as usual. This is ground completely away with a green whetstone. A coating of *Nashiji* (pure transparent lacquer) is now given, and the article is inclosed in the press for twenty-four hours. It is again ground with a green whetstone till no remains of the lacquer coating are apparent. Then follows a second coat of transparent lacquer, which, after drying as before, is ground smooth with a piece of *Hiyakujikko* (*Lagerstrœmia indica*) charcoal. Transparent lacquer is again applied with a piece of cotton wool, and wiped off with soft paper, and the article is set to dry for twelve hours. Afterwards it is given a primary polish with an equal mixture of *To-no-ko* and deer's-horn ashes applied with a cotton cloth and a little oil. Next, a coating of *Yoshino* lacquer is applied with cotton wool, wiped off with paper, and set to dry as before. At this stage only deer's-horn ashes, with a trifle of oil, are used for polishing. This process is repeated three times, and results in an exceedingly brilliant polish. Only hard woods are used for this kind of ware.

(*k*.) *Red and Coloured Lacquers*. For making best red and other coloured lacquers the first twenty-two processes are the same as in *Honji* (*a*). Next a mixture of *Nashiji* (pure transparent lacquer) and vermilion, or the colour desired, is given to the article, which is thereupon set to dry. The remainder of the processes are identical with (*a*), except that *Yoshino* lacquer is substituted for "branch lacquer," and transparent varnish is used instead of *Rō* (black lacquer). For extra high-class work, instead of the thin coating of lacquer which is wiped off again, a thick coating of transparent varnish is given, applied with a brush, and set to dry for about thirty-five hours, the remaining processes remaining unchanged. For second-rate articles the colour is mixed with *Shu-urushi* (transparent lacquer containing oil), and no after polishing takes place. The article presents a brilliant surface, and the colour is better and brighter than in the best kind, but the surface much less hard. Many processes are omitted for cheaper articles, as is the case in black lacquer, and less lacquer and more oil is used.

(*To be continued.*)

SELECTIONS FROM THE NON-OFFICIAL FORMULARY OF THE DUTCH SOCIETY FOR THE ADVANCEMENT OF PHARMACY.*

(*Continued from page* 186.)

TINCTURA KAMALÆ (*Tincture of Kamala*).

Kamala	3
Stronger alcohol	8

Macerate during three days, and filter.

TINCTURA GUARANÆ (*Tincture of Guarana*).

Extract of guarana	1
Alcohol	16

Dissolve the extract in the alcohol, and, if necessary, filter.

EXTRACTUM GUARANÆ (*Extract of Guarana*).

Guarana	1
Stronger alcohol	3
Water	q.s.

Mix the guarana with 2 parts of the alcohol and 3 parts of water, and let it stand three days, occasionally shaking. Then express and treat the residue with a mixture of 1 part of the alcohol and 2 parts of water. Let stand during one day, express, unite, and filter the strained liquids, and evaporate them, on a water-bath, to a thick extract.

TINCTURA PUCHURY (*Tincture of Puchury*).

Puchury beans (from *Nectandra Puchury*, Nees), in coarse powder	1
Stronger alcohol	8

Macerate during seven days, express and filter.

TINCTURA PYRETHRI COMPOSITA (*Compound Tincture of Pellitory*).

Walker's Toothache Tincture.

(Commonly called, in Dutch, "woordhoulder" = "word-keeper.")

Pellitory root (*Anacyclus Pyrethrum*), finely cut	1
Guaiac resin, in powder	4
Stronger alcohol	24

Macerate during seven days, express and filter.

* From *New Remedies*, August, 1882.

TRIMETHYLAMINA (*Trimethylamine*).

(Propylamine, improperly so called.)

A liquid obtained from herring-brine [or, more abundantly, from beet-root molasses.—ED. N. R.], containing 20 per cent. of pure trimethylamine. It is a clear, colourless liquid, of an alkaline reaction, the specific gravity 1·124, and having a peculiar odour, recalling that of ammonia and herring brine. It is miscible with water and alcohol in all proportions.

One part of hydrochloric acid of specific gravity 1·170 should neutralize 3 parts of trimethylamine. The salt, obtained by evaporating this solution, should be completely soluble in absolute alcohol.

TROCHISCI IODOFORMI (*Troches of Iodoform*).

	Grams.
Iodoform	50
Sugar, in powder	1000
Oil of peppermint	1·5
Tragacanth, powdered	2·5
Glycerin	10
Water	q.s.

Mix the first four ingredients with the glycerin and enough water to form a mass, and divide this into 1000 troches.

Each troche contains 0·05 gm. or nearly $\frac{3}{4}$ of a grain of iodoform.

TROCHISCI CETRARIÆ (*Troches of Iceland Moss*).

Iceland moss sugar (see vol. xii., p. 827)	q.s.
Orange-flower water	q.s.

Make troches, weighing 1 gm. (15½ grains) each. Dry them, and keep them in a stopped bottle.

UNGUENTUM LENIENS (*Cold Cream*).

(Unguentum Aquæ Rosæ.)

Olive oil	360
White wax	36
Spermaceti	60
Rose water	120
Tincture of benzoin	24
Oil of rose	1

Melt the first three ingredients together on a water-bath, allow the mixture to become nearly cold, then add to it, under constant stirring, the other three ingredients.

UNGUENTUM ARGENTI NITRATIS COMPOSITUM (*Compound Nitrate of Silver Ointment*).

(Unguentum Nigrum.)

Nitrate of silver	1
Oxide of zinc	3
Balsam of Peru	3
Lard (unsalted)	24

Dissolve the nitrate of silver in a few drops of distilled water and mix the solution with 12 parts of suet. Then, having mixed the oxide of zinc with the remainder of the suet, incorporate it with the first prepared mixture, and finally add the balsam of Peru.

UNGUENTUM OPHTHALMICUM COMPOSITUM (*St. Yves' Compound Eye Salve*).

Red oxide of mercury	15
Oxide of zinc	6
Camphor	5
Oil of almonds	10
Lard	140
Yellow wax	24

Mix the oxides and the camphor intimately with the oil of almonds, then incorporate with the lard and wax previously melted together and allowed to cool.

VASELINUM (*Vaseline*).

Vaseline is a product obtained from the residue left after the distillation of petroleum.

American Vaseline is a semi-transparent, orange-yellow, odourless and tasteless mass, melting at 32°–33° C. (89·6°–91·4° F.), and having the spec. grav. 0·860. It is insoluble in water, very little soluble in cold or boiling alcohol, but is easily soluble in ether, chloroform, benzol, fixed or volatile oils.

When heated in an atmosphere of oxygen, it absorbs much of this gas, acquiring a sharp odour, and yielding, when dissolved in ether, a solution having an acid reaction.

Austrian Vaseline is almost identical, in properties, with American vaseline.

Virginia Vaseline is a greenish-yellow, odourless and tasteless mass, melting at 40°–41° C. (104°–105·8° F.), having the spec. grav. 0·900, and a denser consistence than American vaseline. Towards ether, water, benzol, etc., it behaves like the American. In strong alcohol it is somewhat more soluble.

This variety of vaseline absorbs but little oxygen, when heated in an atmosphere of the gas. Its odour is scarcely affected thereby, and if shaken, after cooling, with ether, it yields a liquid of not more than a faintly acid reaction.

Vinum Amarum Alkalisatum (*Alkaline Bitter Wine*).

(Elixir Aurantiorum Compositum.)

Tincture of orange peel (1 of orange p. and 6 alcohol	2
Carbonate of potassium	1
Sherry wine	46
Extract of gentian	1
„ centaury (lesser)	1
„ wormwood	1
„ Carduus Benedictus	1

Dissolve the carbonate of potassium in the sherry wine; add the extracts, and let the mixture stand for one day, occasionally agitating. Finally add the tincture of orange peel.

Vinum Amarum cum Spiritu (*Bitter Wine with Alcohol*).

Gentian, finely cut	4
Red bark (Indian or Javanese), in coarse powder	8
Orange peel, deprived of the white layer, and finely cut	1
Canella, in coarse powder	1
Alcohol	30
Sherry wine	200

Macerate the solids with the alcohol for twenty-four hours, then add the sherry, macerate for four days, strain, express, and filter.

Vinum Camphoratum (*Camphor Wine*).

Camphor, in powder	1
Acacia, in powder	1
White wine	44
Stronger alcohol	4

Mix them. It forms a white, turbid liquid.

Vinum Cinchonæ (*Wine of Cinchona*).

(Laroche's Cinchona Wine.)

Red bark (Javanese or Indian) containing at least 6 per cent. of alkaloid, and powdered	1
Stronger alcohol	4
Sherry wine	20
Sugar	16
Water	q.s.

Macerate the red bark with twenty parts of water, for half an hour, then strain, transfer the residue to a displacement apparatus, and pour upon it the sherry wine. Allow the percolate to pass slowly, and, when the wine has disappeared from the surface, follow it by a mixture of four parts of stronger alcohol and six parts of water. Finally percolate with water until the volume of the whole liquid amounts to fifty parts. Let this stand for a few weeks until it has completely settled, then dissolve in it the sugar, and filter.

Vinum Cinchonæ Ferratum (*Wine of Cinchona and Iron*).

(Laroche's Ferrated Wine of Iron.)

Pyrophosphate of iron (soluble)	2
Citric acid	1
Water	3
Wine of cinchona	200

Dissolve the pyrophosphate of iron and the citric acid in the water, add the wine of cinchona, and filter, if necessary.

Vinum Quineti (*Wine of Quinetum*).

Quinetum	1
Stronger alcohol	20
Sherry wine	180

Dissolve the quinetum in the alcohol and add the wine.

Vinum Pepsini (*Wine of Pepsin*).

Mucuous membrane of the stomach of the hog (or of the fourth stomach of the calf or ox) scraped off with a bone knife	20
Glycerin	10
Water	10
White wine	200
Hydrochloric acid	1

Mix the mucous membrane with the glycerin and water, and then add the wine and acid. Shake the mixture well, macerate it for three days at 20° C. (68° F.), occasionally shaking, and filter.

The product should be clear, of a yellowish colour, and should have a vinous, slightly acid taste.

Ten grams of the wine, when mixed with 10 gm. of distilled water and 24 drops of diluted hydrochloric acid, should dissolve 3·5 gm. of egg-albumen (coagulated at 80°–90° C. = 176°–194° F.), after being digested with it for ten hours at a temperature of 30° to 40° C. (86°–104° F.).

MORAVIAN RHUBARB.*

The culture of *Rheum compactum* in Moravia was commenced, in the beginning of the present century, by Prikryl, apothecary in Austerlitz. Until about twenty-five or thirty years ago the root was largely exported to Lyons and Milan, where it was used for dyeing silk. With the use of chemicals for dyeing, the price of this rhubarb receded to about 10 florins per hundredweight, but more recently has advanced again, and is about 1 florin per pound for triennial roots. This rhubarb is again largely exported, chiefly to Russia, whence it is exported again as Asiatic rhubarb. Professor Dr. A. Vogl has pointed out histological differences by which this article may be distinguished from Chinese rhubarb; but a correspondent insists that even in this respect it will resemble the latter much more closely if permitted to remain in the ground for five or six years. The commercial article is said to yield extracts, tinctures and infusions, which, not only in colour, odour and taste, but likewise in activity, compare favourably with the corresponding preparations of Chinese rhubarb. The author urges the employment of this rhubarb, partly for patriotic reasons as far as Austria-Hungary is concerned, but chiefly on account of its low price and its good effects, these being fully secured if 5 parts of Moravian rhubarb be used in place of 4 parts of the Chinese root, as was pointed out already, in 1808, by Trommsdorff.

CHLORODYNE.†

Dr. John H. Gilman, of Lowell, Mass., gives the following formula for chlorodyne, in which the ingredients are so combined as to form a perfect solution, and which can be diluted with 10 parts of water without separation.

Chloroform	fl. oz.	2
Ether (stronger)	„	½
Alcohol ("95" per cent.)	„	8
Oil of peppermint	min.	24
Tincture of capsicum	fl. dr.	6
„ cardam., comp.	fl. oz.	2
Fl. ext. of licorice root	„	2
Diluted hydrocyanic acid	„	1
Glycerin	„	16
Sulphate of morphia	grains	40

Mix in the order quoted, and shake until dissolved. Dose: 10 to 30 drops.

* From the *Phar. Post*, June 16, 1882, p. 206—209. Reprinted from the *American Journal of Pharmacy*, September, 1882.

† From *New Remedies*, September, 1882.

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FREDERICK WÖHLER.

ON the last Wednesday in September there passed away at Göttingen, in his eighty-third year, one of the most illustrious chemists that the present century has yet seen, and one who in the length of his life seemed almost to form a connecting link with a time when the science of chemistry was, comparatively speaking, still in swaddling clothes. FREDERICK WÖHLER was born in the year 1800 in Frankfort-on-the-Maine. He first studied medicine and chemistry at Marburg and afterwards at Heidelberg, where upon the advice of GMELIN he gave up the idea of practising medicine and decided to devote himself to chemistry. In 1823 he went to Stockholm and became a pupil of BERZELIUS. Famous as was the master, WÖHLER was at that time his only scholar. As to the school, two common rooms with some simple accommodation, though without furnace, ventilation or water supply, constituted a not very pretentious laboratory; but WÖHLER had been preceded there by such men as MITSCHERLICH and HENRY and GUSTAVUS ROSE and was followed by MAGNUS. One long pine bench for the master and another for the pupil; some cases against the wall to hold reagents; a mercury trough, a glass-blowing table, a sink, and a pail used in common by the household servant, constituted the furniture of one room, and the balances and other apparatus that of the other, whilst the sand-bath was found in the kitchen. Such were the surroundings where the Swedish chemist did most of his famous work and where his German pupil learned to follow in his footsteps. Late in life WÖHLER loved to recall the memories of his earlier years, and some other interesting autobiographical details of his connection with BERZELIUS have already appeared in this Journal.*

In the first few years after WÖHLER'S return to Germany he obtained some minor posts; but in the year 1836 he succeeded STROMEYER as Professor of Chemistry in the University of Göttingen and Director of the Chemical Institute; and he was also appointed inspector-general of pharmacies in the Kingdom of Hanover. His university appointments he retained until his death; the inspectorship he eventually resigned, Dr. WIGGERS being chosen as his successor. But of greater importance even than his professorial work were the numerous memoirs, reporting the results of most important and diverse researches, with which he enriched chemical literature. No less than two hundred and sixty-eight communications of which he was the sole author are enumerated in the Royal Society's Catalogue, besides thirty or forty written in conjunction with such men as JUSTUS VON LIEBIG, HENRI STE.-CLAIRE DEVILLE and others. His first paper appeared in 1821 and was upon the occurrence of selenium in oil of vitriol prepared from a Bohemian mineral. Other papers followed pretty quickly, and in 1827 he announced that he had succeeded in isolating the metal aluminum by igniting the chloride in the presence of potassium. For thirty years this work appeared without adequate result, and it was DEVILLE'S successful researches upon the preparation of sodium and aluminum that first brought this metal within the reach of the manufacturer. M. DUMAS, at a recent meeting of the Academy of Sciences, speaking of the joint work of WÖHLER and DEVILLE, said, "United by a rivalry that would have caused division between less elevated minds, these two great chemists pursued in common their researches in mineral chemistry, utilized their respective labours to elucidate points still obscure in the history of boron, silicium and the platinum metals, and remained closely bound in a friendship which increased every year." WÖHLER'S early connection with BERZELIUS would appear to have influenced the direction of his work to a considerable extent, as is shown by his numerous papers on the isolation of elemental bodies—such as aluminum, glucinium, tungsten, boron, iridium, osmium, silicium, vanadium, etc.—and on various points of mineralogical chemistry.

But, perhaps, WÖHLER'S most famous communication was that upon the artificial formation of urea, published in 1828, in which he took up the position of pioneer in the synthesis of organic compounds. Before that time the apparently distinctive peculiarity of the compounds found in or eliminated from animal or vegetable organisms had given rise to the idea that their formation was due to some special agency, to which the term "vital force" was applied, and the chemistry of organic compounds was treated as a branch of chemical science distinct from the chemistry of inorganic compounds. But the discovery by WÖHLER, that the highly nitrogenous body, urea, could be produced by the molecular rearrangement of cyanate of ammonium made the first breach in this wall of partition, and when FOWNES subsequently showed that cyanogen could be formed by the direct combination of its elements, the steps in the passage from the simple inorganic substance to the "organic" compound were complete. Since that time many other compounds occurring in animal and plant organisms have been formed synthetically, but in the words of a competent judge, M. DUMAS, "la formation artificielle

* *Pharmaceutical Journal,* [3], vi., 65.

de l'urée reste encore l'exemple le plus net et le plus élégant de ce genre de créations."

Mention might be made of Wöhler's researches in conjunction with Liebig on the benzoic compounds and on the derivatives of uric acid, as well as a number of papers on essential oils; but it would be evidently impossible to attempt in these columns to analyse the subjects of all his memoirs, and enough has been said to give some indication of their importance. Before concluding, however, a few words must be devoted to another phase of his literary and scientific work. Many of his memoirs first saw the light in the famous *Annalen der Chemie und Pharmacie,* and of that journal he was one of the principal editors from the year 1838 until the time of his death. He was also the author of several larger works, such as 'Elements of Organic Chemistry' (1831), 'Examples in Mineral Analysis' (1840), and 'Practical Exercises in Chemical Analysis' (1853), and was co-editor of the 'Handworterbuch der Chemie.'

Notwithstanding his great age, Dr. Wöhler appears to have taken outdoor exercise within a week of his death, his final illness only lasting four days.

A DENTISTS' BILL FOR VICTORIA.

A Bill for the regulation of the practice of dentistry in Victoria has been introduced into the colonial legislature. Like the British Act it is based upon the reservation of the title of "dentist" to registered persons; but although providing for the registration of persons who have practised dentistry for three years continuously immediately before its passing it contains no provision for the registration of those who have *bonâ fide* practised it "in conjunction with the practice of medicine, surgery and pharmacy," similar to that which was introduced into the British Act at the instance of the Council of the Pharmaceutical Society and has been found so useful. The Victoria pharmacists are, however, alive to the importance of the omission.

A LARGE DOSE OF EXTRACT OF MALE FERN.

The *Ceylon Observer* reports an interesting case in which a death, following the administration of an unusually large dose of liquid extract of male fern, has been the subject of a magisterial inquiry. It appears that the deceased had been for some time under treatment for tape worm, and had urged his medical adviser to relieve him as quickly as possible, so as not to interfere with his business arrangements. The prescription given, which appears in the exhibits of the case, was as follows :—

℞ Ext. Æth. Filic. Mas.		1½ oz.
Pulv. Kamalæ		3 drms.
Pulv. Granati Rad.		3 drms.
Mucil. Acac.,		
Syrup. Simp.		q. s.
Aquæ Cinnam.	ad	4 oz.

Fl. Half to be taken at bedtime and half at 2 a.m.

The dispenser left out the pomegranate root, signifying that he done so to the prescriber. After taking the first dose the patient was so distressed that he sent to the prescriber to know whether he should take the remainder and received an answer in the affirmative. He did so and the worm was expelled, but the patient became worse with vomiting and purging and died in a few hours. A certificate of death from choleraic diarrhœa was given; but in consequence of the circumstances a *post-mortem* examination of the body was made, and as a result the doctor was charged with "homicide by imprudence." The prescription as actually dispensed closely resembles one attributed in Naphey's 'Medical Therapeutics' (6th edit., p. 331) to the late Dr. William Brinton, who it is there said, "believes this superior to all other combinations for the ejection of teniæ." The dose of male fern ordered is precisely the same in both cases, but in the book it is possibly a misprint for 1½ drachms. This fact was mentioned during the inquiry and eventually the charge was dismissed.

GLUCOSE MANUFACTURE IN THE UNITED STATES.

The manufacture and consumption of glucose in the United States is assuming enormous proportions. According to Mr. Consul-General Archibald, the present production is estimated at not less than ten thousand tons daily. The product is chiefly used by brewers, but it is also largely used as a substitute for cane sugar in the manufacture of confectionery and the mixing of syrups. A product known under the name of "new process" sugar is said to be coming into increasing demand; it contains 20 per cent. of glucose, and is with difficulty distinguished from genuine cane sugar, for which it is probably sold to a considerable extent.

"CAUTIONS TO CHEMISTS."

Under the above heading we continually receive communications which have for their subject the victimization of the writers by more or less plausible impostors. In some of these the statements are so diffuse and vague that it is difficult to gather what is the exact ground of the complaints, whilst on the other hand in some the indications are so precise that it would be unwise to undertake the responsibility of publishing them without a fuller acquaintance with the facts, especially as in these cases the writers generally desire to retain their anonymity. Whilst willing to render all reasonable service to the trade, we think it will be seen that it is undesirable, except in extreme cases, for us to undertake the task of publishing such statements, and the more so because as a rule immunity from impositions can, after all, be only secured by the exercise of a proper amount of carefulness in dealing with strangers.

Pharmaceutical Society of Ireland.

ANNUAL MEETING.

The seventh annual meeting of this Society was held in the College of Physicians, Dublin, on Monday, October 2, at 4 o'clock.

The chair was taken by the President, Professor R. C. Tichborne, Ph.D.

The other members of the Society present were:—Dr. Aquilla Smith, Vice-President; Messrs. Allen, Brunker, Dr. Collins, Messrs. Doran, Grindley, Hayes, Hodgson, Holmes, Dr. Montgomery, Sir George Owens, Messrs. Simpson, Wells, Batt, Bernard, Beggs, Whitby, and McIlwaine.

The first business was the election of seven members of Council to replace the outgoing seven. Messrs. Doran, Batt, and Beggs were appointed scrutineers of the voting papers.

The President said while they were waiting for the report of the scrutineers he would say a few words as to the progress of the Society. They might congratulate themselves on having, generally speaking, a quiet and steady success. On January 1, 1881, they had 187 licentiates. On January 1, 1882, they had 201, being an increase of 14, notwithstanding that they had lost two or three by death. That increase he believed had since gone on. As regarded the number of members, there had been a slight decrease, the numbers having been 96 in 1881, and 92 in 1882. He did not attach much importance to that, because in new societies a certain number of members often put down their names at first and did not continue them afterwards. As to the Preliminary examination, the result was most satisfactory. At the present moment it appeared by the list that 275 candidates had passed the Preliminary examination, and most of those gentlemen he presumed would hereafter come forward at the examination for the licence. Besides this, the Society having agreed to accept the Preliminary examinations of other licensing bodies, the number of those who had passed their own Preliminary examination did not represent all that would ultimately seek to become licentiates of the Society. Their Treasurer would no doubt place a more or less satisfactory account before them. He understood that they had been able to lodge £100, which was a satisfactory circumstance. With respect to illegal compounding, the Society had been doing their best to put a stop to it. He firmly believed every member of the Council was of opinion that the success of the Society depended on the determination with which they carried out the law as it existed in the country. Frequently there were great difficulties in the way of carrying out these prosecutions, but they had been successful in the two they had tried this year. No doubt one of them had cost a considerable sum of money, but they did not look on the matter as one of merely pounds, shillings, and pence. They prosecuted not from any animus against individuals, but to show that they were determined, if possible, to put an end to illegal compounding. One prize had been given this year by a member of the Council to a young licentiate who competed for it. He (the President) had not seen the prize essay, but the examiner in chemistry and another gentlemen who read it had reported that it was one of the cleverest essays they had seen for many years. This was in itself a mark of progress, showing that they had amongst them young men who were likely to make a name in the scientific world.

Mr. Hodgson, Treasurer to the Society, in submitting the balance sheet for the year, said it showed that they commenced with a balance in the Bank of Ireland of £133 4*s.* 2*d.* The amount received during the year was £289 19*s.* 2*d.* That included £68 5*s.* for the subscriptions of sixty-five members. The total income for the year was £432 2*s.* 4*d.* The cost of prosecutions amounted to £29 3*s.* 2*d.*; while they received £3 for a fine imposed on one party prosecuted. He was aware that the feeling of the Society was that it was most desirable to put down illegal compounding, and there was no doubt whatever that the Council was the proper body to move in the matter; but their income was limited and law was an expensive luxury; and although many members might think that if the Council did their duty they would have had even more prosecutions, there was no doubt that if they repeated these prosecutions very often it would cost a very considerable sum of money indeed. It might, therefore, be desirable to consider whether some arrangement could not be come to by which the parties who would be benefited in the towns or districts in which the prosecutions took place would recoup the Society for the expenditure thus incurred. A sum of £100 10*s.* 5*d.* had been invested in 3 per cents. The cost of printing had been £44 7*s.* 3*d.*, and he had requested Mr. Fennell to get some estimates in connection with that department. There was an item of £42 9*s.* 2*d.* for the *Pharmaceutical Journal.* As a member of the Council he had always had the strongest possible objection to that. It was absurd to spend such a sum as a bonus in order to get £68 5*s.* for sixty-five subscribers. The final result of the present account was that they had only £17 5*s.* 11*d.* in bank, together with about £400 invested in the Funds.

The President stated that the account had been duly audited by Messrs. Allen and Hayes.

Dr. Collins moved the adoption of the account.

Mr. Wells seconded the motion, which was agreed to.

The President then announced that the report of the scrutineers of the ballot was as follows:—Dr. Aquilla Smith, 50 votes; Mr. H. Bennett, 46; Mr. J. C. C. Payne, 45; Mr. Minchin, 40; Dr. Henry Whitaker, 38; Mr. McIlwaine, 36; Sir George Owens, 31; Mr. Holmes, 29 votes; and Mr. Goulding, 20.

The President declared the first seven gentlemen duly elected to serve on the Council for the ensuing three years.

Sir George Owens said he had great pleasure in moving that Dr. Charles Tichborne be re-elected President of the Society. They were much indebted to him, and he was well entitled to any compliment that they could pay. It added honour and prestige to the Society to have for their President a gentleman whose writings were so well known.

Dr. Collins said he had much pleasure in seconding the motion, which was put by the Vice-President and carried unanimously.

Dr. Tichborne said he almost forgot how many times he had to thank them for re-electing him. He could conscientiously say as regarded whatever he did, whether it met their approval or not, that it was done with but one object and that was the benefit of the Pharmaceutical Society of Ireland. For reasons which it was not necessary to mention he accepted the Presidentship now; but he thought the time was come when they should consider whether it was not desirable to change the occupant of the office, so that it might not be a permanent position for one person. In fact, it was his intention before the next election to bring forward a notice of motion on the subject. He thanked them very much for their kindness.

Dr. Collins said he had great pleasure in proposing that Dr. Aquilla Smith be re-elected Vice-President. The same reasons applied to his re-election as to that of the President. They could not possibly have a better man, if he would do them the honour of accepting reappointment.

Mr. Hodgson said he had much pleasure in seconding the motion. They all knew how much they owed to Dr. Smith. At the time of the inauguration of the Society no one gave more talent, acumen and attention to the working out of details than he did.

The President said he had much pleasure in putting the motion. He looked on Dr. Smith as a tower of strength to the Society, and he hoped he would long remain with them.

The motion having been unanimously agreed to,

Dr. Smith said he accepted his reappointment with pleasure. He had always entertained an earnest desire to promote the interests of the Society and would willingly continue his efforts with that object.

Mr. Hayes moved:—

"That Mr. Hodgson be re-elected Treasurer."

And the motion was seconded by Mr. Simpson, and unanimously agreed to.

Mr. Hodgson said he was much obliged to them for re-electing him. It was his most anxious desire to conserve the funds of the Society with one special object, namely, that they might as soon as possible obtain for themselves a "local habitation." This object he had long had before him. Of course the Society were greatly indebted to the College of Physicians for their kindness in allowing them to meet there; but still they should remember that they were only there on sufferance and that they might at any time receive an intimation that the room was required for other purposes. If once their funds attained a certain amount he did not think subscriptions would be wanting from members in order to make up the balance of what would be required to provide its own rooms for the Society.

Mr. Holmes: I think such an arrangement would soon become self-supporting.

Mr. Brunker moved:—

"That Mr. Fennell be re-elected Registrar."

They all knew how efficiently that gentlemen discharged his duties.

Mr. Hodgson seconded the motion, which was agreed to; and Mr. Fennell returned thanks.

On the motion of Mr. Holmes, seconded by Mr. Doran, Mr. Allen and Mr. Hayes were re-elected Auditors.

On the motion of Mr. Grindley, seconded by Mr. Simpson, the Law Committee were re-elected.

On the motion of Mr. Beggs, seconded by Mr. Holmes, the Committee to visit Examinations for the Licence were re-elected.

On the motion of Mr. Brunker, seconded by Mr. Collins, the following were elected the Committee for examining certificates of candidates for the licence:—Dr. Collins, and Messrs. Brunker, Allen, Payne, Hayes and Lester.

The following were re-elected the Pharmacy Act Amendment Committee:—Messrs. Allen, Draper, Hayes, Collins, Payne and Brunker.

Mr. Hatchell Whitby moved the following resolution:—

"That a Committee of twelve members, or such other number as shall be agreed on, of whom not less than one-third or more than one-half shall be members of the Council of the Society, be appointed with a view (*a*) to inquire into and report to the Council on the best means of rendering the Society more attractive to its members; and (*b*) to consider and recommend for adoption alterations calculated to induce licentiates to become members and to improve the prospects of the Society generally."

No one could hold the opinion that the Society was in a satisfactory condition. In the year 1880 they had 187 licentiates, 78 members, and seventy-two subscriptions. In 1881 they had 197 licentiates, 74 members, and fifty-three subscriptions. Their balance to credit in 1880 was £430, while in 1881 it was only £404. The members of the Society should be offered some advantages, such as a library and room in which they could meet for the purpose of consultation. He thought some money could be saved in connection with the printing of the Calendar. From 1878 to 1880 they paid £51 for printed matter, a large part of which he supposed consisted of the cost of printing the Calendar.

The President: We have a library here which is accessible to members. It is not very extensive at present, but we hope it will grow bigger. It contains some very valuable and useful books, of which one alone is worth £10, and the value of all is about £50.

Mr. Beggs seconded the motion.

Mr. Grindley supported it, and considered that much assistance in the promotion of the objects of the resolution could be given by outsiders.

Mr. Hodgson observed that the necessity of having a nice library was an additional reason for conserving their funds. When they had £1000 in bank they would be in a position to invite subscriptions for the purpose of getting a place of their own.

In the course of discussion, Mr. Brunker remarked that the fact that prosecutions for breach of the law had been so few, was due, not to any neglect on the part of the Law Committee, but to the difficulty of getting evidence. Several places had been reported as suspected, but the Committee could not get evidence against them. Still they knew that illegal dispensing was going on. Unless members of the Society and licentiates came forward openly and above board and gave evidence, it would be utterly impossible to have prosecutions. In several houses in that city it was known that the law was broken, but they were wide-awake enough not to afford evidence of it.

The resolution was put and carried unanimously, and it was agreed that the Committee should consist of eight members, viz., the mover and seconder of the resolution, Messrs. Bernard and Batt, and four members of the Council to be named by that body.

This terminated the proceedings.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The annual meeting of the above Association was held at the Royal Institution on Septemper 28.

The members having as usual partaken of tea and coffee, the President, Mr. Michael Conroy, took the chair at 8 o'clock.

The minutes of the last general meeting were read and confirmed and the following donations announced:—'The Smithsonian Report,' from the Association; 'Report of the Alumni Association of Philadelphia,' from the Association; The *Pharmaceutical Journal*, from the Society; The *Canadian Pharmaceutical Journal*, from the Editor; and the following Reports and Transactions of local societies from the respective societies:—Liverpool Naturalists' Field Club, Liverpool Philomathic Society, Liverpool Science Students' Association, Birkenhead Literary and Scientific Society.

The Hon. Secretary then read the following report of the Council for the past year:—

Annual Report.

"Your Council, in presenting to the Association this, the Thirty-third Annual Report, trust that it may show that the Association has maintained its satisfactory position among the societies of the city.

"Ten new members have been elected; three members and one associate have resigned; but owing to the Council having removed from the list of members and associates the names of several gentlemen whose membership has, from various causes, lapsed, the totals have slightly diminished, and are—honorary members 19, ordinary members 99, associates 18; total 136.

"There have been thirteen general meetings during the session, at which papers and communications upon important and interesting subjects were read.

"The Associated Soirée, in which the Association again participated, was in every way a success. Messrs. A. C. Abraham, Conroy and Mason have been appointed delegates from the Association to the General Committee for the forthcoming soirée.

"An insufficient number of students having come forward to attend the Organic Chemistry Class, usually conducted by Mr. Davies, that class was not held, and the customary examination for the President's prize did not, therefore, take place. The attendance at the Inorganic Chemistry Class was, however, good.

"At the meeting of the British Pharmaceutical Conference, recently held at Southampton, the Association was represented by Messrs. Symes and Mason.

"Several valuable additions have been made to the Library during the session. The various periodicals have been bound up to a recent date. Three series of the reports of the Association, as complete as possible, have also been bound. One of these has been forwarded to the Pharmaceutical Society, at their request; one to the Liverpool Free Library, at the request of the Librarian; and one retained for our own Library. The number of volumes, etc., issued from the Library has been 423, and the references have been numerous.

"At the last general meeting Mr. Joseph Woodcock was elected President in succession to Mr. Conroy, who desired not to be again put in nomination, his time being too fully occupied to allow him to fill the office to his satisfaction.

"Messrs. E. Davies, R. M. Sumner, Alex. Watt, and Thomas Williams retire from your Council, their term of office expiring this evening; they are, however, with the exception of Mr. Alex. Watt (who has retired), eligible for re-election, and have signified their willingness to continue their services.

"The Hon. Treasurer's Financial Statement ashows balance in favour of the Association of £4 18*s.* 8*d.*"

The Hon. Treasurer, Mr. R. M. Sumner, then read the annual statement of the financial position of the Association, from which it appeared that although the balance in hand was not large, the condition of the Association was pecuniarily satisfactory.

On the motion of the President, seconded by Mr. Joseph Woodcock, it was resolved:—"That the report as read be adopted, and, together with a list of members and abstract of proceedings of the past session, be printed and circulated among the members."

Mr. R. M. Sumner then moved:—"That the best thanks of this meeting be given to the donors to the Library, and to the authors of papers during the session." Mr. H. O. Dutton seconded this motion, which was carried unanimously.

The following motion, proposed by Mr. Parkinson, seconded by Mr. Samuel, was also carried:—"That the best thanks of this meeting be given to the officers and Council for their services during the past session."

The election of four members of Council then took place, and Messrs. E. Davies, R. M. Sumner, T. Williams and R. Parkinson were duly elected.

There being no further business brought forward the proceedings terminated.

LEEDS CHEMISTS' ASSOCIATION.

The annual meeting was held in the Library, Church Institute, Leeds, on Wednesday, September 20, 1882. Mr. E. Yewdall, Vice-President, in the chair.

The Honorary Secretary, Mr. Hellowell, read the following reports:—

"The Committee meet you to-day under exceptional circumstances and regret to have to state that since the last meeting of the society our President, Mr. T. B. Stead, has passed away from us. In all matters connected with the trade, Mr. Stead, by his regular attendance at the meetings, unostentatious manners and judicious remarks, did much to forward its interests. Several members of the society attended his funeral, and the Committee, at a special meeting convened for the purpose, passed a resolution of condolence with Mrs. Stead and her family.

"The great depression which has affected our trade for some time and still presses upon us, having produced a feeling of dissatisfaction in the minds of some, has no doubt been the cause of the society not making any addition to the list of members and associates during the past year; but as there are indications of an improvement it is hoped that there will be more interest shown in our work and a consequent desire to join our ranks.

"The Committee have carefully considered the desirability of affording an opportunity to all those not connected with us to do so by lowering the membership fee, and the subject will be brought before you in a formal manner at this meeting.

"The society is greatly indebted to J. J. Humel, Esq., F.C.S., for a very interesting lecture 'On the Chemistry of Dye Materials used in Pharmacy,' given by the kind permission of the Governors of the Yorkshire College, in the new Technical Schools, College Road, at which there was a good attendance.

"The Library has been thoroughly cleaned, the walls and ceiling have been recoloured and whitewashed, affording a comfortable room for any of the associates wishing to consult the various excellent books of reference or to examine the specimens of materia medica in the cabinet. It has also been regularly supplied with periodicals, including the *Pharmaceutical Journal*, *Chemist and Druggist*, *Chemical News*, *Nature*, and *Science Gossip*.

"The Committee hope the associates will make a greater use of the advantages offered by such a good library so centrally situated.

"The lectures upon chemistry at the Mechanics' Institution and Yorkshire College, to which associates of this Society are admitted without any extra charge beyond the lecture fee, afford opportunities for the systematic study of this science in its various branches, and to those youths who wish to thoroughly learn the Committee strongly recommend them.

"The botany class at the College is another means by which associates can make themselves well acquainted with this subject, and if masters will allow their apprentices and assistants, wishful to attend these lectures, the opportunity of doing so, they need not ask for better opportunities of acquiring the knowledge required for them to pass their examinations."

The Treasurer's report showed a balance in favour of the Society of £8 5*s.*

The following gentlemen were unanimously elected officers for the ensuing year:—President, Mr. S. Taylor; Vice-President, Mr. J. Abbott; Honorary Secretary, Mr. J. Hellowell; Treasurer, Mr. J. A. Hirst; Committee, Messrs. T. Barrowclough, P. Jefferson, W. Manfield, R. Reynolds, F.C.S., W. Smeeton, E. Yewdall.

Mr. Yewdall proposed the best thanks of the Association be given to the Pharmaceutical Society for the gift of the Journal, also to the British Pharmaceutical Conference for the gift of the Year-Book of Pharmacy.

Mr. P. Jefferson, gave notice of alteration of a rule:—"That the annual subscription be reduced from 10*s.* to 5*s.* per annum."

BOLTON DISTRICT ASSOCIATION OF CHEMISTS AND DRUGGISTS.

The annual meeting of the above Association was held at the Commercial Hotel, Town Hall Square, at 7·30 p.m. on Tuesday evening, September 19, when upwards of twenty-five members with a few friends sat down to an excellent dinner. After the removal of the cloth the usual loyal and patriotic toasts were given, and the following report of the Committee was read by the Secretary, Mr. W. B. Mason, F.C.S.—

"In presenting the members of the Association with a report of the work done during the past session, your Committee congratulate the Association on the increase of the numbers now on the books. During the year the rules have been revised, and assistants and apprentices are now admitted on payment of a small annual subscription. By this slight alteration the numbers of the Association have been increased by ten, making a total of forty members. In consequence of the Association not meeting until March of the present year, there have been no general unions for the discussion of trade topics, but your Committee trust that during the winter a series of evening meetings will be held as often as is deemed convenient. The wants of the younger members of the trade have not been neglected, the room kindly placed at the disposal of the Association by Mr. Priestley having been furnished with a very complete collection of materia medica and botanical specimens, which your Committee hope ere long will be materially augmented by a donation from the Pharmaceutical Society. Arrangements have been made for a series of classes during the winter months in the subjects of the Minor examination to which your Committee hope the attention of the apprentices will be directed."

The report having been received and adopted, the meeting then proceeded to the election of officers for the ensuing session, after which Mr. W. Blain, the President-elect delivered his annual address, urging upon chemists the necessity of united action, more especially with regard to the education of apprentices. After pointing out to the members the courses of lectures arranged for the coming winter, especially thanking the wholesale houses who so kindly contributed to the materia medica collection, the President concluded by appealing to the members of the Association on behalf of Mr. Buott, a gentleman who formerly greatly interested himself in Bolton chemists, but who now unfortunately is in great distress.

As a direct result of this appeal it may be stated the sum of 24*s.* 6*d.* was subscribed, and has since been forwarded to Mr. R. Hampson.

The remainder of the evening was occupied with recitations and songs, and a most successful meeting brought to a close with the National Anthem.

YORK CHEMISTS' ASSOCIATION.

A meeting of the above Association was held at 9, High Ousegate, on Friday evening the 29th ult.

Mr. Councillor Dawson presided, and the following officers were elected:—President, Mr. Dawson; Secretary, Mr. Scruton; Treasurer, Mr. Sawray.

A committee was appointed to make arrangements for meetings and lectures during the winter months.

It was also decided that a room should be engaged at the above address where the books and specimens belonging to the Society will be available for the use of the assistants and apprentices connected with the trade.

PRESTON CHEMISTS' ASSOCIATION.

At a meeting of this Association, the prizes and certificates gained by the students in the science classes last session were distributed by Mr. J. Scott, Vice-President, who congratulated the students on their success, and hoped the ensuing session would be equally satisfactory.

Proceedings of Scientific Societies.

BRITISH ASSOCIATION.

Gas Burners.*

BY WILLIAM SUGG, A.I.C.E.

Coal gas, as now supplied to the public, consists of hydrogen and marsh gas to the extent of about 80 per cent., and the remainder consists of luminous hydrocarbons of various qualities, with traces of sulphur in the form of disulphide.

The gas supply of London is watched over by a Commission, appointed by the Board of Trade, called gas referees, who are Professor Tyndall, Professo Vernon Harcourt, and Mr. Pole. They are empowered to prescribe the manner of verifying the illuminating power and purity of the gas, and they have also authority to act in cases of dispute in public lighting. Their prescriptions, as emanating from the only legal body of the kind in the kingdom, are accepted as the proper methods, so that in effect, though they are appointed in London, they may be said to be gas referees for the whole kingdom. But the use that is made of gas is a matter which is altogether out of the control of gas companies and their engineers, and here the proverb about food and bad cooks may be paraphrased. The great hindrance to the improvements in the use of gas has been the general public themselves, who have not taken sufficient interest in the kinds of apparatus employed, but have, as a rule, supplied themselves with the cheapest burners, stoves, and other apparatus, utterly regardless of the waste and annoyance which this system entailed; and when they have complained, they have always attributed the causes of failure to the quality or pressure of the gas, instead of ascribing it to the true cause.

In 1871, the gas referees made an examination of a number of gas-burners which they had collected from various large establishments, newspaper offices, warehouses, shops, and dwelling-houses, and they found that those burners (samples of those generally employed by the public) would only give about one-half the light that the gas was capable of yielding per cubic foot consumed, and several of the burners tested by them gave only one-fourth of the proper light of the gas.

They say in their report to Parliament:—"The economy to the public, arising from the use of good gas-burners instead of bad ones, is so obvious as hardly to need remark. The gas rental of London amounts annually to more than two millions sterling. Taking a very moderate estimate, upwards of one-fourth of this sum (£500,000 per annum) might be saved by the use of good burners. This is the saving which might be made in London alone; how much vaster the sum thus economized if good gas burners were to come into general use throughout England."

Now, the quantity of gas used in London last year, according to the analysis of the London Gas Companies' accounts, prepared by Mr. John Field, was in round numbers, 20,230,000,000 cubic feet, which is equal to a bulk of 1 mile square × 726 feet high, and its cost to the public was £2,911,000.

The result of careful trials, made with a number of burners taken lately from private houses and shops, shows that, as a rule, the amount of light obtained by the general public, from five cubic feet of gas, is less than one half of that which it is capable of giving. The iron and metal burners, of which a great many are used, give the best result in light when they are worn out, although the shape of the flame is bad. The reason why, is that in order to obtain from what is a compound of hydrogen, marsh gas, and carbon, its best effect in light, the burner must be so made that the quantity of gas required to be consumed is proportionate to the size of the burner, so that it cannot exceed the maximum quantity which the burner is made for. Then the outlet of the burner itself, whether it be of the Argand or the flat-flame form, must be so arranged that the gas issues forth at a sufficiently low rate of velocity, so that it has time to get heated to a proper degree by the hydrogen and marsh gas before it comes into combustion with the oxygen of the atmosphere. When this rate of velocity is obtained in an Argand burner, the pressure at the point of ignition is almost *nil*. In flat-flame burners the pressure of the gas must be raised to a point sufficient to blow out the flame to a fan-like shape, but it must only be sufficient to do this if it is desired to obtain a good result per cubic foot of gas consumed.

One more point is of great importance in the construction of a gas-burner—that is, that the gas should

* Abstracted from a paper read before the Mechanical Section of the British Association, at Southampton. Reprinted from the *Journal of the Society of Arts.*

not be heated until it arrives at the point of ignition. The body of the chamber below the point of ignition must therefore be made of material which is a bad conductor of heat; so as not only to prevent the undue expansion of the gas before it arrives at the point of ignition, but also to maintain the heat in the flame.

Sir Frederick Bramwell very ingeniously pointed out, some time since, that the important point in the proper combustion of gas is not so much to keep the gas cool as to keep the flame hot. The distinction is extremely subtle; but, nevertheless, a non-conducting gas-chamber performs both these important functions. If a gas-chamber made of metal or any good conductor of heat is used, then the gas becomes expanded in bulk, and the velocity of the issuing gas is greatly increased; less time being given for chemical combinations necessary to produce a proper amount of light from it. In addition to this, as Sir Frederick Bramwell has pointed out, the heat which should remain in the flame is conducted away from it into the lower fittings of the burner, where it may burn the fingers of the incautious consumer, but it is of no manner of use in the evolution of light.

You will, perhaps, say it is not possible to conceive how the flame can be kept hot without keeping the gas cool at the same time, because if the heat is to be kept in the flame, and not conducted away down the stem of the burner, the gas must be kept cool by the means employed. But, nevertheless, there is a difference in the effects produced, and the ingenious definition of Sir Frederick is scientifically accurate. As an explanation of the expansion theory, it may be stated that if 1 cubic foot of gas is heated to about 500° F., it will occupy the same bulk that 2 cubic feet do at the mean temperature of the atmosphere. Now, supposing it is issuing in a cool state from the aperture of the burner at a velocity equal to 1½ mile per hour, it must then issue at 3 miles per hour, if the rate of consumption is equal in both cases. Therefore it has only half the time in the heated state to combine with the oxygen of the air that it had in the cooler state, and a loss of illuminating power is the result. Again, as regards the maintenance of the heat in the flame; supposing the chamber from which the gas issues is a conductor of heat. In this case the heat from the flame is conducted away from it down the stem of the burner, expanding the gas and leaving the flame so relatively cooled, as to require more gas to raise it to the necessary state of incandescence to allow the oxygen to combine with it in the proper proportions. In this case, as the two operations are simultaneous, it is difficult to apportion the effect produced. But that the effect is produced is proved by the following experiments, made some time since by the late Mr. F. J. Evans.

Two Argand burners were made precisely alike in every respect, except that one had a combustion chamber made in steatite, and the other in brass. The same quantity of gas was consumed through both of these, the result being that the burner with the non-conducting chamber gave more light per 5 cubic feet of gas consumed than the other, the proportion being as 15 candles to 13. The burner with a non-conducting chamber was quite cool immediately below the chamber, while the other was so hot that it could not be touched without burning the hand. The metal burners which are now used in enormous quantities in London and the provinces become exceedingly hot, so much so as to communicate the heat to a considerabe distance down the fittings. The velocity of the issue of 5 cubic feet per hour of gas from these burners, varies from 10 to 60 miles per hour. The worn-out burners generally give the lowest velocity. As a rule, the metal burners give the lowest result in light per cubic foot of gas consumed.

For example, a metal burner of the flat-flame type, which has been stated in the columns of the *Journal of Gas Lighting* to be identical with the steatite hollow-top burner, invented in 1868, gives the following results:—A large-sized burner, No. 8, burning 5 cubic feet per hour, gave a result equal to 11·5 candles, whilst the result obtained with a like quantity of gas from a steatite burner of corresponding size, which has a non-conducting gas-chamber, was 14·6 candles, a difference in favour of the steatite of 3·1 candles, or nearly 25 per cent. more light. Another metal burner, of a size more generally in use by the public, only gave 6·2 candles for the 5 cubic feet, or considerably less than half the latent value of the gas, which was 16 candles.

The fact of the difference of illuminating power, with like quantities of gas, clearly shows that the two burners are not the same by any means. The statement gravely made in the columns of the *Journal of Gas Lighting* that they are identically the same, clearly shows that if this is the belief of the gas trade generally with respect to these two burners, it is no wonder that the public, who rely on the recommendations of the trade, continue still to waste their gas in the manner pointed out by the gas referees in 1870 and 1871.

As before stated, careful tests of a collection of burners, bought from different gas-fitters and ironmongers in various towns in England, and from their recommendations, prove that the knowledge of the proper use of gas possessed by those persons is still most incomplete, and, therefore, the general public continue still to burn gas in the same wasteful manner as they did when the gas referees made their report.

The remedy for this enormous waste of gas is in the hands of the public only. Gas producers whether they are corporate bodies or public companies, are almost powerless to oppose the vested interest which derives large profits from the sale of gas-burners constructed with a view to require frequent renewals. It is only fair to say that the producers of gas have always shown the greatest interest in the improved use of gas in every way; but the speculating builder and his colleague, the local plumber and gas-fitter, hold a final power for evil over the employment of gas, which, till very lately, has been paramount.

Happily for the gas interest, the general public are beginning to take a deep interest in gas, and are acquiring a great amount of information concerning it, through the numerous gas exhibitions which have been held under the auspices of gas companies and corporate gas committees throughout the kingdom, and it is to be hoped that the forthcoming exhibition at the Crystal Palace, in October next, will very largely aid the good work of instructing the public how to use gas to the best advantage. Thus we may hope that soon the ring of interests inimical to the progress of gas will be broken through, and fresh encouragement given to the inventors of improvements in the use of gas. It will be impossible, in the limits of this paper, to give you a complete idea of all the improvements which have been, and are still being made; but I propose to indicate the direction they are taking, and give you a general idea of what they are.

It has been found that a comparatively large quantity of gas, about four to six times that ordinarily used, will give a much better result from one burner per cubic foot of gas consumed than can be obtained from four or six separate burners consuming the aggregate quantity of gas equal to that consumed by the large one; and this is true of both Argand and flat-flame burners. This is by no means a new idea; it was known to Faraday and others before him. I have in my possession an old burner made many years ago; it has several rings and a silver top drilled with very fine holes. The quantity of gas used is large—the effect is small—in fact, it is more useful for boiling water than for giving light. But this old burner is a type of the large Argands of twenty or thirty years ago. They did not succeed, because although they produce a great amount of light, it was at the cost of too much gas. Modern Argands will produce just double the amount of light for the same quantity of gas.

There is also incorporated in some of the newest burners now before the public an idea which was originated by Professor Frankland more than ten years ago, viz., that if the air for combustion supplied to a burner be heated before it arrives at the point of ignition, a much better result per cubic foot of gas consumed can be realized. This you will perceive is a mode of carrying out Sir Frederick Bramwell's idea of keeping the flame hot, and undoubtedly a better result can be obtained. This burner, although it did not come much into use, has very lately been repeated, and is now being sold on the Continent. The burner is so much like Dr. Frankland's that there is no difficulty in recognizing it at once.

Of the modern Argands, there are now several kinds; one is made with two or three concentric rings of flame and a glass chimney, and is made with non-conducting steatite gas-chambers, and apertures permitting the gas to issue under an almost inappreciable pressure at the point of ignition, the velocity per hour being only about 1½ mile. In this kind of burner the gas is kept cool and the flame hot. These were first used in the public lighting of Waterloo Road, in 1879, and in Waterloo Place and Queen Victoria Street.

Another kind, of newer type, is made on the theory of keeping the flame hot by making use of the products of combustion to heat the air-supply. This also combines the low velocity of emission theory, and likewise heats the gas itself. It is made by inverting the flame of the burner, the heat generated by the products of combustion being carried away by a concentric flue, fastened round the burner, through which metallic tubes convey the air necessary to produce combustion, which thus becomes heated.

A third is constructed on the principle of keeping the flame hot and the gas cool, but has besides an arrangement for admitting separate currents of cold air round the flame, for the purpose of keeping the chimney cool. It was important to observe that, although this burner does not warm the air admitted to it for promoting combustion, yet the results per cubic foot of gas consumed are stated to be as high as any of the others, showing clearly that there is no advantage in heating the gas before combustion. As to the advantage obtained by heating the air, the practical effect upon an Argand suitable for use by such ordinary unskilled labour as is usually employed to look after gaslights, has not yet been clearly demonstrated; although it is without doubt a great advantage to burners of the flat-flame type, because these have always too much cold air supplied to them.

The Argand, with its more complete regulation of air and its immunity from the effect of surrounding cold air, is able to evolve from 15 to 30 per cent. more light per cubic foot of gas consumed than can be obtained from the best flat-flame burner; but, although the general public have no objection to glass chimneys in paraffin and other oil lamps, they do not appear to look with favour upon the general employment of glass chimneys for gas-burners, no matter how much better the result to be obtained. I need not say that the cordial support of the ring inimical to the true interests of gas is given to the public on this point, and a great deal of very strong literature condemnatory of the Argand burners has been widely disseminated. But it is impossible, in the face of the improvements which are continually being made in gas-burners of the Argand type, to believe otherwise than that they are destined to play an important part in the gas-lighting arrangements of the future. The improvements in the flat-flame burners, though not producing such high results as those obtained from large Argands, are great, and, concurrently with improved lanterns, have placed the lighting of the public streets on a much improved footing. Here, again, about three times the amount of light per cubic foot of gas is obtained from the use of large burners than with the old-fashioned small ones. The consumption of gas by the large ones is only equal to the aggregate consumption of four or six smaller burners. In addition to this, the improvements in the reflecting tops of the lanterns make the new lamps still more effective, and may fairly be said to double the effective power. In internal lighting, the progress of gas has been very considerable of late years. Small burners for rooms have been greatly improved. For large rooms and theatres new kinds of sun-burners are made, to give three times the amount of light obtainable from the old ones, and to ventilate the buildings at the same time.

One of the greatest advantages of gas is that the heat generated by the combustion can, if properly applied, be made to do the work of ventilation, and it is in this direction that the future progress of gas-lighting lies. There are many ways of utilizing this heat; some are extremely easy to put into practice, others require more preparation. Among the simplest, is the method of ventilating rooms by the fish-gill ventilator, invented by the late Goldsworthy Gurney. It consists simply in covering an opening made in the wall with strips of calico fastened across the hole by tacks put into the two upper corners of each band. The bands are made just long enough for the lower part of the superior band to cover the top part of the inferior one. When fixed properly, they open like the gill of a fish, hence the name. They can be used to let in fresh air, or carry off heated air from the top of a room.

These useful and simple ventilators, if employed in rooms where gas is used, would tend greatly to the comfort of the public who require a good light, but complain of the resulting heat. They work when closed by diffusion, the heated air passing through the porous medium of the calico, and the cooler air from outside the rooms passing in without draught. For the ventilation of ballrooms it is very easy to put into the windows a frame fitted with muslin or washed calico of half or even the full size of the window. Ventilation will thus take place by diffusion, and the draughts and danger resulting from incautiously-opened windows will be avoided. If the wind blows hard on this opening, it may be protected by a loose curtain of muslin or calico hanging in front of it.

You will perceive, therefore, from what I have said, that the progress of invention in gas lighting is great and continuous, and that in the future, if the public will only interest themselves just sufficiently to obtain a moderate amount of information on the subject of gas, they will be enabled to use it with great economy and comfort to themselves in every way. The facile manner in which gas can be employed to produce the light of a rushlight or the blaze of a thousand candles by the mere turn of the wrist, joined to the readiness with which it can be conveyed to great distances without any practical loss, will always ensure a large and growing demand for it everywhere.

But it must be remembered that its extreme adaptability renders it capable of being used with the most crude apparatus as well as the most perfect; and when we see in the public streets the blazing pipe and shovel, a rough but powerful burner of from 100 to 600 candles power, rigged up in a few minutes by a navvy, we must not be surprised at the prevalence of crude apparatus of smaller dimensions put into practice by the public, who are not aware that they can do better with a more perfect burner.

Parliamentary and Law Proceedings.

Suicide of a Chemist and Druggist.

On Saturday, October 7, the Deputy Coroner for Bristol, Mr. E. M. Harwood, held an inquest at 51, White Ladies Road, on the body of John Facey, aged 42. Deceased, who had been carrying on business as a chemist and druggist at the above address, was found dead in a bathroom early on Saturday morning, under circumstances which led to the belief that he had committed suicide.

John William Newhill, an assistant to the deceased, said that he had known him for about two months, and during that period he had noticed that he appeared very ill at times. Witness did not think he was satisfied with his business with regard to the amount of money he had paid for it and the returns. Any person who understood the business could be of no other opinion. Deceased was married on September 6, and witness had every reason to believe that he lived very happily with his wife. He had at times spoken to witness about his business affairs, and complained that his returns were not in proportion to the money he had paid for the concern. Witness believed that he paid £750 for the business, but there was a stipulation that he was to pay £26 in addition to that sum if the returns came up to £800 in the first year. As Mr. Facey's assistant, witness was satisfied that the returns were not adequate, and that if the deceased had kept the establishment up and conducted it as it should be he would lose £150 a year by it. For the first few weeks when witness was there deceased was very irritable, and complained very much about the price he had paid; but latterly, although he complained occasionally, he did not appear so much irritated. Deceased left the shop about half-past six o'clock on Friday evening, and witness did not see him again alive.

William Player, brother-in-law to the deceased, said that on going into the bath-room he found the deceased laying on the floor quite dead, with a little bottle by his side.

Mr. Player, M.R.C.S., said that he was called in by the last witness to see the deceased, who was then dead, death having taken place some hours previously. The bottle produced, which smelt strongly of chloroform, was found by his side and on making inquiries in the shop witness found that about an ounce was missing. A handkerchief which had been saturated with chloroform was spread over his face, the effects of which would alone, he thought, have been sufficient to cause death. That afternoon he found in the left hand pocket of his coat a small bottle perfectly empty, which had contained about an ounce of prussic acid. Deceased smelt very strongly of prussic acid, and witness's theory of the affair was that he took the prussic acid first and then threw the handkerchief saturated with chloroform over his face to deaden the pain.

The Jury were of opinion that deceased was not in his right mind at the time, and returned a verdict to the effect that he committed suicide whilst in a state of temporary insanity.—*Western Daily Press.*

Review.

Pharmakognosie des Pflanzenreiches. [Pharmacognosy of the Vegetable Kingdom.] By F. A. Flückiger. Second Edition. Parts I and II. Berlin: Rudolf Gaertner.

Any work on pharmacognosy by the surviving author of the classic 'Pharmacographia' demands and is sure to secure the attention of all interested in materia medica. The work which is the subject of the present notice is a portion of what is nominally a second edition of a manual dealing with the natural history of the more important medicinal substances of vegetable origin, published by Professor Flückiger in 1867. But it is in reality a new book. Since 1867 'Pharmacographia' has appeared, and an enormous number of books and scattered memoirs upon allied subjects have been published, which required to be taken into account in order to bring such a work abreast of the times. How thoroughly this has been done is proved by the fact that the second part contains in several places information that has only been published since the issue of the first. Naturally the 'Pharmakognosie' has points of resemblance to the 'Pharmacographia,' and it includes most of the information contained in that work; but it is not merely 'Pharmacographia' in a German dress and indeed it presents some striking differences.

Probably the first feature that will catch the eye is the arrangement. As is known, in Flückiger and Hanbury's work the different articles of materia medica are arranged under the botanical orders to which the plants belong from which they are derived. In the 'Pharmakognosie,' however, this arrangement does not obtain, and, for reasons hinted at in the preface, the plan is adopted of classifying mainly in respect to the physical characters of the crude drug. As the whole of this scheme of classification will not be disclosed before the appearance of the third and concluding part, it will be premature to criticize it now, further than to say that as far as it goes the different substances described fall fairly well into the different classes and sub-classes in which they are found, though some curiosity is justifiable respecting the ultimate lot of some that are not yet dealt with. This feature is sufficiently interesting and important to justify a brief indication of its character.

The *First Class* includes "Vegetable Substances without Organic Structure," and it is subdivided into—"varieties of gum," "sweet exudations," "resin mixed with gum," "resins mixed with ethereal oils and gums," "resins with ethereal oils," "resins," "balsams" (aromatic acids, alcohols and ethers mixed with resin), "ethereal oils," "milky juices," and "extracts." The *Second Class* includes "Organized Substances," and is subdivided into—"substances in powder," "galls," and "vegetable organs not in the powder form," the last being an important subdivision, commencing towards the end of the first part and going entirely through the second.

In the subdivision of the First Class devoted to gums there are articles on gum arabic, Senegal gum, and tragacanth gum, and one in which the less important varieties of gums are briefly summarized. This subdivision well illustrates one of the features in which this work differs from 'Pharmacographia,' that it is written more specially for the German pharmacist, the article on Senegal gum, which in the English work only extends to ten lines, extending over three pages in the 'Pharmakognosie,' in accordance with the relatively greater importance of that gum on the Continent. Manna is the only representative of the "sweet exudations," and gamboge of the gum resins. The "resins mixed with ethereal oils and gum" are myrrh, olibanum, asafœtida, galbanum, and ammoniacum. The oleo-resins described are common, Venetian and Strassburg turpentines, Canada balsam, Burgundy pitch, elemi, and copaiba and gurjun balsams. Chian turpentine, which in 'Pharmacographia' occupies two pages, is, notwithstanding its recent resuscitation, left out in the cold, being only casually mentioned. Then come the "resins," which are colophony, sandarac, dragon's blood, guaiacum, mastic, and benzoin; but jalap and scammony resins are dealt with under their respective roots, and podophyllum resin and root are omitted. Next come the true "balsams," liquid storax, Peru and Tolu balsams. A subdivision of "essential oils" follows, but this only includes camphor and oils of cajeput and rose. By the way, in 'Pharmacographia' it is said that rose oil itself is no longer exported from Persia, and this is also implied in a statement in the 'Pharmakognosie' that it is only prepared for purposes of export in the districts south of the Balkans. But according to Douglas (*Pharm. Journ.*, [3], viii., 811), who is quoted as an authority by Professor Flückiger, "the greater part of the large quantities of rose oil consumed in Western and Northern India is imported to Bombay from Persia." The last two subdivisions in this class are tho "milky juices" (opium, euphorbium, and lactucarium) and the "extracts" (aloes, liquorice, kino, catechu, and gambier).

It will be seen from this outline of one of the principal divisions that although the arrangement has some disadvantages,—as, for instance, sometimes the wide separation of drugs derived from the same plant or closely allied plants,—it has the merit of bringing together substances resembling each other in some of their characters, and thus facilitating their study by comparison.

As previously mentioned, the whole of the second par- is taken up with a portion of the "non-pulverulent" subdivision of the Second Class ("Organized Substances"); this includes "roots," "rhizomes," "stems," "barks," and "bulbs." But the series of "subterraneous or partially subterraneous parts of plants" does not include the roots of *Actæa racemosa*, *Cochlearia Armoracia*, *Atropa Belladonna*, *Helleborus niger*, *Hemidesmus indicus*, *Chondodendron tomentosum* (or *pareira brava*), or *Ferula Sumbul*, or the corms of *Colchicum autumnale*. The woods are guaiacum, quassia, and red sandal (neither the wood nor the oil of *Santalum album* appears). In the subdivision devoted to barks the most important article is that on cinchona bark, which might indeed aspire to the position of a monograph on the subject. It is carefully brought up to date, including the latest information as to the origin of cuprea bark. We notice, however, that Professor Flückiger states that it is not established whether quinine sulphate crystallizes with 7 or 8 molecules of water, or a quantity lying between; in this he ignores the work done upon this subject by Cownley in 1876 (*Pharm. Journ.*, [3], vii., 189), from which it appeared that the freshly prepared quinine sulphate contains 7½ molecules of water of crystallization, but that when freely exposed to the air it effloresces rapidly until the proportion is reduced to 2 molecules, when it remains constant.

Although the possession of 'Pharmacographia' renders English students of materia medica practically independent of the work under notice, its publication is decidedly a valuable acquisition to German literature on the subject.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Poison of the Stinging Nettle.

Sir,—In his lecture on the "Irritating Effects of Stings," reported in your last issue, Professor Vogel says:—"The irritating action of stinging nettles and other similar vegetables depends on formic acid." The same statement is frequently made in botanical textbooks. Can any of your readers refer to definite analyses from which it is deduced? Is it not a fact that the irritant fluid of the common stinging nettle always has an alkaline reaction? If this is so, it is difficult to reconcile with the presence of free formic acid.

St. Thomas's Hospital. ALFRED W. BENNETT.

The Keeping of Leeches.

Sir,—In reply to Mr. Baker, permit me to say that although both *Planorbis* and *Limnea* were present in my tank as well as *Paludina*, I have no hesitation in saying that the ova was that of the leech. A friend who is a noted naturalist, was of opinion, when first he saw them, that they were the ova of *Limnea*; but they agreed so very minutely with the description of the leech ova, in the original edition of Pereira, that I felt convinced my friend was wrong, and after watching every stage of their development, I had the satisfaction of proving to him that my opinion was the correct one, and for months I had a supply of leeches in every stage of development; they were seen by several gentlemen who were well qualified to form an opinion, so that there can be no possible doubt about the matter. I shall be glad to know if any other "keeper of leeches" has previously noticed this; those who are interested will find a very full and interesting account of the leech in the original edition of Pereira, vol. ii., part ii., pp. 2185, *et seq.*

131, *Embden Street, Manchester.* J. HART.

Presence of Organisms in Solutions of Inorganic Salts.

Sir,—The interesting paper on this subject communicated to the Pharmaceutical Conference by Mr. Bothamley reminds me of a discussion on the same subject, which took place here and which may be of some interest in conjunction with Mr. Bothamley's paper.

In November last Mr. C. A. McPherson, of this city, brought before the Assistants' Association several samples of fluid magnesia containing a green deposit; this was shown by Mr. Boa to be composed of unicellular organisms, spherical in form and containing chlorophyll granules. It appeared identical with an alga which I had seen in laboratory magnesic sulphate solution. Mr. McPherson mentioned that it had developed in fluid magnesia obtained from various houses, and that the development took place in white flint glass bottles and not in those of blue glass. I have three of the samples still beside me; all of them have a heavy deposit of magnesic carbonate, in one bottle the crystalline mass is quite green, and the others show the organisms round the edge of the bottom. This is the only instance I have yet observed of the development of the organism in fluid magnesia.

One of the samples contains traces of ammonia and phosphoric acid. Sulphuric acid is also present to a small extent.

I agree with Mr. Bothamley that the organism is more like a species of *Chroococcus* than *Protococcus*; those which I have observed are non-ciliated and appear to multiply by cell division.

Should Mr. Bothamley continue his investigations it would be advantageous were he to direct his attention to the influence which blue light rays may have in retarding the development of the organism.

PETER MACEWAN.

Pharmaceutical Society's Rooms, Edinburgh.

G. E. Post.—We hope you will be able to renew your work eventually, and do not propose to make any alteration in the supply of the Journal at present.

T. J. Wilkes is recommended to devote his attention to the study of the principles underlying chemical reactions rather than to attempts to represent what takes place by diagrams.

F. W. Richardson.—*The Rainband in the Spectroscope.*—A very interesting communication upon this subject, from Professor Piazzi Smyth, will be found in *Nature*, October 5, p. 551. After premising that the slit should be narrowed down almost to extinction, and the eye-piece focussed carefully, Professor Smyth gives the following instructions:—"Observe always low down near the horizon, for atmospheric effects in the spectroscope are there nearly twenty times as strong as in the zenith. Get an opening between clouds if you can to observe through. Prefer that the sun itself shall be angularly distant from your observing direction; and behind a cloud also, if possible, at the instant, so as not to illumine the motes in the air of your neighbourhood with its high altitude light. Especially avoid the minutes of sun-rising or setting, for that act, or rather position, brings certain of the dry gas bands into a short-lived maximum of intensity, without any other signification than that the sun *is* then on the horizon. But good observations may often be taken through falling rain, though not through falling snow, and also between the earth and the under sides of the clouds, if they entirely shut out all view of the air of the heavens beyond them."

J. D. Lawton.—Probably *Solanum Dulcamara*; send a flower.

X. Y. Z.—(1) *Achillea ptarmica*; (2) *Artemisia Dracunculus*; (3) *Scrophularia*: send leaves if you wish to know the species.

H. S. C.—See *Pharm. Journ.*, [3], x., 603.

"*Minor.*"—The employment of iodoform in what appears to be large quantities has been advocated recently by several medical writers. We do not think that the propriety of such treatment can be advantageously discussed in these columns. But it may be remarked that it would be as well for prescribers to remember that the intensity of the action would probably depend to some extent upon whether the compound is brought into contact with the diseased surface in a finely divided condition or in scales.

An Associate.—Your question can only be answered by the result of experiments which you are recommended to carry out for yourself.

J. T. Hall.—(1) *Galium verum*; (2) *Ulva latissima*; (3) *Gigartina mammillosa*; (5) *Porphyra vulgaris*.

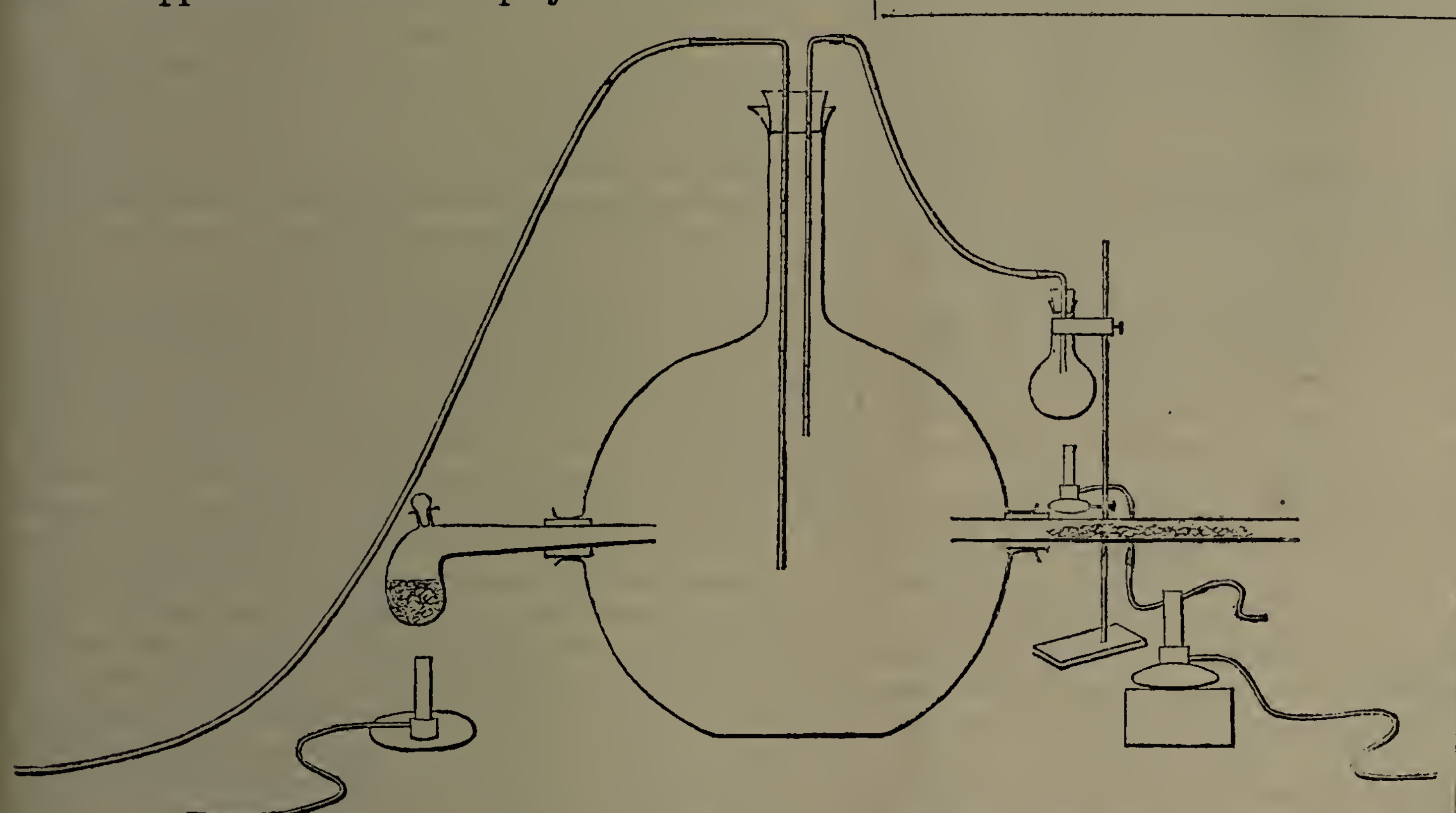
COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Lawton, Modlen, Candy, Woodland, Ward, Agricola, Fritz.

AN IMPROVED APPARATUS FOR ILLUSTRATING THE MANUFACTURE OF SULPHURIC ACID.

BY ALFRED SENIER,
Lecturer on Chemistry in St. John's Training College, Battersea.

The forms of apparatus described in chemical works for the purpose of illustrating the sulphuric acid manufacture experimentally very generally involve the logical error of taking the full quantity of sulphuric acid to begin with. This is to be avoided for educational reasons. There are, however, some exceptions to this general rule, and notably the apparatus recommended by Roscoe and Schorlemmer,* in which they employ sulphur burned in a current of air as the source of sulphurous anhydride. The apparatus here suggested is simpler and more easily constructed than that of Roscoe and Schorlemmer, and employs burning sulphur as a source of sulphurous anhydride. While, therefore, it is to be preferred to the best form of apparatus hitherto suggested, it is an important advance upon the methods generally recommended and employed in teaching. I have myself used the apparatus for several years.

The following drawing illustrates, in outline, the form of apparatus which I employ:—



Through a cork in one neck of the flask (of about a gallon capacity) is passed the neck of a small retort, containing nitre and sulphuric acid; through a similar cork in the opposite neck is passed one end of a piece of combustion tube, containing fragments of sulphur, and open at both ends; through the cork at the mouth of the flask are passed two tubes, one connected with a small flask, in which water is boiled, and the other connected with an aspirator,—preferably a gasholder full of water. Some of the sulphur in the combustion tube is heated to just above its melting point, when it ignites on a gentle current of air being caused to flow over the sulphur into the flask by means of the aspirator. Once started, the sulphur continues to burn by the heat of its own combustion, so long as the current of air is maintained. If it is wanted to introduce air it can be done easily without an extra tube, by stopping the aspirator a minute, when the burning sulphur is extinguished, and cooling below its ignition point, a flow of air passes over it through the combustion tube when the aspirator is again turned on. The sulphur can again be raised to the ignition point by momentary application of the Bunsen flame. In other respects, the mode of working is sufficiently obvious.

* 'Treatise on Chemistry,' vol. i., 322.

THE EXAMINATION OF BALSAM OF PERU.*

BY O. SCHLICKUM.

The author reports the results of a number of experiments having for their object the facilitating of the examination of balsam of peru for adulterants and the quantitative determination of these when present. As materials he used five guaranteed samples of balsam obtained at different times from different sources. The possible adulterants particularly investigated were castor oil, copaiba balsam, purified storax, an alcoholic solution of benzoin brought to the consistence of a balsam, and a similar solution of colophony. Before proceeding to methods of investigation the author makes the following remarks on the specific gravity and the free acids of peru balsam.

The specific gravity is a very important criterion of unsophisticated balsam. All the other substances above mentioned possess a lower specific gravity than the true peru balsam. The highest of the five specimens examined by the author was 1·148 and the lowest 1·142. Any sample of peru balsam having a specific gravity lower than 1·135 may therefore be regarded as adulterated. The specific gravity of castor oil and of copaiba balsam is in each case under 1·00, that of the former varying between 0·95 and 0·97, and that of the latter between 0·94 and 0·99. The specific gravity of the purified storax, which was obtained as a brown transparent balsam by extracting liquid storax with alcoholic ether and evaporating the clear filtrate, was determined as 1·090; that of the colophony solution as 1·016; and that of the benzoin solution as 1·080. These are all considerably below the specific gravity of the true peru balsam, so that an addition of one of them would markedly lower its specific gravity. For instance, an addition of 15 per cent. of benzoin solution to peru balsam, specific gravity 1·146, lowered the specific gravity to 1·135. The author prefers to use the pycnometer in determining the specific gravity of the balsam. The plan recommended by Hager, of observing whether a drop of balsam floats or sinks in a saline solution of known density, he considers to be defective, as the behaviour of the drop is affected by the conditions under which it reaches the surface of the solution.

The author does not consider that the estimation of the free acid constitutes such a good criterion as the specific gravity. The five genuine samples of peru

* Abstract of a paper in the *Archiv der Pharmacie*, [3], xx., 498.

balsam required from 5·1 to 7·2 per cent. of soda crystals for their exact neutralization. The purified storax corresponded to 4·5 to 5·1 per cent.; the copaiba balsam to 5·1 per cent.; the colophony solution to 7·5 per cent.; the benzoin solution to 14 per cent. of soda; only the castor oil was devoid of free acid. The estimation of free acid would therefore only be of use in conjunction with other tests, chiefly in the determination of admixture with benzoin or castor oil, the former increasing and the latter diminishing the acidity.

A. Behaviour of Balsam of Tolu towards Solvents.

(1). Spirit of wine dissolves half its weight of peru balsam almost clear; a further addition of spirit, however, renders the solution turbid, through separation of a small quantity of resin. Ether behaves similarly; it mixes clear with an equal quantity of balsam, but the solution becomes turbid upon the addition of more ether, resin separating equal to about 6 per cent. of the peru balsam.

As ether and alcohol easily form clear solutions with both castor oil and the colophony solution, they do not furnish a means for detecting admixtures of these substances. Purified storax and copaiba balsam give with alcohol very turbid and with ether clear solutions; benzoin solution mixes clear with alcohol, and turbid with ether, about 10 per cent. of resin separating. Consequently these solvents give no decisive indication of adulteration of peru balsam with the last three substances.

(2). Carbon bisulphide dissolves peru balsam with the exception of 11 to 16 per cent. of resin, which adheres so fast to the sides of the vessel that the light coloured solution can be poured off clear. Benzoin resin is almost insoluble in carbon bisulphide, giving up only the benzoic acid present, so that carbon bisulphide furnishes a good means for detecting a large admixture of benzoin. The following table shows the behaviour of one part of the substance tested in two parts of carbon bisulphide.

One part of	In two parts of Carbon Bisulphide.
Peru balsam	At most 16 per cent. of resinous residue. The genuine samples varied from 11 to 16 per cent.
Purified storax . . .	Dissolved completely; clear solution.
Colophony solution . .	Entirely soluble; perfectly clear.
Copaiba balsam . . .	Dissolved completely; quite clear.
Castor oil	Dissolved completely; quite clear.
Benzoin solution . .	60 per cent. of resinous residue.

Consequently if a sample of peru balsam, when shaken with double its weight of carbon bisulphide, yields more than 16 per cent. of undissolved resinous residue, an admixture of solution of benzoin is probable.

(3). Petroleum spirit takes up from peru balsam a light yellowish balsam, probably consisting principally of cinnamein (benzyl cinnamate). Upon saponifying this with alcoholic solution of caustic soda, besides sodium cinnamate, benzyl alcohol is obtained, easily recognized by its intense hyacinth odour. By repeatedly shaking peru balsam with three or four times its quantity of petroleum spirit half of it is dissolved and half remains undissolved. The following shows the relative behaviour of the other substances:—

	Shaken with Petroleum Spirit.
Peru balsam	Half dissolved.
Purified storax . . .	About one-third dissolved.
Benzoin solution . .	Only 12 per cent. dissolved.
Colophony solution . .	More than half dissolved (40 per cent. of resin).
Copaiba balsam . . .	All dissolved.
Castor oil	All dissolved.

Consequently if a sample of balsam gives up more than 50 per cent. to petroleum spirit an admixture of copaiba balsam or castor oil is indicated.

B. Behaviour of Peru Balsam towards Caustic Lime.

When peru balsam is mixed with dried calcic hydrate, no saponification or decomposition of the cinnamein contained in it results; neither does this take place if water or alcohol be added. The cinnamein can be extracted from the mixture by means of petroleum spirit, and in a large number of experiments with peru balsam the proportion was found to remain constant at 41 per cent. of the balsam used. From the residue undissolved by petroleum spirit ether dissolves out about 14 per cent. of styracin, which differs from cinnamein in being difficultly soluble in cold alcohol, and in yielding upon saponification with alcoholic soda solution not benzyl alcohol, but cinnamyl alcohol, together with sodium cinnamate.

Purified storax behaves similarly, but gives up somewhat less cinnamein to petroleum spirit and about as much more styracin to ether. Colophony and benzoin solutions, when macerated with calcic hydrate, combine with it so that petroleum spirit extracts scarcely anything from the mass. On the other hand castor oil can be completely removed with petroleum spirit as long as there has been no addition of water; but if castor oil be digested in a water-bath for several hours with calcic hydrate and successive additions of water, saponification takes place, and petroleum spirit no longer dissolves out oil from the mass. Copaiba balsam behaves similarly, its resin eventually combining with the lime, after which petroleum spirit only dissolves out the essential oil of the balsam.

After several hours' digestion with caustic lime and water, petroleum spirit removes from—

Peru balsam	41 per cent.
Purified storax.	35 per cent.
Copaiba balsam	Its essential oil.
Castor oil	Almost nothing.
Benzoin solution	Almost nothing.
Colophony solution	Almost nothing.

This method is not very suitable for the recognition of the substances used for sophistication, but it is of great value in their quantitative determination.

C. Behaviour of Peru Balsam towards Caustic Ammonia

When an ethereal solution of peru balsam is shaken with ammonia solution, sp. gr. 0·960, two yellowish-brown layers are formed, between which brownish flocks swim. The upper layer is the ethereal solution of the balsam, and leaves when separated and evaporated about 80 per cent. of the quantity used as a brown balsam. The inconsiderable resinous mass swimming between the two layers adheres partially to the side of the vessel. The lower ammoniacal layer, when separated and rendered acid with acetic acid, shows a whitish turbidity, but becomes almost clear on boiling and again turbid on cooling through separation of cinnamic acid, without, however, forming a solid deposit at the bottom. The ammonia solution withdraws the free cinnamic acid from the balsam, without affecting its other constituents.

Benzoin solution behaves similarly. It gives up to the ethereal layer the greater part of its resin, whilst the watery layer takes up the benzoic acid, and upon supersaturation with acetic acid and boiling becomes only slightly turbid.

Castor oil passes so completely into the upper ethereal layer that the ammoniacal layer upon being acidified scarcely separates a single oil globule.

In the case of colophony solution and copaiba balsam the resin combines with the ammonia, so that when the lower layer is rendered acid and boiled a considerable separation of solid resin takes place.

With purified storax there is scarcely any separation into two layers, but it yields a stiff homogeneous jelly that will hardly flow from the glass.

This holds nearly good for a mixture of equal quantities of peru balsam and purified storax; if less storax be present there is a separation into layers, but gelatinous lumps are to be seen swimming in the ethereal solution. Whilst also with pure peru balsam the lower ammoniacal layer, when separated and supersaturated with acetic acid, appears only slightly turbid upon boiling, the lower liquid layer from a balsam adulterated with copaiba balsam or colophony, when similarly treated, shows a separation of more or less solid resin.

D. Action of Strong Sulphuric Acid on Balsam of Peru.

If peru balsam be mixed with at least an equal quantity of concentrated sulphuric acid, the mass becomes hot, blackened and thickened. Upon washing it with hot and afterwards with cold water, it is at first plastic, but after cooling becomes solid and brittle. If it be spread out smooth, dried superficially with blotting paper, crushed and placed in a test tube with several times its quantity of ether, complete solution takes place in a short time. When a small quantity (1 to 2 grams) of peru balsam is used no smell or frothing or evolution of vapour is observed when the mixing takes place; but with larger quantities these phenomena are manifested, sulphurous acid being set free. When the test is used with the adulterants mentioned, their behaviour in small quantities—1 gram—exactly resembles that of genuine peru balsam; except in the case of copaiba balsam with which, even in the smallest quantity, there is strong frothing and an evolution of white vapour and sulphurous acid. With colophony, benzoin, storax and castor oil these appearances are first manifested with a quantity exceeding 2 grams. Consequently, if frothing and evolution of sulphurous acid commences when the quantity is limited to 1 gram, the presence of copaiba balsam may be concluded.

The washed resinous mass is completely soluble in ether, as before mentioned, so long as it contains neither benzoin nor storax. But if only a small quantity has been taken for the experiments, so that no reduction of sulphuric acid has taken place (1 gram of balsam and 1 gram concentrated sulphuric acid), a sample containing storax or benzoin yields a mass that when washed and superficially dried is only partially soluble in ether. Upon mixing 1 gram of substance with 1 gram of concentrated sulphuric acid, and subsequently washing with hot and afterwards with cold water, there was obtained with peru balsam, copaiba balsam, or colophony, a solid brittle mass completely soluble in ether; with purified storax or benzoin a solid brittle mass, only partially soluble in ether; and with castor oil a smeary greasy mass completely soluble in ether.

The smeary property which castor oil imparts to the sulphuric resinous mass indicates with certainty the presence of this oil. In the case of all the other substances the washed residue possessed a plastic or even crumbling character, and became quite hard on cooling.

If the insoluble residue be well washed on a filter with ether and then treated with alcohol any portion of it derived from benzoin dissolves completely. If it owes its origin to storax a small white residue is left, consisting of a substance first observed by the author in 1881 and which E. Mylius has named styrogenin, and represented by the formula $C_{26}H_{40}O_3$. Styrogenin is still better isolated by treating the residue left by ether with acetone, which dissolves any portion of the residue derived from benzoin completely and that from storax all except the styrogenin. Styrogenin is insoluble in water, alcohol, acetone and alkalies, but is easily soluble in chloroform. It can therefore be readily got pure by treating with a little chloroform the white powder left after washing the ether residue with acetone or spirit, and allowing the chloroformic solution to evaporate in a watch glass. The styrogenin is thus obtained in microscopic crystals partly tabular and partly more pointed, but always prismatic.

If larger quantities of storax be used no styrogenin is obtained, since the reduction of the sulphuric acid thus set up involves the decomposition of the storax in other ways. But with quantities not exceeding 1 to 2 grams storax always yielded the author styrogenin. It is also requisite that the quantity of sulphuric acid used should not be less than that of the balsam. Storax yields from 6 to 7 per cent. of styrogenin.

If therefore a sample of peru balsam treated with sulphuric acid is not entirely soluble in ether, the residue if completely soluble in acetone or alcohol indicates an adulteration with benzoin; but if a white powder insoluble in acetone or alcohol be left, it shows an adulteration with storax. This powder may then be dissolved in chloroform and left to crystallize.

Scheme for the Qualitative Examination of Balsam of Peru.

(1). The specific gravity should be determined. It should never fall below 1·135.

(2). Upon shaking 1 gram of balsam three or four times with several grams of petroleum spirit, not more than 0·5 gram should be taken up, so as to be left behind upon evaporation. Otherwise an admixture of castor oil or copaiba balsam would be probable. The latter would be recognizable by the odour of the essential oil.

(3). Dissolve 1 gram of balsam in several grams of carbon bisulphide and estimate the undissolved portion, dried at 140° C. This should not amount to more than 0·16 gram, otherwise an admixture of benzoin is probable.

(4) *a.* Mix 1 gram of balsam with 1 to 1·2 gram of concentrated sulphuric acid. If frothing and a smell of burning sulphur be observed an admixture of copaiba balsam is probable. (Confirm by tests 2 and 5.)

b. After the mixture has cooled wash it first with hot and then with cold water. The residue should be at first plastic and afterwards hard and brittle. A smeary character indicates an admixture with castor oil. (Confirm by test 2.)

c. Dry the washed resinous mass superficially with blotting-paper and dissolve it in several grams of ether. It should dissolve completely; if an insoluble residue be left it indicates an admixture of benzoin or storax. Treat this insoluble residue with strong alcohol, or preferably with acetone. If it dissolves completely, the adulterant is benzoin, in cases where carbon bisulphide leaves more than 16 per cent. of the balsam undissolved (test 3). If after treatment with alcohol (or acetone) there remains a white powder, easily soluble in chloroform and separating in microscopic crystals upon evaporation of the solvent, storax is present. (Confirm by test 5.)

(5). Dissolve 1 gram of balsam in 3 grams of ammonia solution, specific gravity ·960. No gelatinization of the mixture should take place, or appearance of gelatinous fragments swimming in the ethereal layer; otherwise storax is present. (Confirm by test 4.) The mixture should separate readily into two layers, the lower of which when separated, supersaturated with acetic acid and heated to boiling, should only present a slight turbidity. The separation of solid resin shows copaiba balsam or colophony. The former gives the reaction mentioned under test 4; further, the extract obtained by evaporation of the petroleum spirit solution (test 2) has clearly the smell of oil of copaiba, whilst a colophony residue has no special odour.

Quantitative Estimation of Adulterants.

(1). Estimation of Benzoin Admixture.

a. An admixture of solution of benzoin increases the amount insoluble in carbon bisulphide, which in the case of genuine peru balsam was never found by the author to exceed 16 per cent., to the extent of the whole of the benzoin resin, exclusive of the benzoic acid by which it is accompanied, and this may be used as the basis of one method of estimating the extent of adulteration with benzoin.

Example.—1 gram of a mixture of equal parts of peru balsam and an alcoholic solution of benzoin containing 75 per cent. of resin, when treated with carbon bisulphide, left a residue which, dried at 100° C., weighed 0·38 gram.

Of this 0·08 gram is reckoned as belonging to the half gram of peru balsam and the remaining 0·30 gram as the amount of resin in the half gram of benzoin solution.

b. A second method of estimating added benzoin is based upon the amount of residue insoluble in ether after the sample of balsam has been heated with sulphuric acid. The undissolved residue amounts to about half the benzoin resin or one-third of the benzoin solution.

Example.—1 gram of a peru balsam containing 14 per cent. of benzoin solution, after treatment with sulphuric acid, left a residue of 0·05 gram insoluble in ether, which represented 10 per cent. of benzoin.

c. The direct estimation of the peru balsam in a sample adulterated with benzoin may be effected by repeatedly shaking it with petroleum spirit, which dissolves out nearly half the peru balsam as well as the benzoic acid of the benzoin. If 1 gram of the balsam be mixed with 0·30 gram of calcic hydrate and allowed to stand an hour the petroleum spirit then dissolves only 41 per cent. of the balsam of peru present, so that the quantity of this may easily be calculated.

Example.—From a balsam mixed with 14 per cent. of benzoin solution, after maceration with calcic hydrate, petroleum spirit dissolved 35 per cent. (cinnamein), which, according to the proportion $41 : 100 = 35 : x$, indicated 85 per cent. of peru balsam.

(2). Estimation of Admixture of Purified Storax.

As purified storax consists, like peru balsam, mainly of styracin, cinnamein and cinnamic acid, though with a greater preponderance of styracin, the estimation of added storax is difficult, and can only be effected by preparation of the crystalline styrogenin as before described. The quantity of styrogenin left after evaporation of the chloroform amounts to about 7 per cent. of the storax present in the balsam.

Example.—1 gram of a mixture of equal parts of peru balsam and purified storax yielded 0·04 gram of styrogenin.

(3). Estimation of Admixture of Colophony.

a. The direct estimation of colophony is effected by shaking the ethereal solution of balsam with ammonia solution, sp. gr. ·960, as before described, and separating the resin taken up by supersaturating with an acid. The solid resin dried at 100° C. amounts to seven-eighths of the colophony present.

Example.—One gram of balsam mixed with 23 per cent. of a 60 per cent. solution of colophony yielded 0·115 gram of solid resin from the ammoniacal layer of liquid.

b. The direct estimation of the peru balsam present may be made by macerating the sample with caustic lime and exhausting with petroleum, as in the estimation of benzoin.

Example.—1 gram of balsam containing 23 per cent. of solution of colophony, macerated with caustic lime, gave up to petroleum spirit 0·32 gram (cinnamein), corresponding, according to the proportion, 41 : 100, to 0·78 gram of peru balsam.

(4). Estimation of Admixture of Castor Oil.

The author was unable to accomplish the direct estimation of the castor oil, being unable to separate it from the balsam by any suitable solvent; nor was he more successful in saponifying it with an alcoholic solution of an alkali. An attempt was also made to remove the oil from the resinous mass resulting from treatment with sulphuric acid, but it was found that the castor oil was so much decomposed by the strong acid as to be no longer soluble in petroleum spirit.

a. The amount of admixture may, however, be estimated by first ascertaining the amount of cinnamein and castor oil dissolved out by petroleum spirit, and then the amount of cinnamein alone. 1 gram of the mixture of balsam and castor oil is first macerated for an hour with 0·30 gram of caustic lime, without the addition of water, and then exhausted with petroleum spirit, which dissolves the cinnamein (41 per cent.) of the balsam together with all the castor oil. A second quantity, with the addition of water, is macerated in a water-bath for several hours, by which the saponification of the oil, but not of the balsam, is induced. Petroleum spirit then dissolves only the cinnamein of the balsam. The difference in the two results gives the amount of castor oil, whilst the quantity of peru balsam can be easily calculated from the cinnamein. Of course the exactitude of the result is dependent upon the complete saponification of the oil.

b. A more simple plan is to exhaust the sample by three or four shakings with petroleum spirit, and then to estimate the soluble constituents by evaporating the solution, and the insoluble by drying the residue. The former include nearly one-half of the peru balsam together with castor oil; the latter more than one-half of the peru balsam present. By subtracting the amount undissolved from that dissolved an approximation to the quantity of castor oil is obtained.

Example.—1 gram of balsam containing 23 per cent. of added castor oil, left after four shakings with petroleum spirit 0·40 gram undissolved, which indicated approximately 80 per cent. of peru balsam. The petroleum spirit left upon evaporation 0·60 gram of oily residue, which quantity indicated somewhat more than 20 per cent. of castor oil ($0·60 - 0·40 = 0·20$).

(5). Estimation of Admixture of Copaiba Balsam.

a. The proportion of peru balsam is estimated directly by digesting the sample for several hours with caustic lime and water, exhausting the mass completely with petroleum spirit and leaving the filtered liquid to evaporate. In this way there is at first obtained 41 per cent. of the peru balsam, together with the essential oil of copaiba. To volatilize the latter the residue is heated in a water-bath until it no longer perceptibly loses weight. What is now left represents 41 per cent. of peru balsam, whilst the loss in weight gives the amount of essential oil of copaiba.

b. The amount of copaiba resin is found by means of the caustic ammonia test, as described for colophony. If to this be added the amount of essential oil, as obtained in the preceding experiment, the total will represent the amount of copaiba balsam present.

Example.—One gram of peru balsam containing 30 per cent. of added copaiba balsam after being digested with lime and water gave up to petroleum spirit 0·38 gram, which in the water-bath decreased to 0·27 gram, representing 0·11 gram of essential oil. The 0·27 gram of residue indicated 66 per cent. of peru balsam. (41 : 100.) One gram of the same sample gave when treated with ammonia solution 0·17 gram of solid resin, which added to the 0·11 gram of essential oil made a total of 0·28 gram, or 28 per cent. of copaiba balsam.

b. A more simple and sufficiently exact method is to shake the sample repeatedly with petroleum spirit, and to weigh the undissolved portion after drying at 100° C., and the dissolved portion after evaporation of the spirit at the ordinary temperature. The undissolved portion amounts to a good half of the peru balsam, and by subtracting the amount from that of the evaporation residue, an approximation to the quantity of copaiba balsam is obtained.

Example.—One gram of peru balsam containing 30 per cent. of added peru balsam left after shaking with petroleum spirit 0·35 gram undissolved, or equal to 70 per cent. of peru balsam. The petroleum spirit left upon evaporation 0·65 gram. Consequently $0·65 - 0·35 = 30$ gram (30 per cent.) of copaiba balsam.

PRECIPITATES IN FLUID EXTRACTS.*

BY J. U. LLOYD.

In considering the formation of precipitates or sediments in fluid extracts and tinctures, I have previously presented a line of experiments to show that, to a greater or less extent, they result from the mixing of various solutions whereby a new solvent is formed, and which is incapable of retaining in solution the matters extracted from the crude material by each section of the original percolate, hence a line of precipitates. As this act of precipitation progresses, the solvent power of the menstruum changes, in consequence of deposition of material which formed a part of the previous liquid; therefore the deposition of one precipitate led to the formation of others. If this phase alone were to be considered, after a certain length of time, varying perhaps from months to years, the menstruum would arrive at a point where it could hold in solution all of the material then dissolved, and at this point the act of precipitation would cease. This view of the case must be accepted, even if we assume that none of the constituents in solution are soluble, after purification in the original menstruum; for, after a certain time under such conditions, a pure menstruum would remain, and all of the dissolved matter would have settled to the bottom of the vessel.

Now we know that this point is never reached. Fluid extracts and tinctures often precipitate to a very great extent, and sometimes become much lighter in colour, but never reach a point where all of the dissolved matters become insoluble. Upon the other hand, under ordinary conditions, changes usually follow as long as we may keep a specimen of fluid extract, and the result of these changes is a continuous precipitation. In taking up this phase of the subject, it may seem that the two preceding statements contradict each other. However, such is not the case, for continuous precipitation may be taking place without depleting the liquid of dissolved matters, and may continue for an indefinite period. Let me introduce the proposition with the following experiment, which, although apparently foreign to our subject, will illustrate phenomena which follow with the tinctures and fluid extracts upon our shelves.

Into a glass vial from six to twelve inches in length and an inch in diameter, pour distilled water until it is half filled, then finish filling the tube with simple syrup. The mixture at first will not be transparent, owing to the different refractive power of the mixture of liquids; after a time, however, the liquid appears homogeneous and transparent, and is apparently uniform, a diluted syrup. Place the tube near a warm stove, or hang it against a hot steam-pipe, and in a few moments the liquid will have divided into several sections by what appear to be sharp planes.† These planes of division resemble the plane which divides a layer of chloroform from a layer of water, and are fully as sharply defined, but the refraction of light from the surfaces of the upper and lower liquids is not as great. To observe the lines of division most readily place the eye on a level with the tube, and gradually raise or lower the head so as to bring the edges of the planes one after another before the eye, when sharp distinct lines will appear. If the eye be just above or just below the edge of the plane, a reflection from its surface will become apparent and which resembles the aforenamed reflection from the contact surfaces of chloroform and water. These divisions remain for some time, often for days, dependent upon the diameter and length of tube, difference in gravity and viscosity of the liquids and the heat to which the tube is subjected.*

Let us examine more closely the contents of the tube while heat is being applied, and during which the planes to which I have referred are distinct. If the solutions are transparent and the heat regular, the observer will not be able to detect a trace of motion. The lines which are the edges of the planes of demarcation will steadily hold their position as though fixed on the glass, and the liquid between the lines will appear to be at rest. These conclusions are erroneous, however, for the planes are gradually shifting their positions, and from time to time will severally disappear, to be succeeded by others, and the liquid within the tube is in rapid motion.

If the experimenter will scatter over the surface of the liquid a few particles of some finely divided powder, which is insoluble in the liquid, each particle will settle with a steady motion until it strikes the upper plane, where the downward motion will experience more or less of a check, as though it had struck some obstruction; then it will pass through the second section of liquid with decreased velocity. Upon reaching the second dividing plane another arrest in the velocity of the downward motion will be experienced, and the particles will afterwards settle more slowly. This experience will be repeated with each plane and each section of the solution until the fall of the powder ceases. Now it will be found that each plane or section of liquid will have arrested certain portions of the powder. This distribution is in accordance with the gravity of the different particles of which the powder is composed; those of less density being first arrested, and others in accordance with their weight, falling until they reach a section of solution, or a plane, of their own specific gravity, and such particles as have a greater gravity than the lower stratum of solution will have reached the bottom of the tube.

Let us now consider the composition of this solution, and the changes which give rise to the formation of these planes of division and intervening sections of liquid, each of different specific gravity.† When we poured the syrup into the water, by reason of its greater gravity a portion of it settled to the bottom and formed a layer of syrup. Other portions become more or less mixed with water, and, in accordance with the gravity of each mixture, arranged themselves over the syrup. This selection of position continued, the upper portion of the tube containing nearly pure water. In a short time the act of diffusion had blended the points of contact between the various solutions, giving to the contents of the tube the appearance of a homogeneous liquid. When heat was applied to one side of the tube, expansion of the liquid next to that side resulted. Each portion of the liquid next the heated side of the tube started upward, but, excepting more or less of the top of the liquid, each heavy layer quickly reached a lighter overlying stratum through which, by reason of its greater gravity, it could not ascend.

* Read at the meeting of the American Pharmaceutical Association held at Niagara Falls, 1882.

† It might naturally be supposed, that when the heat is applied to one side of the length of a tube under the conditions named, there would be one upward current of fluid would result along the entire side next to the heat. If this were the case, in a few moments the entire contents of the tube would be a uniform mixture. Such is not the result, however, and in consequence much time is necessary to effect this end. On a larger scale, but following the same principle, we have oceanic and atmospheric currents, giving us the Gulf Stream and the strata (clouds) of condensed or precipitated vapour between the moving currents of air.

* By viscosity of liquids I refer to those that have little diffusive power, and which are known to form ropy and sticky solutions. Thus, under the same conditions, a heavy solution of potassium bromide will disappear much sooner than a solution even of less gravity of gum or glucose.

† I have as yet simply made the statement, that these sections are composed of different solutions, and have brought no proof to demonstrate the fact. This is self-evident, however, although it is but just for me to say that these sections have been examined severally at different times, and invariably there is an increase of solid matter in solution as we progress from the surface downward. The following example illustrates this fact, a tube containing a dense solution of sodium chloride overlaid by distilled water having been submitted to a one-sided heat until it had formed five zones. Upon removing 1 c.c. from each zone, the proportion of sodium chloride was as follows:—

No. 1 (top), 0·24 gr.; No. 2, 0·73 gr.; No. 3, 2·37 grs.; No. 4, 3·97 grs.; No. 5, 4·44 grs.

Hence at intervals the top of each stratum of this current ceased to rise, but owing to the upward pressure of the current beneath it was crowded away from the side of the tube and into the cool solution beyond. The deficiency occasioned by this upward current was supplied from the lower part of each section of liquid, and quickly we had a circulation of liquid, Each of these eddies continued to increase in a horizontal direction, but remained bounded by nearly the same planes above and below. Finally the entire tube was filled with eddies each of less specific gravity than the one below.

When we dropped the powder on the surface of the liquid within the tube, each particle descended in the manner before explained, until it reached a section of solution nearly of its own specific gravity, where its fall was arrested. Not so the motion, however, for each particle of powder circulated with the liquid within which it was retained, thus showing us exactly the movement of each section of solution within the tube.* This movement will continue while heat is being applied, or until the entire liquid within the tube is of the same composition, and then the solution as one body will circulate from the bottom to the top of the tube.

The experiment which I have described, and which all can verify easily, is typical of the motion which always results when heat is applied to liquids of different specific gravities, and if they are capable of forming a solution one with another. A variety of movements may be obtained by varying the position of the body which imparts the heat, but such variations simply result from modification of manipulation. It matters little whether the heat be applied evenly to all parts of the vessel, to the bottom, or to other sections, circulation follows, and the result is finally a uniform mixture of the liquids.†

If a tincture or a fluid extract be made by percolation, and the percolate be received in the order obtained, there will be a decrease in gravity from the bottom of the container upward. This is in consequence of the well-known fact that the denser part of the percolate passes first, and that the percolate grows less dense with more or less regularity as percolation progresses. When such a percolate is permitted to stand it will resolve itself into strata, and the liquids will mix in a manner similar to those in the experiment we have cited. The phenomenon is not so readily observed in these instances, owing to the fact that most percolates are dark in colour and will not permit the passage of light, but the collection of strata of precipitates at one or more points throughout such liquids indicates where the lines of division are to be found; and it is for the purpose of introducing these precipitates understandingly that I have briefly directed attention to the experiment with the tube of liquid, and I will now return to a more minute analysis of the changes which occur.

Under the conditions we have named, it has been shown that each solution rested upon one more dense, and where the liquids are in contact we have motion in opposite directions. The surfaces of each of these liquids appear to be in direct contact, and to move as though pressing against a solid plane, which is the line of division between them. If we magnify this apparent line, it will be found of considerable thickness, and in reality to consist of a stratum of fluid almost at rest as compared with the rapid flow of the upper and lower strata. However, it is in a state of excitement occasioned by the friction of the two opposing solutions, and is eddying and struggling as it is tormented by these contrary agents. It will be further found that portions of the upper side of this thin stratum are being constantly torn off and carried mechanically into the upper liquid; and this is true also of the lower side and the lower liquid. As the stratum is made up of a mixture of these two revolving bodies, and its existence depends upon an admixture of these liquids, it follows that whenever a portion of the stratum is detached and carried into one liquid, the result is an admixture with it of a portion of the other liquid. Inasmuch as these admixtures are constantly taking place while the circulation of the liquid continues, it follows that there is a continual handing down of the upper revolving liquid, and a handing upward of the lower. When we consider that the foregoing example is a simile of changes that are taking place throughout the entire tube with each of the other sections, we must see that at some time the liquid at the bottom and the liquid at the top of the tube will have become identical in composition. We can also see that this interchange is independent of the act of diffusion, and can only be considered a result of mechanical action, the primary agent being heat. Now if we have a liquid at the top of the tube differing from that at the bottom to such an extent that when these liquids are mixed precipitation results, it follows that wherever the liquids are interchanging in the proper manner precipitation must follow at that point.* Hence it is that I have called attention to the foregoing argument and experiments as a means of illustrating a fact connected with precipitates in tinctures and fluid extracts, which perhaps has not presented itself to many of us, but which will be often noticed after attention has been called to the matter.

(*To be continued.*)

* I speak now of a rapidly circulating solution and a precipitate near its own gravity. If the section is moving slowly and the precipitate heavy, the particles of powder will either rest upon the plane of division, or, seeking the side of the vial next the heat, in obedience to the motion of the lower part of the stratum, will adhere to the glass.

† During the past six years I have carried on a series of experiments regarding this motion of fluids, but the example I have given is all that is necessary for the subject now under consideration.

* This may be nicely illustrated by introducing at the bottom of the tube a pellet containing a decided trace of potassium ferrocyanide, and dropping on the top of the liquid a little solution of a ferric salt. The formation of a blue precipitate in some intermediate stratum shows where the two come together.

THE LACQUER INDUSTRY OF JAPAN.

BY JOHN J. QUIN,

Her Majesty's Acting Consul at Hakodate.

(*Concluded from page* 309.)

Colouring Matters used.

Shu (vermilion).—For red lacquer, used also mixed with gold dust for shading.

Sei-shitsu (green lacquer).—A mixture of *Kiō* (chrome yellow) and *Bero-ai* (Prussian blue).

Muras-aki-ko (purple powder).—A mixture of white lead and *Tō-beni* (*Magenta roseine*).

Benigara (red oxide of iron).—Sometimes used instead of vermilion.

In the district of Aidzu the light colours are produced to the greatest perfection, viz., yellow, green, and intermediate shades. In Tôkiô, though the same materials are used, the resulting colours are inferior and darker. In Aidzu no after polishing takes place with coloured lacquers. The lacquer is applied like paint. Tôkiô is, however, best for black lacquer, as well as for such high-class red, etc., as are polished afterwards. These differences are attributed to some climatic influence.

The *Kioto*, so called "black lacquer," shows a reddish-brown tinge. With the exception of Tôkiô, Kioto, Osaka, Kaga, Tsugaru, Wakasa, Nagova, Suruga, and Shidzuoka, and one or two isolated places, the method of smoothing with charcoal and afterwards polishing is not pursued. In Tsugaru and Wakasa neither flat nor raised gold lacquer is manufactured.

It should be mentioned that the plain lacquered articles are almost exclusively manufactured by one set of workmen, who supply the workers in gold lacquer with the articles ready for the application of the gold powdering, various patterns, etc.

The wholesale lacquer trade is in the hands of a few large merchants. In Tôkiô there are two houses only. These receive the crude lacquer from the producers as it arrives from the various districts, either buying it outright or making advances to the contractors, who are bound by the rules of the guild to deliver only to them. They sell it in quantities as required to the lacquer manufacturers, who prepare and refine the sap for the market, and these again retail the material to the lacquer workers. The various processes that the lacquer undergoes in the hands of the manufacturers before retailing are kept secret, only the approximate mixtures being known.

That all lacquer, even that sold as pure lacquer, undergoes some adulteration, is rendered evident from the fact that, in accordance with a strange custom peculiar to the lacquer trade, the retail manufacturers sell even the smallest quantity at the same rate at which they buy it from the wholesale merchant.

Among the Tools and Materials used in the Manufacture of Gold Lacquer, are—

Neji-fude.—Brushes made of rats' hair, used for tracing out the patterns, and for drawing the very fine lines, etc. The best are made of the long hairs from the backs of "ship rats," whose fur is not so likely to get rubbed.

U-no-ke-usuji-fude (fine brushes made of hares' hair).—These are a little larger than rats' hair brushes, and are used for filling in the patterns of the best articles, also for drawing outlines on common articles and ground work. There are two sizes, *Dai* and *Sho*, used for drawing "large" and "small." There are besides five sizes of *Ji nuri fude* (grounding brushes).

U no-ke-hake (a flat brush made of hares' hair, used for spreading the lacquer on large pieces of work).—There are two sizes used.

Men-sō (a stiff brush made of deer's hair, used for applying the *Sabi*, etc., in making raised gold lacquer).—It is only used for stiff mixtures.

Haké (flat brushes of human hair, for smoothing the lacquer after application, as in ordinary plain lacquer).—There are two sizes used.

Bun-mawashi (compass with fine brush attached for describing circles).

Ké-bo (brushes made from the long body hairs of a horse, used for smoothing the fine gold powder and brushing off extra particles, used also for dusting).—There are four sizes.

Fude-arai (brush cleaner, made either of ivory or tortoise shell).—The brushes have to be very carefully cleaned, after using, with *Sesamum orientale* oil, to remove every trace of lacquer.

Tsutsu (a quill, from the wing of a swan or crane, over one end of which is stretched a piece of silk, used for scattering the gold dust).—There are two sizes used.

For applying *Nashiji* or *Hirame* bamboo tubes of three different sizes are used, with silk of more open texture.

Saji (spoon), for putting the gold dust into the quill or bamboo tube.

Hirame-fude.—A pointed piece of bamboo or other wood, used for picking up and applying *Hirame*, or the gold, or shell squares.

Kujira-bera (whalebone spatula).—Used for mixing the materials, and also when transferring the tracing on the paper to the article to be painted (process described farther on). The kind used is called island wholebone, and comes from China; that obtained from Japan is practically useless, being liable to split. Two sizes are used.

Hera. — Spatulas made of *Hinoki* (*Chamæcyparis obtusa*), smaller than those used by workers in plain lacquer. There are three sizes used for applying plain lacquer, and three sizes for applying *Sabi*.

The Tooth of a fish, ordinarily the *Tai* (*Cerranus marginalis*), fastened with lacquer on to a piece of bamboo, used for polishing such crevices as are too small to admit of charcoal, etc., being used.

A piece of polished shell, used for smoothing the paper on which the pattern is drawn before tracing with lacquer.

Tsume-ban.—A palette, made either of tortoise shell or buffalo horn, worn on the left thumb.

Take-ban.—A small bamboo board, used when cutting the gold and silver foils into squares.

Gold and Silver Dust used for Ornamentation.

Of these there are several kinds, viz:—*Yasuri-ko* or *fun* (file powder), made in *Yaki-kin*; (pure gold) *Koban-kin* (10 parts gold to 2$\frac{6}{10}$ silver); *Gin* (silver). There are twelve qualities of each differing, in fineness.

Besides these, there is an extra large kind, used for ground-work, called *Hira-me* (flat-eye). The coarsest filings, whether of pure gold, *Koban*, or silver, are taken and rolled out flat on an iron plate. Of *Hirame* there are eight kinds each.

Next comes the kind called *Nashiji*, from its resemblance, when applied to the article, to the rind of a pear. *Nashiji* is used for ground-work, in making which pure gold, also *Koban-kin* (10 parts gold, 2$\frac{6}{10}$ silver), *Jiki-ban* (10 parts gold, 3$\frac{1}{10}$ silver), *Nam-ban* (10 parts gold, 3$\frac{6}{10}$ silver), and silver, of seven qualities of fineness each, are used.

Aka-fun (red powder) is vermilion mixed with pure gold, *Koban-kin* and silver, for shading.

Kuro-fun (black powder) is camellia charcoal powder mixed with pure gold, *Koban*, and silver.

Giyōbu nashiji is the coarsest kind of *Nashiji* made; but it is little used, as it requires seven or eight coats of lacquer to be applied before it is covered sufficiently to stand polishing.

Keshi-fun.—This is the finest kind used; it is only made in pure gold and *Koban.* This is made by mixing gold-leaf in liquid glue till it is reduced to an impalpable powder; water is then added, and when the gold sinks the liquor is poured away. This is repeated till all the glue has been got rid of.

Shaku-dō-fun.—A mixture of seven parts pure gold and three parts of copper powder.

Kana-gai.—Foil made of pure gold, *Koban*, and silver. It is made of four thicknesses in each quality, viz:—*Hon-neji*, *Chiu-neji*, *Usushu*, *Kime-tsuke*, the last being the thinnest.

Besides the above, there are several mixtures as—

Kuri-iro-fun (chestnut-coloured powder).—A mixture of one-half gold dust with powdered camellia charcoal and vermilion.

Nedzumi-iro-fun (rat-colour grey).—A mixture of half silver and powdered camellia charcoal, and a little vermilion.

In each case it is evident that several distinct shades can be obtained according as more or less colour is added to the gold and silver dust. It is a remarkable fact that (as I am informed) no vegetable colours can be used with lacquer. They are all eaten up, as it were, by the lacquer and disappear, which accounts for the very few variations seen in the colours of lacquer. The workmen have never been able to produce white, purple, or any of the more delicate shades.

Of late years, since cheap work has been introduced, the custom of using tin dust has been adopted for making common *Nashiji*, It is manufactured of the same sizes as in gold and silver, and when plenty of gamboge is mixed with the lacquer to cover it an inexperienced person might easily mistake it for gold when the ware is new, but it soon deteriorates. Burnt tin dust is also sometimes used for under coats in making cheap raised lacquer.

Mode of making Gold Lacquer.

(*a.*) *Togi-dashi* (bringing out by polishing).—The article having been subjected to the first twenty-two processes, as described in making *Houji* (Class I.), is then treated as follows:—

The picture to be transferred to the article is drawn on thin paper, to which a coating of size made of glue and alum has been applied—that known as *Mino-gami* is best. The reverse is rubbed smooth with a polished shell or pebble, and the outline very lightly traced in lacquer, previously roasted over live charcoal to prevent its drying, with a fine brush made of rats' hair. The paper is then laid, with the lacquer side downwards on the article to be decorated, and is gently rubbed with a whalebone spatula wherever there is any tracing, and on removing the paper the impress may very faintly be perceived. To bring it out plainly, it is rubbed over very lightly with a piece of cotton wool, charged with powdered white whetstone or tin, which adheres to the lacquer. Japanese paper being peculiarly tough, upwards of twenty impressions can be taken off from one tracing, and when that is no longer possible, from the lacquer having become used up, it only requires a fresh tracing over the same paper to reproduce the design *ad infinitum.* This tracing does not dry owing to the lacquer used for the purpose having been partially roasted, as previously mentioned, and can be wiped off at any time.

The next process is to trace out the veining of the leaves, or such lines to which in the finished picture it is desired to give the most prominence, and these lines are powdered over with gold dust through a quill. The qualities called *Mijin*, *Koma-kame-mijin* and *Aragoku*, are generally used; either finer or coarser qualities cannot be used. The article is then set to dry for twenty-four hours in the damp press. The outline is now drawn carefully with a rats' hair brush over the original tracing line with a mixture of black and branch lacquer, called *Rō-sé.* The whole is then filled in with *Rō-sé* applied with a hare's hair grounding brush. Gold dust of a slightly coarser quality than *Mijin* is scattered over the lacquered portion, and the article is set to dry for twenty-four hours. Another thin coating of *Rō-sé* lacquer is again given to the gold-powdered portions, and the article set to dry for twelve hours. Next, a coat of *Rō* (black lacquer) is applied over the whole surface of the article, which is set to dry for at least three days. It is then roughly ground down with *Magnolia* charcoal, the surface dust being constantly wiped off with a damp cloth till the pattern begins to appear faintly. Another coating of *Rō* lacquer is then given and the article set to dry for thirty-six hours. It is again ground down with *Magnolia* charcoal as before, this time till the pattern comes well out. The ensuing processes are the same from 28 to 33 inclusive, as in black lacquer (*Honji* (*a*)).

In making *Togi-dashi* on hard woods, transparent lacquer is used instead of *Rō.*

(*b.*) *Hira-makiye* (flat gold lacquer).

The article having been thoroughly finished, either in black or red, etc., as already described under the head of *Honji*, Class I., and the following kinds, a tracing is applied to the surface as in *Togi-dashi*, the outline is carefully painted over with a fine brush of rat's hair, and then filled in with a hare's hair brush, using *Shitamaki* lacquer (branch laquer and red oxide of iron). Over this surface gold dust, of the quality called *Aragoku* being generally used, is scattered with a brush of horse's hair (*Kebo*) till the lacquer will not absorb any more. The article is then set to dry for twenty-four hours. A thin coating is next applied over the gold, of transparent lacquer or *Yoshino* lacquer, and set to dry for twenty-four hours at least. It is then most carefully smoothed with camellia charcoal, and finally polished off with *Tono-ko* and a little oil on the point of the finger, till the ornamented portion attains a fine polish. The veining of leaves and the painting of stamens, etc., of flowers, or such other fine work, is now done with a fine rat's hair brush charged with *Ke-uchi* lacquer over which fine gold dust (*Goku-mijin*) is scattered from a brush of horse's hair (*Kebo*) as before, and the article set to dry for twelve hours. Some *Yoshino* lacquer is then applied to a piece of cotton wool, and rubbed over the whole surface of the box or other article, and wiped off again with soft paper. It is set to dry for twelve hours, after which it is polished off with deer's-horn ashes and a trifle of oil. When very high-class work is desired, *Yoshino* lacquer, to which a little water has been added, is applied, and polished off a second time, and a very brilliant surface is attained.

More ordinary "flat gold lacquer" differs in the manufacture as follows:—The tracing is accomplished in the same manner, but *Shitamaki-nobe* lacquer (branch lacquer, red oxide of iron and camphor) is used for filling in the pattern with a hare's hair brush. The article is then set to dry in the press for ten to twenty minutes, during which time the lacquer has begun to harden, and less gold will adhere. Then gold dust (*Goku-mijin*) is applied with cotton wool thinly, and the article is set to dry for twenty-four hours. The whole surface is then smeared over with *Yoshino-nobe* lacquer (*Yoshino* lacquer and camphor) on a piece of cotton wool, and wiped off again with soft paper. The reason is that it is less trouble to smear over the whole surface thinly, and it is, moreover, not necessary to give a thick coat of lacquer to the decorated part, as the gold dust has been very thinly applied. It is set to dry for twelve hours and ground smooth with camellia charcoal and polished with powdered whetstone and oil on the point of the finger. The fine lines are then drawn with a rat's hair brush charged with *Shitamaki* lacquer, and sprinkled with gold dust (*Goku-mijin*) from a brush (*Kebo*), and the article set to dry for twelve hours. The whole is again smeared with *Yoshino-nobe* lacquer and carefully wiped off again with paper, and set to dry for twelve hours. The article is then polished with powdered whetstone and oil on the point of the finger, and a second application of *Yoshino-nobe* lacquer with a little water, wiped off with soft paper, set to dry for twelve hours, and finally polished off with deer's-horn ashes and oil on the finger, finishes the operation.

Should it be required to make any dark spots or lines, such as birds' eyes, or to draw human hair, etc., or other shading, this is done last of all with *Kuma*, "bear" lacquer, *Jō-hana*, and lampblack.

More Common Kind of Flat Gold Lacquer Painting.

Instead of tracing the design in roasted lacquer, it is done with a mixture of powdered *Tono-ko* and water, and the impression is transferred to the articles with the whalebone spatula as before. The reason for only using *Tono-ko* instead of lacquer is that the ground-work being inferior it cannot be ground or smoothed afterwards, and the edges of the pattern would not be clean, nor stand out clear, should any lacquer get smeared outside the tracing line. The outline is then filled in with *Shitamaki-nobe* lacquer with a coarse hare's hair brush, and the article is set to dry for twenty minutes, or till a thin skin has formed on the lacquer, and then the half-dry surface is wiped over with cotton wool charged with *Keshi-fun*, the finest gold powder, and set to dry for five or six hours. The whole surface is then smeared with *Yoshino-nobe* lacquer, which is carefully wiped off again with soft paper, and the article set to dry for half-a-day The surface is then rubbed over gently with deer's-horn ashes and soft paper to give it a polish, and to get rid of any of the last coat of *Yoshino-nobe* lacquer.

The fine lines are now drawn with a fine hare's hair brush charged with *Shitamaki-nobe* lacquer, and the article set to dry for twenty minutes or so; then *Keshi-fun* is applied with cotton wool, and again set to dry for five or six hours. No further process takes place.

(*c.*) *Taki-makiye* (raised gold lacquer).

The ground-work may be either black or coloured lacquer, *Nashiji* (pear basis of gold dust), or the plain wood.

The outlines of the pattern are transferred to the surface of the article in the same manner as in *Togi-dashi*, or "flat lacquer." The outline is then painted over with *Shitamaki* lacquer, and this is covered with powdered camellia charcoal. If the outside is to be higher than the inside, a broad margin is painted and covered with charcoal powder, leaving the centre untouched, and *vice versâ*; if the centre is to be higher a faint line only is painted outside, and the inside is given a thickish coating, which is sprinkled with the charcoal dust, and the article set to dry for twelve hours. When taken out of the press it is well dusted to get rid of any loose charcoal powder, and is also washed, using a brush made of human hair (*Hake*) to clean out all the crevices and bring out the lines, etc. Some *Yoshino-nobe*, or "branch lacquer," with camphor, is now rubbed on with a piece of cotton wool and carefully wiped off with soft paper, and the article set to dry for twelve hours. The raised parts are next carefully ground smooth with a piece of *Magnolia* charcoal, and a second coat of *Yoshino-nobe*, or of "branch lacquer," is applied as before and dried.

[If a well-raised pattern is required, one, two, or even three coats of *Sabi* ("branch lacquer" and *Tono-ko*) are applied, the outside edges being painted with a brush of deer's hair (*Menso*), and the inside lacquer applied with a small *Sabi* spatula, the article being set to dry between each application for twelve hours. For coarser work it is then ground smooth with a white whetstone, and for finer work with a yellow whetstone. Over this some "branch lacquer," mixed with camphor, is rubbed with cotton wool and wiped off with soft paper, and the article set to dry for twelve hours.]

If the pattern is not to be very high the operations described between the brackets are omitted. A coating of *Takamaki* lacquer is now given, the outside edges being carefully drawn with a rat's hair brush, and the inside of the pattern filled in with a hare's hair brush, and the article set to dry for thirty-six to forty-eight hours. When taken out of the press the surface is ground smooth with *Magnolia* charcoal, and then partly polished with camellia charcoal on a cotton cloth. A little oil is now rubbed on, and a further polishing takes place with powdered "whetstone" on a cloth. Next, "branch lacquer" is rubbed over the raised parts with cotton wool and wiped off with soft paper, and the article set to dry for twelve hours. It is next polished with deer's-horn ashes and a little "rape seed," or "sesamum" oil applied on the point of the finger. Up to this point the formation of the pattern, whether mountains, waves, trees, men, birds or animals, has been gradually completed.

If small squares of gold foil (known as *Kiri kane*), or of coloured shell, are used in producing the pattern, they are now applied one by one on the point of a bamboo stick (*Hirame fude*), the spot where they are to be affixed having been smeared with a little *Rō-sé* lacquer to make them adhere. When all that is required has been affixed, a piece of soft bibulous paper is spread over the freshly done parts and pressed very carefully with the finger. This is to get rid of as much of the *Rō-sé* lacquer as is not covered by the gold squares as possible; the article is set to dry for twelve hours, and then the portion where the gold has been applied is gently polished with a little camellia charcoal on the point of the finger, to get rid of the remainder of the *Rō-sé* lacquer. Shell patterns, and the coarser kinds of gold dust that may be required, are applied in the same manner. The finer kinds of gold dust are applied next, over a coat of *Shitamaki* lacquer, and the article set to dry for twelve hours. The remaining processes of polishing, drying, etc., are the same as in first-class "flat gold" lacquer.

For making raised lacquer patterns on plain wood the whole surface is covered with tin-foil, stuck on with rice paste, to keep the wood quite clean, and then the place only where the pattern is to come is cut out. In making all high-class lacquer the edges of every article are pasted over with tin-foil to prevent their being rubbed or injured by the workman, and the same is done over each portion as it is finished.

The above is the ordinary method of making best raised lacquer, but from a glance at the specimens which accompany this paper it will be seen immediately that there are such innumerable modifications of one process or another, according to the object to be produced, that it is manifestly impossible to do more than give the above cursory sketch. Nearly every piece of good lacquer made exhibits a specimen of each kind, viz, *Nashiji*, *Toga-dashi*, *Hira-makiye*, or *Taka-makiye*.

In making raised lacquer on inferior articles the methods do not vary much from the good kinds; the work is merely less carefully executed. The saving is in the quantity and quality of the gold dust used, and the absence of minute after-work, or in the use of silver and tin instead of gold dust. In the very cheapest kinds burnt tin dust is used instead of charcoal over the first coat of *Shitamaki*. This is burnished bright, and over it a thin coating of lacquer and gold dust is applied. At first it looks well, but loses its colour in a year or two. By using tin powder the same height is attained in one coat that would necessitate at least three coats of lacquer and charcoal dust. This kind of work is, however, only used for cheap articles for foreign export, and has been quite lately introduced.

(*d.*) *Lacquering on Metal.*

For lacquering on iron or copper, brass or silver, the metal is smoothed and polished, and then given a coating of "crude lacquer," or "black lacquer;" the article is put over a charcoal fire, and the lacquer is burnt on to the metal till all smoke ceases to escape. The fire must not be too fierce, and the metal must not be allowed to get red hot, or the lacquer turns to ashes. After the lacquer has burnt quite hard the surface is rubbed smooth with *Lagerstrœmia* charcoal; these operations are repeated three or four times, till a good foundation of lacquer has been obtained. Then the same operations exactly are repeated as in making best "black lacquer," *Togi-Dashi*, "flat gold lacquer," or "raised gold lacquer," only that the lacquer is burnt dry over the fire instead of being dried in the press. The lacquer is thus rendered quite hard and very durable. After the first two or three coats have been burnt on, the subsequent drying processes can be carried on in the damp press, should it be so desired.

In winter, or when any article is required in a hurry, the workmen sometimes put a charcoal fire in the press, over which a pan of hot water is placed. The steam which is thus generated helps to dry the lacquer in an hour or two, which would take twenty-four hours to harden ordinarily, but the lacquer thus dealt with loses its strength, and is never very hard. "Black lacquer" turns a rusty brown, the colouring virtue of the iron being apparently lost, and therefore this plan is never adopted for good work, and in second-rate work only for under coats.

Nashiji (pear basis).—This style of ornamentation, occupying an intermediate position between plain and ornamental lacquer, is therefore treated of last. Till the opening of Japan to foreign trade it was in the hands of workers in gold lacquer, but now for the most part all *Nashiji* on articles intended for exportation is applied by workers in plain lacquer. In making best *Nashiji*, as in *Togi-dashi*, the first twenty-two processes are identical with *Honji*, Class I. A coating of *Rō-sé* is applied, and the gold dust is sprinkled over the surface through one or other of the bamboo tubes, according to the fineness required. The article is set to dry in the press for forty-eight hours, and is then given a coating of pure transparent varnish. This is set to dry for three or four days, when it is roughly ground with *Magnolia* charcoal, and a second coat of transparent lacquer given. The article is set to dry for forty-eight hours, and then ground with *Magnolia* charcoal till a perfectly smooth surface is obtained. Transparent lacquer is then applied with a piece of cotton wool, and wiped off again with soft paper, and the article set to dry for twenty-four hours. It is then polished with a mixture of *Tono-ko* and camellia charcoal powder and a little oil. Next, a coating of *Yoshino* lacquer is given, and wiped off with paper; the article is set to dry for twelve hours, and then it is polished with deer's horn ashes and oil. This is repeated three times to finish the article.

The same processes are gone through when using silver instead of gold dust.

For cheap qualities tin dust is used, and the powder is scattered on glue immediately above a coating of *Kanoji* (whiting and glue). When the article is dry it is burnished with *To-kusa* (*Equisetum*), and as soon as it presents a bright surface a coating of pure transparent lacquer, with gamboge, is given to it. It is set to dry for a day in the press, and ground with *Magnolia* charcoal. Over this a coating of *Shu-urushi* (transparent varnish containing oil) is applied, and another drying for twenty-four hours completes the process.

SOLUBILITY OF COMMERCIAL SULPHATES OF MORPHINE.*

BY VIRGIL COBLENTZ, PH.G.

An article on this subject appeared in this Journal, March 25, p. 798, by Professor Power, giving the conflicting statements on the solubility of sulphate of morphine, and at the same time making an accurate determination of the solubility of the salt as made by Rosengarten and Son. The object of this article is the determination of the differences in the degree of solubility of this salt as produced by different manufacturers and found in our markets. The method employed to determine the solubilities is that recommended by Professor Power, viz., "An excess of sulphate of morphine was digested with distilled water at 15° C. for several days with frequent agitation, and the solution filtered from the excess of salt (proper temperature being observed), the amount of sulphate of morphine contained therein was determined by precipitation with chloride of barium, and from the ignited amount of barium sulphate the amount of crystallized sulphate of morphine, $(C_{17}H_{19}NO_3)_2.H_2SO_4+5H_2O$, was inversely calculated."

Example.—16·363 grams of cold saturated solution gave ·2650 gram of sulphate of barium, corresponding to ·8625 gram of crystallized sulphate of morphine.

$(BaSO_4)232{\cdot}8:(C_{17}H_{19}NO_3)_2HSO_4+5H_2O)758::{\cdot}2650:x.$

$x={\cdot}8625$ gram morphine sulphate crystallized.

(Solution) 16·336 : (Morph. Sulph.) ·8628 : : 100 : x.

$x=5{\cdot}272$ per cent., and $100:5{\cdot}272=18{\cdot}97$ parts of water.

Sample.	Weight of solution.	Weight of $BaSO_4$.	Weight of Morph. Sulph.	One part of the salt soluble at 15° C. in
I. . .	11·000 gm.	·1580 gm.	·5145 gm.	21·38 water.
II. . .	21·808 „	·2801 „	·912 „	23·90 „
III. . .	17·508 „	·232 „	·7554 „	23·18 „
IV. . .	13·020 „	·226 „	·7359 „	17·69 „
V. . .	16·363 „	·265 „	·8625 „	18·97 „
Average				21·00 „

In round numbers 1 part of this salt requires from 18 to 24 parts of water at 15° C. for solution.

SOLUBLE SACCHARATE OF IRON.†

BY DR. C. BRUNNENGRAEBER.

The author gives the following instructions for the preparation of "ferrum oxydatum saccharatum solubile," or "iron sugar" as the result of numerous experiments. The formula has been adopted for the new edition of the German Pharmacopœia.

Dissolve 9 parts of powdered sugar in 9 parts of water, and next 30 parts of solution of perchloride of iron (sp. gr. 1·280 to 1·282, containing 10 per cent. of iron); then add gradually, with stirring, a solution prepared with heat and allowed to cool of 24 parts of sodium carbonate in 48 parts of water. When the carbonic acid has been given off as completely as possible, add gradually 24 parts of soda ley (sp. gr. 1·159 to 1·163, containing 15 per cent. of NaHO), and allow the mixture to stand until it has become clear. After the addition of 9 parts of sodium bicarbonate, dilute it immediately with 600 parts of boiling water and put it aside to settle. Draw off the supernatant liquid by means of a siphon, and mix the precipitate with 400 parts of hot water. After clearing, remove the liquid and again heat the precipitate in a similar manner with another 400 parts of hot water. Then collect the precipitate upon a moistened cloth, wash it with hot water until the liquor running off, when diluted with five times its volume of water, is only rendered opalescent by silver nitrate, and press. Mix the precipitate so heated in a porcelain dish with 50 parts of powdered sugar, evaporate it to dryness in a steam-bath whilst stirring, rub it to a powder and add sufficient powdered sugar to bring the total weight of the mixture up to 100 parts.

The product should be a red-brown sweet powder, tasting of iron, containing 3 per cent. of iron, and giving with twenty times its weight of hot water a perfectly clear, red-brown, barely alkaline solution, which is not altered by potassium ferrocyanide, but upon the addition of hydrochloric acid becomes first a dirty green colour, and then a pure blue. An aqueous solution (1 in 20) first heated with excess of sulphuric acid and then cooled should only give an opalescent turbidity with silver nitrate.

* From the *American Journal of Pharmacy*, Sept., 1882.

† From the *Archiv der Pharmacie*.

THE "GLOBE" ON LICENSED POISONS.

The following editorial remarks upon the sale of patent medicines containing poisons appeared in the *Globe* of the 17th inst. The inquest referred to is reported on p. 339 :—

"The vices and virtues of soothing syrup as administered to infants were again discussed yesterday at an inquest held upon the body of a child which had been only too effectually soothed by a dose of it. This medicine, if it should so be called, is sold under a Government stamp, and is therefore naturally regarded by many persons who use it as having a sort of official certificate of harmlessness. The medical evidence produced yesterday is not at all calculated to support this view of its innocuous character, or to encourge ignorant people to put much faith in the supposed warranty which such a stamp carries with it. Dr. Diplock, who has had some experience before of the fatal results produced by these syrups, explained that some of them contained ingredients which may be harmless to one child, but 'most fatal' to another; and the medical man who had conducted the *post-mortem* examination averred that the bottle out of which the dose was taken contained enough poison to destroy half-a-dozen children. There are, no doubt, different kinds of soothing syrups, more or less poisonous in their character, and there may be some which are absolutely safe when taken in reasonable doses. But these later are most unfairly discredited through the ill-fame that now justly attaches to the others, while the credit of the Government itself is seriously impugned by its stamping with what is supposed to be a guarantee bottles containing such dangerous poisons as morphia and other strong narcotics. The revenue is, of course, benefited by allowing such mixtures to be stamped and sold, and would suffer considerably if the stamp were refused to all medicines containing any poison. But the public will very generally agree with the coroner's jury yesterday in thinking that 'some restriction should be placed on the sale of medicines which can be used as poisons.' It is often difficult to ascertain whether an overdose has been given or not; but in the case investigated yesterday it seems that even an ordinary dose may have caused death."

The Pharmaceutical Journal.

SATURDAY, OCTOBER 21, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

THE Thirtieth Annual Meeting of this Association was held on September 12 to 15, at Niagara Falls, New York, and commenced under the Presidency of Professor P. W. BEDFORD; in point of attendance it would appear to have been most successful, over three hundred members and fully as many ladies having been present. The meeting on the first day was, as usual, mainly devoted to the reading of the President's Address and to the routine work of organization. We hope on a future occasion to refer more fully to some of the topics discussed in this Address, and in the meantime refer our readers to some passages quoted om it on another page. The second session saw the election of the new officers, Mr. CHARLES HEINITSH, Lancaster, Pa, being the choice for President, w th Vice-Presidents from Maryland, Georgia and ιhode Island. Then there were the reports of the officers and committees; but further reference cannot be made to these here than to mention that the affairs of the Association appear to be in a most excellent and thriving condition, with a full supply in the treasury to meet all wants, and each department doing its share of the work well.

Several scientific papers were read at the second, third and fourth sessions, and were discussed at more or less length. The first paper was entitled, "Oil of Thyme of Commerce is said to be very often deprived of its Thymol. Is this Statement true?" The reply of Mr. J. L. LEMBERGER showed that from nine samples examined the yield of thymol varied widely, the lowest giving 0·42 per cent. and the highest 38·75 per cent. Only one other sample, however, contained as much as 16·67 per cent., the remainder yielding 6·67, 1·67, ·80, ·42, ·84, 7·92 per cent. respectively.

A paper by Mr. P. C. CANDIDUS gave the results of his experiments as to the solubility of officinal chemicals in dilute alcohol at 60° F., and at the boiling point. His paper can only be of service *in extenso,* as it deals entirely with figures.

Mr. G. W. KENNEDY read a paper on "The Quality of Mercurial Ointment in Commercial Use," the conclusion drawn from his investigation being that the bulk of that sold in the United States is probably bought for one-third mercury, instead of one-half, the strength ordered in the United States Pharmacopœia. Some of the samples examined had as low as 21 per cent. A few samples had nearly 50 per cent. This paper was succeeded by one on "The Manufacture of Mercurial Ointment," by Mr. EMLEN PAINTER.

Mr. J. H. FEEMSTER read a paper on "Guarana: the Percentage of Caffeine in Guarana and the Seed, the best Methods of Examination, and the best Menstruum for its Exhaustion." His experiments showed a percentage of 4·32 caffeine in guarana and 5·08 in the seed. The best method for its extraction was found to be that proposed by Professor E. S. WAYNE in 1877, the menstruum preferred being a mixture of 2 parts alcohol, and 1 part each glycerine and water (by measure).

Mr. R. H. COWDREY read a paper on "The Active Diastase in Extract of Malt." The author stated that when made and evaporated at a low temperature there was enough diastase in 1 fluid ounce of extract of malt to convert 1 ounce of starch into dextrine and sugar, but that most extracts of malt would not respond to such a test, because the diastase was injured in the evaporation by too great heat.

A paper on "Percolation, advancing some new Theories as to its *Modus operandi*" was partially read by Mr. N. ROSENWASSER, but owing to its length was referred to the Committee on Publication.

Professor P. W. BEDFORD, New York, read a paper on "The Quality of Commercial Salts of Bismuth." Six samples examined proved all to be well made, containing only traces of impurities, while as to the presence of arsenic, the quantity in 1000 grains varied from $\frac{4}{10}$ to 3 grains.

A paper on "Creasote of the Market," by the same writer, showed that the principal supply, and that which is sold chiefly in the United States, is the coal tar creasote or carbolic acid; but that the true wood creasote is to be had, and pure, without any difficulty.

Mr. WILLIAM SAUNDERS read a paper on "The Germination of Medicinal Seed." This was followed by a paper, sent by Mr. C. SPENCER, on "The Quality of Fluid Extract of Hydrastis Canadensis of the Market," showing, as judged by the analyses made, that there is considerable variation in the formulæ followed.

Professor W. T. WENTZELL furnished a paper on "Phosphoric Acid," the chief interest in which was a method for making the acid direct from phosphorus by the oxidizing influence of a moist atmosphere.

Mr. C. B. ALLAIRE read a paper on "Powdered Drugs and their Adulterations," in which he asserted that after an extensive examination he was of opinion that 40 per cent. of the drugs sold in the United States are impure.

In a paper on "Boracic Acid," Mr. E. DANA referred to its uses, and gave formulæ for various pharmaceutical preparations. Professor E. L. Patch presented a paper on "Gentio-Picrin," being a continuation of some investigations reported at the meeting last year; and Mr. A. Conrath presented a paper on the "Alcoholic Strength of various Fluid Extracts," by which it appears that in commercial extracts it varies considerably from the standard of the United States Pharmacopœia. The list of papers was completed by one by Professor J. U. Lloyd on "Precipitates in Fluid Extracts," which was a continuation of his paper of last year, and one of the best contributions to the meeting.

At the third session the following gentlemen were elected honorary members:—Thomas Greenish, Peter Squire, Joseph Ince, Michael Carteighe, and George W. Sandford, London; George F. Schacht, Clifton; Richard Reynolds, Leeds; Christian Brunnengräber, Rostock; Carl Schacht, Berlin; I. Martenson, St. Petersburg; and Nicholas Sinimberghi, Rome.

At the same session, Dr. W. B. Carpenter, of London, was introduced, and delivered an address.

The social features of the meeting were exceedingly pleasant, and were well carried out by the Committee of Entertainment. The next annual meeting will be held in Washington, D.C., on the second Tuesday of September, 1883.

SIEMENS'S ELECTRIC FURNACE.

Dr. C. W. Siemens and Professor A. K. Huntington read an interesting paper before Section B of the British Association, during the Southampton meeting, detailing a considerable number of experiments made with the "electric furnace." The general ideas and essentials of this apparatus have been previously described in this journal (*Pharm. Jour.*, [3], xii., p. 1030). In the present experiments a very powerful current, produced by five dynamo machines, driven by an engine of 12-horse power, was employed. The current in ampères varied from 250 to 300. The intensity of the heat was such that the most refractory clay crucibles supplied by the Patent Plumbago Crucible Company were invariably cut through in a few minutes, and except for experiments of short duration were useless. Plumbago crucibles stood extremely well. Obviously, however, they could not be employed for all purposes owing to their tendency to cause carbonization of the metal experimented with. In some experiments the fusion of the metal was effected in a bed of lime, sand or electric light carbon dust. The latter is a very bad conductor, and as in the case of lime and sand allows the arc when once formed to maintain a passage through it to the metal beneath. Experiments were made with wrought iron, steel, white iron, cast iron, spiegeleisen, silicious pig iron, nickel, copper, platinum and tungsten. Six pounds of wrought iron was fused in twenty minutes; on pouring into a mould the metal was found to be crystalline, and could not be forged. White iron fused in a clay crucible for thirty minutes when fractured did not appear to have undergone any change. As much as twenty pounds of steel files was melted in one hour; the metal was, however, invariably full of blowholes when working with such large quantities as this. Cast iron fused and kept under the action of the arc forty-five minutes in carbon dust was not materially changed as to greyness, and the general character of the metal as to the way in which it worked under the tool was not materially altered. The object of the experiment was to ascertain the maximum amount of carbon iron is capable of taking up under circumstances presumably the most favourable. The result is hardly that which would have been anticipated. When spiegeleisen was fused in a plumbago or a clay crucible graphite separated as the metal cooled. Silicious pig iron, containing about 10 per cent. of silicon, was fused by itself; it showed but little change, except that some graphite had separated. One pound of grain nickel was fused and poured in eight minutes. The fused metal had a brilliant granular fracture; it could not be cut properly in the shaping machine, shearing off under the tool. One pound of grain nickel fused in carbon dust for twenty-five minutes, yielded a dark grey carburized metal, which worked well under the tool. Three-quarters of a pound of copper was fused for about half an hour in carbon dust. On examining the result it was found that *all but three-quarters of an ounce had been vaporized.* Those who were present during the experiments suffered no ill effects from the atmosphere charged with copper, which they must have breathed. As much as eight pounds of platinum was rendered perfectly liquid in a quarter of an hour. The greatest difficulty was experienced in satisfactorily fusing tungsten; it was, however, accomplished for the first time on record, being previously known only as a grey powder. Tungsten when fused in the electric furnace is, when untarnished, pure white and brittle, the grain being very close. It was found to have its fusing point lowered by addition of carbon. The conclusion is drawn that the amount of any given metal which can be successfully fused in the electric furnace is dependent on (*a*) the relation between the volatilizing point and the fusing point, *i.e.*, the extent to which the volatilizing point is higher than the fusing point; (*b*) the conductivity of the metal for heat. It thus happens that platinum can be more readily melted than steel and in greater quantity for a given expenditure of energy.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association will be held at 32a, George Street, Hanover Square, on Wednesday evening next, October 25, at 9 p.m. precisely, when a paper, "A Summary on Cinchona Barks of Commerce," will be read by Mr. William Elborne.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, the 4th inst., at the College of Physicians, Kildare Street, at three o'clock.

The President, Dr. Charles Tichborne, in the chair.

The other members present were:—Messrs. Allen, Bennett, Brunker, Doran, Grindley, Hayes, Hodgson, McIlwaine, Dr. Montgomery, Dr. Collins, Messrs. Payne, Pring, Simpson and Wells.

Mr. Hugh Fennell, the Registrar, read the minutes of the last meeting, which were confirmed.

A letter was read from Dr. Creed Meredith and Dr. Dunne, Secretaries of the Royal University, stating that certificates for practical pharmacy given by a pharmaceutical chemist were accepted by that University, the words of their regulation on the subject being "under an apothecary or a pharmaceutical chemist." If this did not meet the views of the Council the letter requested them to communicate.

The President: A paragraph on the subject should be inserted in the Calendar.

Mr. Fennell: The word "Irish" is not used.

Dr. Montgomery: They do not intend that there should be any objection to an English pharmaceutical chemist.

Mr. Hodgson: Would one of our pharmaceutical chemists be granted the same privilege in England?

The President: You cannot dictate to the Royal University what privileges they will give to anyone.

Mr. Hayes: It does not concern us whether they will admit Englishmen to the privilege in question or not. They say they will admit our pharmaceutical chemists, and that is all that we have to do with.

Mr. Brunker: The Royal University is an Irish body, and only contemplates the granting of degrees in this country.

Mr. Payne: The English Pharmaceutical Society would not recognize our certificates.

It was ordered that the Registrar should acknowledge the letter of the Secretaries of the Royal University, and state that the information conveyed therein was satisfactory.

A letter was received from Mr. David Baxter, M.P.S.I., asking for a duplicate of his licence, which, his letter stated, had been torn in transmission.

After some discussion,

On the motion of Dr. Montgomery, seconded by Mr. Hayes, it was ordered that Mr. Baxter should be informed that the Council could not grant him a fresh diploma, but would give him a certificate stating that he had passed the examination, on his paying a fee of 10*s.* 6*d.*

A report of the Law Committee was read stating that a case having been submitted to Mr. Purcell, Q.C., as to the legality of pharmaceutical establishments conducted by the representatives of deceased apothecaries who had not been registered as pharmaceutical chemists, Mr. Purcell had given the following opinion:—"I am clearly of opinion that neither of the cases comes within the provisions of the 32nd Section of the Pharmacy Act, Ireland, which applies only to the representative of a pharmaceutical chemist or druggist who was registered as such during his lifetime: and, therefore, that the parties are not entitled to carry on the business of a pharmaceutical chemist or druggist under that Act. Nor are they so entitled as representatives of a licentiate apothecary, as the Apothecaries Act contains no provision enabling them to do so. By doing so, therefore, they incur, in my opinion, the penalty imposed on them by Section 30 of the Pharmacy Act."

It was pointed out that apothecaries had the privilege of registering as pharmaceutical chemists and thus obtaining the privileges given under the Pharmacy Act, by the payment of a fee of three guineas.

On the motion of Mr. Hodgson, seconded by Mr. Grindley, the report of the Law Committee was adopted.

A report of the Certificate Committee dealt with the case of Mr. Walter Boyd, who sought to be admitted to the examination. He had made a declaration stating that he had been engaged for upwards of two years in the compounding of prescriptions and in practical pharmacy under the superintendence of the late Mr. John Goodwin, at No. 6, Merrion Row, but that the sudden and unexpected death of that gentleman prevented him from obtaining a certificate from him.

The Registrar, by direction of the Committee, wrote to Mr. Boyd asking if, during the time named in his declaration, he had been engaged in the *bonâ fide* practice of pharmacy at 6, Merrion Row, and not elsewhere; and he now replied, stating that he had been exclusively so engaged at that place during the time mentioned in his declaration.

After some discussion,

On the motion of Mr. Brunker, seconded by Mr. Hayes, it was resolved:—

"That Mr. Boyd's declaration be accepted in lieu of a certificate."

The Council then proceeded to consider the recommendations of the Pharmacy Act Amendment Committee. The first was:—

"That no pharmaceutical chemist or apothecary shall legally hold a branch establishment for the retail of poisons or compounding of prescriptions except under the responsible management of a duly qualified pharmacist."

Mr. Wells thought that the word "apothecary" ought to be inserted after the words "duly qualified pharmacist."

Mr. Hodgson: We have no power to deal with apothecaries.

Dr. Montgomery was of opinion that it would be best to legislate for themselves, and to leave the apothecaries out. Let the Apothecaries' Hall deal with them. It would lead to ill-feeling between the two bodies if they used the word "apothecary."

Mr. Hayes: Send a letter to them and ask them would they approve of the insertion of the word "apothecary." The object is that an apothecary shall not open half-a-dozen shops without having a qualified assistant in each.

Mr. Wells: I do not think they can do that now.

Dr. Montgomery: An apothecary may have either an apprentice, or an assistant who must be qualified under the Apothecaries' Act, under a penalty of £20.

Mr. Allen: A pharmaceutical chemist should be enabled to employ an apothecary if he chooses. If you don't add the word "apothecary," he must have a pharmacist.

Mr. Brunker expressed a similar opinion.

The President: My view is that we should assist the apothecaries in this matter. We asked the assistance of the Apothecaries' Hall in these amendments, and they said they were quite willing to act with us and to give us every assistance. Let us submit to them for their opinion a copy of the resolution with the word "apothecary" inserted. We may be doing them an injury by not inserting the word. It is used all through the Pharmacy Act.

Mr. Pring: An apothecary can register as a pharmaceutical chemist by paying three guineas. That gets over the difficulty at once.

The President said he thought that would meet the case.

The recommendation was unanimously adopted originally stood, but leaving out the word "apothecary.'

The next amendment proposed by the Committee was:—

"That all assistants engaged in dispensing must give sufficient proof of their competence by examination, or by having passed a sufficient time as apprentices."

Mr. Wells: Three years ago a resolution was passed that there should be an examination for assistants.

Mr. Pring said that it was very difficult to get assistants, and if an examination were made indispensable it would be a great deal more difficult. He believed that every man in his establishment was a qualified man, but they had not passed examinations for their places, although they might have passed them in England or elsewhere.

Mr. Brunker: The feeling of the Society is that there shall be an examination for the assistants.

Mr. Wells: But not a compulsory one.

The President: If you do not make it compulsory you need not have it at all.

Mr. Payne said he did not agree with the second recommendation. If adopted it would put a difficulty in the way of getting good assistants. They were hard enough to get at present. At present they got a very good class of assistants from Scotland and England, who possessed a great deal of practical knowledge because they had served apprenticeships.

Mr. Hayes: We shall not be prevented from having Englishman or Scotchmen if we wish it, but the adoption of this recommendation would prevent it.

Mr. Simpson considered that the recommendation, if passed, would interfere immensely with business.

Mr. Hodgson: What will you gain by passing this recommendation? Every respectable compounder feels that his position and his means depend upon the duties which he has undertaken being critically and properly performed, and, therefore, for his own safety he will be careful as to whom he engages as an assistant. It almost amounts to telling gentlemen that they require to be taught how to engage assistants.

Dr. Montgomery was in favour of having an examination for assistants. They had to look not to gentlemen occupying such positions as Mr. Pring or Mr. Payne; they had to take care of the interests of minor men.

Mr. Payne moved that the recommendation be rejected.

Mr. Wells seconded the motion, which was carried, Dr. Montgomery alone dissenting.

The third and last recommendation was as follows:—

"That all candidates for the licence shall be required to produce evidence of having passed three years in a *bonâ fide* apprenticeship to an apothecary or pharmaceutical chemist keeping open shop."

Mr. Hayes moved that the term be a minimum of five years.

Mr. Pring seconded the motion.

The President begged of the Council carefully to consider this proposal. It involved two points. First, were they likely to get Parliament to approve of such a clause. He was quite sure they would not as compulsory for a licence. Next, was the proposal a fair one. No doubt it would be the best thing that could happen to any youth to be in such an establishment as that of Mr. Pring for five years; but there was no earthly object in insisting upon an apprenticeship. That Council had nothing to do with the exigencies of trade. They were custodians of an Act of Parliament. The preamble of it declared that there was a scarcity of compounders in Ireland, and that it was desirable to create pharmaceutical chemists. The pharmaceutical chemist in that country owed his existence to the fact that there were not enough of men in country places to compound prescriptions. Therefore the Council should put aside every personal consideration in this matter and only have regard to whether or not they were properly carrying out the requirements of the Act of Parliament. That there were not enough of pharmacists in the country was plain from the fact that the Registrar of the Apothecaries' Hall had received five applications within the last six months, and two within the last week, for qualified men, either pharmaceutical chemists, or apothecaries, to take charge of establishments in the country, and he had been unable to get the men. Therefore would the Council be justified in putting restrictions upon candidates coming forward for the licence? If they thought three years a desirable minimum to teach a man his business, let them make that the term: it would not preclude the party from spending five years, or the principal from getting him as an apprentice for six; but that was a personal arrangement. There was no doubt that apprenticeships, particularly in country places, had been abused; and also that the system of apprenticeship was to a great extent exploded and gone out amongst medical licensing bodies. In a first-rate establishment the apprentice was in his right place, but he knew two or three very large establishments, in which six or seven men were employed at compounding, and in those establishments, nevertheless, they would not take apprentices. Had they any right to say to those assistants, that although they might have obtained the greatest skill and experience they should not come forward for the licence, simply because they had not submitted to a kind of black mail which was only imposed for the benefit of the employer? (No, no!) Well, that was his (the President's) opinion with respect to the apprenticeships. He also strongly objected to so long a period as five years being a minimum at present. On the other hand if they made it three years now they could, if necessary, lengthen the period by degrees afterwards. Besides there were other important educational branches as well as compounding. In England they were going to make theoretical and practical chemistry, botany and materia medica compulsory. His experience was that it was in these subjects that the dispenser failed. He therefore urged that the clause should provide that the person had passed three years as a *bonâ fide* "apprentice" or "assistant" to an apothecary or pharmaceutical chemist keeping open shop.

Mr. Wells: Have they it in England?

The President: They require a three years' apprenticeship, but I believe it is not strictly carried out. The want of it is winked at.

Mr. Brunker said he was not for adhering to the word "apprentice" in the clause, the words "or assistant" would answer the purpose. The President had spoken of large establishments that did not take apprentices, but if they went through those establishments they would find that every one of those assistants had served an apprenticeship elsewhere. He (Mr. Brunker) did not take apprentices, and yet every assistant in his establishment had served an apprenticeship elsewhere.

The President: I do not think that is always the case.

Mr. Brunker said it would be found that there were very few assistants that any of them would care to engage as compounders, who had not served an apprenticeship somewhere. Apprenticeship was not so inconsistent with the spirit of the times as the President appeared to suppose. It was very general in the business; and it was very important in the interests of pharmacy that some such regulation as that which was proposed should be laid down in a hard and fast way. They had seen how much difficulty arose from having matters left open. They had been fighting for month after month over the certificates of certain candidates for the licence, simply because the law was not laid down clearly as to what were the requirements in practical pharmacy from those candidates. Therefore, whether they made the term three or five years, let it be a hard and fast rule about which there could be no dispute. He believed himself that three years should be the minimum term for both apprentices and assistants, and he would not object to five years.

Mr. Wells was not sure that there was such a want of assistants. There were vacancies in one of the poor-law unions for which there were nearly twenty applicants. He knew of other situations for which first-class men were wanted, but only small salaries were offered.

Mr. Hodgson said they were now dealing with candidates for the licence and not assistants. He was completely opposed to the principle of apprenticeship. He considered that the adoption of it would be a move backward. Apprenticeship was completely ignored in the Pharmacy Act, and very properly. The principal was paid for the apprentice, who no doubt learned the general details of the business; but his relation of apprentice did not at all imply that he would be occupied in compounding during his term. The Pharmacy Act did not contemplate apprenticeship, but contemplated that the man should be occupied in compounding and practical pharmacy. It was for the purpose of opening the door to the Major licence for carefully trained compounders of medicine that apprenticeship was ignored in the English Pharmacy Act, and he now objected to any attempt to set up apprenticeship by a side wind.

The President: It is contrary to the spirit of the country.

Mr. Hodgson: It is contrary to the spirit of the Act of Parliament and I do not think it would work well. By adopting what is proposed you would shut out a great many competent and thoroughly qualified compounders.

Dr. Montgomery moved that the further discussion of the recommendation be adjourned to the next meeting. It was getting late and members of the Council were leaving.

Mr. Hayes seconded the motion.

The President: It should be understood that the first two recommendations have been disposed of.

Mr. Payne asked if a resolution were sent to the Privy Council and sanctioned by them, would it not have the same force as an Act of Parliament.

The President: Not if it were contrary to the Pharmacy Act.

Mr. Brunker gave notice that when the discussion of the question should be resumed he would move that all candidates for the licence should be required to produce evidence of having passed three years *bonâ fide* in the exclusive employment of an apothecary or pharmaceutical chemist keeping open shop.

The motion of Dr. Montgomery was then put and agreed to.

Mr. James Gray Fyvie, of Coleraine, was elected a member of the Society.

Some financial business having been disposed of, the Council adjourned.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The opening meeting of the session was held on the evening of Wednesday, October 11, in the rooms of the North British Branch. Mr. Peter Boa, President, in the chair.

The minutes of the last meeting having been read and adopted—

Mr. Boa first made a few introductory remarks in which he pointed out the great value of such an Association, and the eminent desirability of every assistant and apprentice availing himself of its advantages. He also referred to the honour which had been conferred upon him by being elected their President, a position carrying with it a responsibility, which no feeling of inability on his part would prevent him from endeavouring to fulfil to the best of his power. Having urged the members to be regular in their attendance, so that the splendid audience which he was so gratified to see on the opening night might be continued during the session, he proceeded to deliver the inaugural address.

Mr. Boa said that the business of a chemist and druggist, as it is now conducted in these realms, was a very unsatisfactory one. Part of the work was worthy of being called professional, but another portion of the work could not by the greatest stretch of imagination be so denominated. It was this mixture of the professional and commercial types, which was the cause of all the ills to which the pharmaceutical body is heir, because the two were not compatible. Between the man of business and the professional man there was a well marked difference and it was useless to expect to have in one man, or business, a satisfactory combination of the two, unless on rare occasions. Until a condition was attained in which the two should be kept apart, pharmacy would not have attained its true position. The practice of pharmacy should be removed from the conditions and influences which make it necessary for its members to discuss the propriety of competing with co-operative stores, grocers, drapers, and such like, in the prices of patents and other commodities of a similar character. In dealing with stores the members of the public were not surprised if they found themselves occasionally "done," but they did not hesitate to run this risk for the sake of the average saving. With a pharmacist it was entirely different; to hm no suspicion of even a possibility of his supplying drugs of inferior quality should attach. To supply drugs of genuine quality and compound prescriptions in the most approved style was the proper province of the pharmacist, and in this he need never fear competition from stores. If he made himself a specialist in those things he need not fear any encroachment on his territories by unqualified persons. Specialists were the order of the times. The public demand them in every department of commercial or professional life. "Cutting" grocers and co-operative stores were specialists. In the departments in which they generally compete against pharmacists the latter are not specialists, hence the reason they found themselves defeated. In the case of drugs pharmacists argued that they were entitled to an extra profit on account of the guarantee of quality which the purchaser had in buying them from men who are specially trained to the recognition and testing of genuine specimens. The public was willing to admit this, but scarcely recognized the same argument in the case of retailing a tin of Swiss milk. When a man, through force of circumstances, engaged in work not in keeping with the business to which he had been specially trained, he did that work in an unsatisfactory manner. For instance, medical men who dispensed their own medicines invariably executed their compounding in as lovenly fashion, doing it under a state of chronic protest. So, in like manner, chemists, having to trade in articles belonging to the category of grocers or perfumery, conducted this portion of their business in a way which did not always give satisfaction to their patrons. There were at present few chemists' businesses that were not "mixed," the difference being only one of degree; but until this class of business disappeared there would always be anomalies which would prevent the public from according to the calling the respect and standing to which it was entitled on account of the knowledge and attainments of many of its members. This, however, would require many years for its attainment, but he did not despair of its being by-and-by brought about. There was great reason to be encouraged by the improvement in the status of pharmacists in recent years. It was only fourteen years since the compulsory examinations were established. Complaints were made that unqualified persons still conduct businesses and yet escape punishment. To the speaker fourteen years did not seem a very long time in which to effect a complete reorganization of a whole trade or profession throughout a country, and he was disposed to wonder rather that there were not more unqualified persons in practice than that there were any. The compulsory curriculum which it was proposed to establish for chemists and druggists was a subject now occupying some attention. At present there was an indefiniteness in the training of pharmacists which was highly to be deprecated in the case of a profession, the members of which were entrusted with such grave responsibilites, not only because it failed to satisfy the ideas of those who had to trust them, but on account of its leaving it possible for a chemist to go into business with an imperfect acquaintance with some parts of his duties which he might ever afterwards regret. In justice to himself and those who trusted him to compound their medicines, a definite course of scientific study ought to be established for a pharmacist. It would be the first step in establishing a status for him, which might have a reasonable claim to be designated professional. To make a student take certain classes at a university before he presented himself for examination would give some guarantee that he had been educated for the responsibilities he would be legally entitled to undertake should he satisfy the examiners. True he might pass the examination well without this course of training, but the mere fact of his doing so would never give him the standing that both taken together would confer. The percentage of failures in the examinations of the Pharmaceutical Society was larger than in those of any other examining body in the kingdom. He had not heard anyone say that the mental calibre of the men who became pharmacists was inferior to that of those who enter any other business or profession in which examinations are required. He might say that he was surprised rather that the percentage of passes was so high, and he considered it much to the credit of the candidates that they go up so well prepared as they do, when only a very small percentage of them had the advantage of a systematic preparation. If there were any means of obtaining a return of the failures of those who present themselves for examination after a course of training, say at Bloomsbury Square, he was confident that the percentage would be found very small indeed. This went to show that it was not the capacity of the candidates that was at fault, but rather the means at their command for acquiring the information required of them. In the event, too, of pharmaceutical students having to attend several of the classes at the Universities, they would have the opportunity of associating with the medical students who are to form their contemporary generation of physicians and surgeons, and in this way many friendships would be formed, and much done to promote reciprocity of confidence and respect. Another matter in which some changes on the present custom would have to be made, was the training of apprentices. At present the apprenticeship of a chemist and druggist was not an attractive period of his experience. In view of a compulsory curriculum and a professional status there must needs be some modifications of the present means of introducing him to his professional work. At present the initiatory stages of his career were largely taken up with dusting bottles, polishing drawer fronts, and, in some cases, washing measures and mortars—work which more appropriately belonged to some one whose educational advantages did not warrant his undertaking more responsible employment. The supporters of the present system said that at the outset the apprentice must learn habits of neatness, arrangement, etc., and that his period of bottle dusting was eminently calculated to enable him to acquire these; that by washing and drying the measures and mortars he acquired a familiarity with their handling, which world give him confidence in using them. The truth of these arguments he did not question, but those who advanced them seem to forget, however, that a lad who had been well brought up might have acquired neat and methodical habits before the time when he began his business career; and as for the confidence in the use of measures acquired by washing them it might as well be said that it is necessary for a man to go through a course of cleaning guns before he learns to shoot. Whilst, however, the present system of conducting the business continued it might be expected that more or less of the work now falling to the lot of the apprentice would still devolve upon him. The many and various ornamental accessories of the shop must be kept bright. Carboys, specie jars, show cases, fancy drawer fronts, elaborately labelled bottles, all these required constant attention to maintain the brilliant appearance which they were intended to give to the establishment. But good reason for maintainimg so scrupulously the present style of conducting business he failed to apprehend. The carboys of coloured water and specie jars with elaborately painted devices were relics of ancient times when the art of an apothecary was considered to be associated with the supernatural. The presence of these things did not lend any additional effect to the medicines. Their presence would not tempt people to buy more physic than they would do were they absent. The cost of their original purchase and of maintaining them was considerable, and the consequence was that the chemist had to resort to a trade in sundry commodities extraneous to his legitimate business in order to gain a living. For the purposes of a compounder of medicines all that the pharmacist required was a room or rooms, fitted with shelves, drawers, bottles, etc., for the storage of the drugs. His name and occupation could be advertised by a brass plate affixed to his door. It would be an advantage to the chemist not to have his laboratory open to the interruptions caused by any small boys who may find it convenient to run in for "coppers for a sixpence,"—as not unfrequently happened under the present arrangements. It was now considered unnecessary and in fact undignified to expose stock in the windows of a chemist's shop, and he hoped in a few years it would be unnecessary for a chemist to incur the expense of a shop at all.

Mr. C. F. Henry, in proposing a vote of thanks to Mr. Boa, said there could only be one opinion as to the instructive, and useful, and philosophical address to which they had all listened, he felt sure, with pleasure. He had come there expecting a good deal, but the result had exceeded even his highest anticipations. The address contained many very original ideas, some of which might prove matter for discussion during the present session. He did not think druggists ought to be frightened by the competition of stores, grocers, etc. It was well known that the drugs retailed in such places were, as a rule, of an inferior quality, and sooner or later the public would find out that if they wished to purchase drugs of reliable quality, they must do so from those who, from their special knowledge and training were competent to guarantee the purity of their wares. He had no doubt that the members of the Association would feel that they had been highly honoured by the attendance at their opening meeting of the President and other eminent members of Council of the North British Branch, and he had very great pleasure in inviting those gentlemen to address to them a few words of encouragement and advice.

Mr. J. R. Young said that he had great pleasure in seconding the vote of thanks to Mr. Boa. It was the first time he had been present at a meeting of this Association, and he was much gratified to see such a meeting. The address contained some very novel ideas, and some which had evidently been well weighed, and which had an important bearing upon the business of a chemist and druggist. He agreed with very much that had been said as to the training of apprentices, but believed that the introduction of the proposed compulsory curriculum would remove many objectionable features in the present state of things. An apprentice who had passed the Preliminary examination before entering the trade could hardly be expected to spend two or three years washing measures, dusting bottles, running messages, etc., and yet it was essential that he should have some training in the practical details of his calling. He thought they were still very far from the time when the chemist's shop would give place to a room in his private house, and the signboard to a brass plate on the door. On the Continent pharmacists were generally considered to be much in advance of them in professional status, and yet they still had shops, and he thought that no such serious change was likely to come about for many a long year to come. The cause of pharmacy had been greatly benefited by the efforts of the fourteen years which had elapsed since the institution of compulsory examinations. Looking back about twenty years he remembered that the assistants of that period had some meetings to get the hours of business shortened or something of that kind, but a meeting such as this and an opening address such as he had just listened to could not have been had at that time. He concluded by referring to the many advantages to be derived from such an Association, and expressed his earnest wish for its continued prosperity.

Mr. Alexander Napier, President of the North British Branch, had much pleasure in supporting the vote of thanks which had been proposed. By coming there that night his thoughts were thrown back to a time when an Association of a similar kind, though with comparatively very small numbers, existed in that city. They used to meet in a room in Princes Street, about the year 1862 or 1863, and he remembered that they had many enjoyable gatherings and many interesting papers. Some of those who were connected with that Association had now removed to other countries, but they still showed their appreciation of old acquaintances by occasional contributions to the North British Branch of the Pharmaceutical Society. He earnestly desired to see the Association prospering because he believed it to be a nucleus of very important and valuable influence.

Mr. J. B. Stephenson said he was very glad to be present that night, because he had known that for several years this Association had been doing good work. He had no intention to criticize the address, although it contained a good deal of explosive matter, especially toward the close. He would heartily congratulate Mr. Boa on his excellent address which contained many views which he had himself given expression to, on more than one occasion, from that chair. There was just one bit of advice which he would like to impress upon the members of this Association, and that was, that success did not depend upon numbers but upon individual effort. No matter how large the membership of such an Association as that might be, unless they had individual effort they could not succeed, and that was a principle which he would strongly advise every member to bear in mind and act upon. He had already congratulated Mr. Boa, and he would conclude by congratulating the Association on the truly academic address to which they had listened.

Mr. William Gilmour said he had been asked to say a single word, but he did not think it was necessary to add to what had already been said as to the excellent address to which they had listened. He believed that this Association was a great educational institution and that it gave a good tone to the whole profession. The department of their work to which he would more particularly refer was the prize competition for apprentices which they had just instituted. He would strongly advise all apprentices to avail themselves of that opportunity. Not that every one would get a prize, because that could only be the fortune of two; but, even if they should not be successful in gaining a prize, the experience of going in for the examination would help to give them confidence in the future. He observed that this confidence in going in for an examination had been emphasized by Mr. Ince, the other day, in his inaugural address to the students at Bloomsbury Square, and he believed it was of very great importance and that they were, as a rule, far too frightened for examinations. He thought there were many points in Mr. Boa's address which were worthy of the highest commendation and that it struck a keynote which he hoped would be maintained throughout the whole session.

The discussion was continued by Messrs. Crowden, Hill, Low, and McEwan, and the vote of thanks was briefly acknowledged by the President.

The Secretary then made a statement as to the apprentices' prize competition, and the President having intimated that the next meeting would be an open one, and would be held on Wednesday, November 1, the meeting was closed.

Proceedings of Scientific Societies.

AMERICAN PHARMACEUTICAL ASSOCIATION.

This Association commenced its Thirtieth Annual Meeting, on Tuesday, September 12, at Niagara Falls, N.Y. A lengthy and interesting address was delivered by the President, Professor P. W. Bedford, from which the following passages are taken:—

In many of the States where Pharmaceutical Associations have been formed there now exist Boards of Pharmacy, organized under State laws, which have been aided by the action of the State Association. Unfortunately, in a number of States the Associations have failed to secure the passage of pharmacy laws.

During the present and preceding years such failures have occurred in Massachusetts, New York, Pennsylvania, Louisiana, Virginia, and possibly other States. So far as I have been able to procure statistics, pharmacy laws exist in the following States:—Maine, New Hampshire, Connecticut, Rhode Island, New Jersey, West Virginia, North Carolina, South Carolina, Georgia, Alabama, Iowa, Illinois, Wisconsin, Missouri, and Kentucky; and in the cities of New York, Brooklyn, Philadelphia, Baltimore, Washington, Cincinnati, and San Francisco.

Pharmacy laws in the United States never can be made uniform. The feasibility of obtaining the favourable consideration of legislators to a fair, uniform pharmacy law is one of the possibilities of a later if not a "latter" day; but at present the literature of pharmacy laws is an entanglement of the mind in the mazes of legal enactments.

It seems that in the most of the Boards of Pharmacy there is a fair yet just and conservative rendering of the laws applicable to the subject.

From a correspondence with all the Boards of Pharmacy mentioned, I am led to believe that each board tries to faithfully execute the laws under which they are appointed. These laws vary, however, widely; in some cases permitting all in business to become registered, in others requiring an examination of all persons who have not been in business on their own account for a term of years.

Candidates are required to undergo an examination, usually before each member of the board to which he applies; and, on a comparison of replies to my inquiries I find that the lowest percentage at which any candidate can be passed successfully was 60 per cent., while in one or more boards they decline to pass any who fall below 80 per cent.

From the replies received by me from the Boards of Pharmacy, it would appear that on the first examination about 60 per cent. of the candidates are successful, the remaining coming up one or more times until successful or refused further examinations.

In some instances copies of questions used by the Boards of Pharmacy have been submitted to me for my own information on the subject, and it is fair to state that in every such case I have found them common-sense, practical questions, calculated to bring out knowledge rather than to surmise what the answer should be.

Under this incongruity of pharmaceutical legislation it seems almost impossible for Boards of Pharmacy to take any concerted action, save an agreement to increase the care exercised in questioning and valuing the replies of applicants examined.

To make the certificates of proficiency exchangeable in the several parts of the Union to which their possessors might direct their footsteps would seem to be not only impossible, but in some cases a positive error.

There should be a difference between the standing of one who has passed under a lax law and one who has been subjected to a critical examination, and both these should be of less value than the college diploma, which is a guarantee that its possessor has given the time to carefully pursue a pharmaceutical course of study and has gained his honour after an examination that is usually a very thorough one.

The college graduate necessarily has the advantage in education and thoroughness. I would not be considered as discouraging Boards of Pharmacy or unduly extolling the College of Pharmacy, but it seems a self-evident fact that the practical student with a college training is the man that will make the better mark in his life-work.

To-day I plead the cause of pharmaceutical education. I would call your attention to what the founders of this Association recorded at their meeting thirty years ago on this very subject:—

"The subject of pharmaceutical education being considered of paramount importance by this Convention, and having been deliberated upon by its committee, the following resolutions have been adopted expressive of the sense of the Convention in reference to this important subject: It is resolved—

"'1st. That this Convention earnestly recommends to the practising apothecaries in all sections of the United States, in places where they are sufficiently numerous, that they should organize themselves into societies for mutual improvement as pharmaceutists, for the encouragement of pharmaceutical literature by the formation of libraries, and for the adoption of rules of conduct calculated to elevate the character of the profession among them.

"'2nd. That as schools of pharmacy are the most effectual aids to the student, this Convention respectfully recommends to pharmaceutists in all cities where they are numerous, to take measures for the establishment of such institutions as powerful means of improving the education of their assistants and apprentices, and thus benefiting themselves and the public.

"'3rd. That this Convention also recommends that more attention should be given by proprietors to the claims of apprentices or assistants, who are in course of study, as regards the facilities for learning, and the tuition which of right should proceed from them (the proprietors) in the absence of schools of pharmacy, especially in the provision of the best books of reference on the several subjects that claim the attention of students of pharmacy.

"'4th. That in the opinion of this Convention it is desirable that apothecaries should be more generally careful, in taking pupils or apprentices, in reference to their fitness as regards natural endowments and preliminary education, believing that many persons who are now engaged in pharmacy and unfitted for its duties might thus have been prevented from misapplying their time and abilities in a profession for which they are not calculated.'"

Surely these resolutions of thirty years ago have the true spirit which should animate not only this Association collectively, but each member individually.

Boards of Pharmacy are, or should be, only a means to an end. They are intended as a safeguard for the present time, a method only to weed out the utterly incompetent, but they are not now, nor were they ever intended to be, educational.

The pharmacy law of England enforces an examination much more rigid than is carried out here, but it would seem that even there, to a large extent, the education given in most all the institutions have solely for their object the success of the candidate before the Board of Examiners, rather than a solid education.

Contrasting the educational establishment of the Pharmaceutical Society of Great Britain with the Colleges of Pharmacy of Philadelphia or New York, we would call the English organization a financial failure. Its students are comparatively few as contrasted with the two colleges named, certainly not more than one-fourth in number, yet there can be no doubt that its course of instruction is thoroughly practical and sound.

Throughout Great Britain there have been established rival schools, to "coach" or "cram" the applicants preparatory to the examinations.

Punch has aptly compared such teaching to the process by which water is charged with carbonic acid, and the examination to the removal of the cork which lets out all the knowledge attained, and they are never able afterward to come up for an examination without being crammed all over again.

There are some who are born pessimists, who see no bright future in pharmacy; who are for ever lamenting the days of the past, when the public were not so enlightened on facts relative to our business; when competition was not so sharp; when education and knowledge were not so necessary as now; who fear that business laws are tying them down as slaves to certain modes or business regulations, and they wish for the days of the past to be revived. No such lamentations are available. The present and the future have demands that must be met and conquered. The "sign of the times" is a sound and thorough education—one that will fully fit the young pharmacist to cope with the scientific problems of our business as well as the simple knowledge of cost and gain on his merchandize.

Those who have no soul above the merchandize side of our calling will ere long be left behind in the race, and it will be truly the "survival of the fittest."

Regarding the examinations of pharmaceutical students a few words may be added.

The records of the examinations in London show that fully one-half of the applicants fail on their first effort.

Doubtless the examinations are rigid, but from a careful examination of the papers with which I have been favoured in the past I should say that they were none too much so under the circumstances.

Of the large number of applicants but a small proportion fit themselves properly by education, but, seeking a shorter road, attend the establishments where they are forced into a superficial knowledge, and when the days of examination come, they risk their success, usually as risky as successful.

The colleges of pharmacy in our land are acknowledged to be excellent in their methods of teaching. Those who attend their instructions may be classed as the more intelligent and promising of those who are growing up in the ranks of pharmacy. Yet even with the large numbers of those availing themselves of such education, not one-tenth of the young men are attending our colleges of pharmacy. What is being done for the other nine-tenths? It is not my observation that employers, as a class, give themselves much trouble to advance the technical knowledge of their *employés*, being as a rule more anxious to have them know the money value than the properties of the commodities they handle.

The founders of this organization gave their views when they said:

"The subject of pharmaceutical education is considered of paramount importance."

The colleges of pharmacy were the originators of this Association; this in turn has been the originator of the State Associations, and we may note that some of the recently organized colleges of pharmacy are the outgrowth of the State Associations. There are none too many colleges; there is room for more; if they are only good ones and willing to maintain their standards of education and examination to equal in value those now adopted by the older colleges of pharmacy. If, however, such institutions are to be perverted to facilitate improper modes of procuring the insignia of competency without the substance, it should be our bounden duty to expose such schemes, and take active measures to prevent their practices.

Our colleges should be sustained and encouraged by the active co-operation of every pharmaceutist who has that respect for his business that leads him to see in it something more than mere merchandize. Our colleges are the educators, our pharmaceutical associations the promoters of pharmacy, yet not only the fifteen hundred members of this Association but the five thousand members of our State Associations should see to it that their valuable aid shall be given in the cause of pharmaceutical education; that they take active steps to send their young men to colleges of pharmacy that they may receive the solid foundation of a thorough education in their chosen profession.

Employers have also a duty to perform in another respect. It is the aid they can and should give their clerks in both theoretical and practical studies, and duty in their stores.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The first meeting of the sixth session of the above Association was held at 32A, George Street, Hanover Square, on Wednesday evening, October 11, when the President, Mr. W. A. Wrenn, delivered the opening address. There was a large attendance of members. Mr. Wrenn commenced by stating what a privilege he felt it, to deliver the annual address at the commencement of the session, and to follow in the steps of the many worthy men who had preceded him. He then gave a review of the progress of the Association from its foundation, now six years ago, until the present time, and expressed his belief that those who had had the difficult task of organization must view with satisfaction and pleasure the benefits which it has continued to confer upon chemists' assistants. The first meeting was held in the rooms of the Pharmaceutical Society and from that time until this the primary objects of the Association, viz., the social and scientific improvement of its members, had been continually in view. This was the commencement of a new session, and on behalf of the Council he had very great pleasure in bidding the members welcome to the varied meetings which had been arranged for the first half of the session. Having alluded to the necessity of individual exertion as necessary to continued progress, Mr. Wrenn concluded with a few well-chosen words of advice to members.

A very hearty vote of thanks was given to Mr. Wrenn for his admirable address.

Parliamentary and Law Proceedings.

The Sale of Patent Medicines containing Poisons.

Dr. Diplock held an inquest on Monday, at Notting Hill, on the body of Edward Harris, aged ten months, the illegitimate son of Jessie Harris, a widow.

It appeared from the statement of the mother that on the morning of Sunday week last she gave the deceased twelve drops of "soothing syrup" to relieve a cough from which he was then suffering. On the following day the child was taken to St. George's Nursery, Peel Street, where it was seen by the matron, who noticed its drowsy condition. On the Tuesday following it was taken to Dr. Davis, who prescribed an emetic which took off the sickness. The child, however, became worse and died on Thursday.

Dr. Davis proved having made a *post-mortem* examination, and finding traces of morphia in the stomach. He said death was due to a narcotic.

A Juror observed that the sale of such a medicine should be at once prohibited.

The Coroner explained that the medicine was sold under a stamp duty. Juries had referred to the dangerous condition of the syrup in their verdicts on several occasions. To some children, the Coroner added, the syrup was a most fatal poison, but others could take it with impunity.

Dr. Davis informed the Court that the bottle which the mother bought contained sufficient syrup to poison half-a-dozen children.

The Jury returned a verdict that death was due to a narcotic, through misadventure, to which the following rider was attached:—"That some restriction should be made on the sale of patent medicines which could be used as poisons." The Jury also expressed their unanimous opinion that no blame whatever was attached to the matron of the Nursery.

The Coroner having promised to forward a copy of the verdict to the Home Secretary, the proceedings terminated.—*Standard.*

Poisoning by Vermin Killer.

At an inquest held at Bramley to inquire into the circumstances attending the death of Angelina Abbott, it appeared from the evidence that the deceased had taken some "vermin powder" in consequence of a dispute with a man with whom she had been keeping company. A verdict of "Poisoned by a dose of vermin powder, taken while in an unsound state of mind" was returned.—*Leeds Mercury.*

Obituary.

GEORGE HENRY KENDRICK THWAITES, F.R.S.

We regret to learn that intelligence has been received from Ceylon of the death, on the 11th ult., in his seventy-second year, of the celebrated botanist, Dr. Thwaites, formerly Director of the Royal Botanic Garden, Paradenia, in that island. Dr. Thwaites was an Honorary Member of the Pharmaceutical Society of Great Britain, having been elected in the year 1856.

Notice has also been received of the death of the following:—

On the 27th of August, Mr. William Potter, Chemist and Druggist, Fleckney, near Market Harborough. Aged 79 years.

On the 2nd of September, Mr. Gaudern Wilson, Chemist and Druggist, Crowland, Lincolnshire. Aged 68 years.

On the 13th of September. Mr. Clement Taylor, Chemist and Druggist, St. John's Road, Sevenoaks. Aged 62 years.

On the 17th of September, Mr. Edgar Humphries, Chemist and Druggist, Garston, Liverpool. Aged 34 years. Mr. Humphries had been an Associate of the Pharmaceutical Society since 1875.

On the 19th of September, Mr. Thomas Teasdale, Chemist and Druggist, Goulgreave, Derbyshire. Aged 53 years.

On the 23rd of September, Mr. Thomas William Drinkwater, Chemist and Druggist, Pollard Street, Manchester. Aged 50 years.

On the 23rd of September, Mr. James Michie, Chemist and Druggist, High Street, Forres. Aged 65 years.

On the 1st of October, Mr. Edmund Crossley, Chemist and Druggist, Princes Street, Bury. Aged 54 years.

On the 4th of October, Mr. Francis Johnson, Chemist and Druggist, Kentish Town, N.W. Aged 63 years.

On the 6th of October, Mr. James Dashwood, Chemist and Druggist, Fratton Street, Portsmouth. Aged 27 years. Mr. Dashwood had been an Associate of the Pharmaceutical Society since 1873.

On the 7th of October, Mr. John Facey, Chemist and Druggist, Woodwell Crescent, Bristol. Aged 42 years.

Correspondence.

**** No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Dr. Greenhow's Report and the Curriculum.

Sir,—I can well understand the consternation produced in the minds of Mr. Schacht, Dr. Symes, and the other supporters of the curriculum scheme, by the remarks that Dr. Greenhow thought fit to make in the concluding paragraph of his report. I can also appreciate the strong desire to explain away the obvious meaning of his words. And I would strongly recommend the advocates and opponents of the scheme to ponder them seriously.

Now Dr. Greenhow has not arrived at his conclusions hastily, but they are evidently the result of prolonged and careful observation and experience. In support of this statement I would refer your readers to his three previous reports (*vide Pharmaceutical Journal*, 1880-81, pp. 313 and 843). I will make one quotation, but I would advise all who are interested in the question to read the entire reports. In that dated March 8, 1881, writing of the Minor examination, he states:—"The propriety of compelling candidates for this examination to pass a certain time at a school of pharmacy has been a good deal discussed lately among persons who are interested in the subject of pharmaceutical education. I am, however, of opinion, that a curriculum or special course of study at a school of pharmacy is not required for persons who are preparing for the Minor qualification. The examination, when properly conducted, affords a sufficient guarantee of a candidate's fitness for registration under the Pharmacy Act."

Dr. Greenhow then proceeds to give his reasons, which I will refrain from quoting, being merely anxious to call attention to the reports themselves, and to show that the remarks in the last, viz., that under discussion at the recent Council meeting, were not made inadvertently or ignorantly.

I cannot quite understand Mr. Hampson's position in regard to the scheme, for he seems to me to halt between two opinions, and to be the connecting link between the two parties.

As chairman at the meeting of the Chemists and Druggists' Trade Association in May, he seemed disposed to throw in his lot with the advocates of the curriculum; but from the tone of his remarks in the discussion on the report on Wednesday, he seems to return to the views which first aroused my sympathy and active support. Truly the workings of Mr. Hampson's inner consciousness are mysterious. But I am not disposed to quarrel with Mr. Hampson, for, generally speaking, he evinces a highly practical turn of mind, and I suppose that sometimes what is termed the "Shadow of the Council" obscures his mental vision. Now again he and I are in complete accord. Again I ask with him, What is the prevailing state of affairs?

Are there any businesses which would utilize to the full the scientific knowledge which it is proposed to render imperative? I would not be misunderstood, it is compulsion I object to, for I would not discourage the acquisition of knowledge to any extent practicable by those who have the means and the inclination for it. But it does strike me as being not a little hard, that men should be compelled to acquire knowledge such as proposed, simply for its own sake. The compulsory examination should only require such an amount of knowledge and skill as is required for the protection of the public.

This view is neither mischievous nor misguided, but is, I contend, practical and what is more, fair. Why should men be driven out of the trade merely to satisfy the whims of those who, having by some means or other acquired a good financial position, now hanker for a professional status which they at present lack?

As to the class of men who enter the trade, the thing speaks for itself; they are for the most part suited to its requirements. For it must ever be borne in mind that our trade is of a most heterogeneous description. Why then should all be compelled to acquire such a highly trained condition? Let the Minor examination stand as it is. Institute a curriculum for the Major if you will; that is voluntary, and so no hardship would be inflicted. The two classes would be gradually differentiated and eventually perhaps, if pharmaceutical prospects improve, the Major men might bloom forth as a professional order.

But it is because the higher class fears that under the natural process it will itself disappear, or has not the patience to await its action, that it seeks to violently extinguish the lower, and having the ear of the authorities and command of the votes it may possibly achieve its purpose. Some may say that the admission contained in the latter statement cuts the ground from under my feet. I reply, Not at all, for it is, to a great extent, only the higher class that has votes. Take a plebiscite of the whole trade and then see which way the balance leans.

I, as a pharmaceutical chemist, most certainly desire to see our lot ameliorated, but not by unfair means. As soon as there is a real demand for a higher and better educated class of men, depend upon it there will be an ample supply, Openings in life are daily becoming more and more scarce for such, but they will not come forward in any numbers unless the prospect be considerably better than it is now. We cannot, under present circumstances, afford to cast aside that portion of our business which stamps us as traders, and, as Mr. Hampson says, in very many businesses pure pharmacy scarcely exists. Certainly many chemists would soon cease to exist if they relied solely upon it.

The great majority of practitioners in town and country do their own dispensing, and many of them dispense physicians' prescriptions whenever they get the chance. We, for the most part, act as jackals, picking up such scraps as may be left.

I therefore earnestly hope that whilst this state of things continues, the authorities will be cautious, and restrain somewhat their eager desire for a professional position, unless they can give us the means of supporting it.

Wantage. J. Gilbert Candy.

Rat Poison.—A correspondent has directed our attention to an article that has recently been introduced into this country as a rat poison, which he says consists of coloured arsenic. We should think no person would undertake the sale of such an article before he has satisfied himself as to its nature.

J. Ward.—We are unable to answer your question.

A Country Pharmaceutical Chemist is recommended to call the attention of the Inspector appointed under the Sale of Food and Drugs Act to the practice.

A. B. C.—See the case reported in the Journal for January 28 last, respecting the labelling of syrup of chloral hydrate for the only decision upon the subject with which we are acquainted.

Associate.—We are unable to furnish you with any information about the oil in question.

Antiseptic.—Neither an aqueous nor an alcoholic solution can be said to "keep indefinitely," and the permanence of either would probably depend upon the condition of the salt. Other things being equal the alcoholic solution would probably remain unaltered longest.

"*Nemo.*"—Tincture of hamamelis, made according to the published formula (1 to 10 of proof spirit) is dark brown. But as there is no authoritative formula the preparation as obtained from different sources may differ in appearance.

W. I. S.—The question is one that involves medical opinion. The dose of liquor strychniæ is below the maximum of the B.P.

R. Andrews.—The preparation of the article as directed in your formula would involve considerable risk.

"*Guerra el Cuetiello.*"—(1) The extract, being an alcoholic one, should be dissolved in spirit previously to mixing it with the water. (2) Insoluble carbolate of lead being formed the lotion will be unsightly. There is no remedy for it. (3) Crumb of bread. (4) Emulsify the ol. terebinth., *sec. artem,* with half its weight of pulv. acaciæ.

Communications, Letters, etc., have been received from Messrs. Bennett, Davis, Landerer, Dobson, Woodland, Brown, Morgan, Newsholme, Keyworth, Zinc, Pertinctus, Succus, Tegid, Junior, W. R. F.

"THE MONTH."

The recent gale and rain have produced quite a wintry effect on botanical gardens, denuding the trees of their foliage, and rotting the blossoms of the already limited number of autumnal flowers. The fruits of many medicinal plants may, however, still be observed in good condition. At the Botanical Gardens, at Regent's Park, the dulcamara grows side by side with a variety of *Solanum nigrum* (var. *miniatum*), with orange-red berries and another variety with yellow berries, the red ones look so like red currants that it is fortunate these varieties are not common, or cases of poisoning by *S. nigrum* would be more common than they are. Only last week another case of poisoning by the berries of *Solanum nigrum* occurred, this time in the north of London, but the child recovered after the administration of sulphate of zinc. As few as three or four berries have been known to produce sleep, and Dr. Taylor, in his work on Poisons (1875, p. 677), records the occurrence of a death from eating the black berries of this plant. The deaths which have resulted from eating these berries have been thought by some to have been caused by belladonna, which had been confounded with it. In the present case, however, there can be no doubt about the plant, the berries being stated to have been of the size of currants and to have grown in a London garden. The fruit of belladonna when black is as large as a black cherry. This plant (*S. nigrum*) certainly deserves chemical investigation to determine whether it contains solanine or some other alkaloid, and at the present time of year the berries could be procured in considerable quantity for the purpose.

About two years since, Dr. Harley, in an article that was reproduced in this Journal (vol. xi., p. 437), affirmed decidedly that there was no warrant for the generally accepted opinion that fool's parsley (*Æthusa Cynapium*) is poisonous. Some results of an investigation reported by M. Tanret to the Paris Pharmaceutical Society, at a recent meeting, fully bear out Dr. Harley's statement (*Journ. Pharm. et Chim.*, [5] vi., p. 325). M. Tanret says that he has failed to find in fool's parsley any alkaloid, glucoside, or other body, to which the reputed poisonous action of this plant could be attributed, and that physiological experiments gave equally negative results. He is, therefore, of opinion that fool's parsley is non-poisonous. M. Tanret has also observed that malic acid, which is rather abundant in the roots of fool's parsley, is replaced in the aerial parts of the plant by fumaric acid; vegetation would, therefore, in this case appear to produce upon malic acid the same effect as heat.

The carbohydrates contained in Ceylon moss (*Sphærococcus lichenoïdes*) form the subject of a communication by Mr. H. G. Greenish to the *Archiv der Pharmacie* (xvii., 241). Instead of confining his attention to one constituent, the author has endeavoured to ascertain what carbohydrates enter into the composition of the drug, to what extent they resemble or are identical with similar substances contained in phanerogams and to what extent they are present. He finds that the gelatinizing constituent (named by Payen "gelose") is a carbohydrate convertible by boiling with dilute acid into arabinose and probably identical with a similar constituent in the agar-agar of commerce; the latter differs from pararabin (its identity with which was asserted by Reichardt) in its insolubility in cold dilute hydrochloric acid. In addition to the gelatinizing constituent (36·7 per cent.) the drug appears to contain mucilage (2·7 per cent.), starch, metarabin (1·32 per cent.), wood-gum (3·17 per cent.), cellulose (identical with that of phanerogams, 10·17 per cent.); and further a carbohydrate, provisionally termed paramylan by the author, dissolved by dilute acid but differing from Reichardt's pararabin (which is extracted from phanerogamous plants in a similar manner) in being directly convertible into sugar and then yielding not arabinose but a fermentable sugar, probably grape-sugar. This substance is present to the amount of about 6·5 per cent. and appears, as the author remarks, to be deserving of closer investigation.

The observation that diastase is present in ungerminated corn was made by Dubrunfaut, and found confirmation in the discovery by Gorup-Besanez of a diastatic and peptone-forming ferment in vetch seed. Since then diastatic ferments have been reported to have been met with in various starchy and oleaginous seeds, potatoes, turnips, the buds of trees and other parts of plants. An investigation has now been undertaken by Dr. K. Nachbaur having for its chief object to determine what part of the corn grain is the seat of the diastase, the embryo being the part chosen for the first experiments and the grain used being Russian rye (*Monatshefte*, iii., 673). He has failed, however, to obtain from the finely powdered embryo any body capable of converting starch paste into sugar or coagulated albumen into peptone, and he draws the conclusion that the diastatic ferment observed in species of corn is not contained in the embryo. Qualitative and quantitative determinations of the embryo gave results corresponding perfectly with the statement of vegetable physiologists that it consists of protein substances, fat, cellulose, sugar, ash and water, but contains no starch.

It is, perhaps, not generally known that Dicotyledonous plants do not invariably consist of two entire cotyledons. Bentley and Hooker in the 'Genera Plantarum,' describe the genus *Bursera* as having cotyledons, "*interdum trifidæ, in una specie hippocrepiformæ.*" A specimen of the seeds of *Bursera microphylla*, collected at Arizona, near Maricopa, and cultivated at the Botanic Gardens of Harvard University, shows this species to possess cotyledons biternately dissected into linear lobes. The second pair of leaves are simpler than the cotyledons, the secondary lobes being fewer and short, while the next succeeding are pinnately divided into seven leaflets, thus approaching in character the adult form of leaf, which is pinnate with numerous very small leaflets, on an interruptedly margined leaf (Proc. American Academy of Arts and Sciences, xvii., 230).

Scientific botanical terms are often condemned as the dry bones of an otherwise interesting study; but even these may sometimes have points of interest. This is the case with the word *hilum*, of which, under the head of *Hilus renis*, Professor Hyrtl writes:—"The word *hilus* is, I must say, a barbarism, for it was only known to the Romans as *hilum*. They understood by the *hilum*, according to Festus, *id quod grano fabæ adherent*, that is, the *macula nigricans* on the concave border of beans. From the nature of this little spot, the Romans would talk of any trifling matter as not worth a hilum, *ne hilum*, contracted to *nihilum*, and through the latter term to *nihil*."

Cinchona cultivation appears to have a promising future in Jamaica. In the report on the public plantations and gardens in Jamaica for the year ending September 30, 1881, just issued, the energetic director, Mr. D. Morris, states that 330,000 seedlings and 49,000 plants had been distributed during the year, besides a considerable quantity of seed, whilst the number of plants remaining in the nurseries at the date of the report is estimated at 178,000. Of these about seven-eighths were *C. officinalis* plants; other kinds represented being the "*Uritusinga*" variety of the same species, *C. Calisaya*, *C. Ledgeriana*, *C. succirubra* and a "hybrid." One of the most important of these would appear to be the supposed "hybrid," which for some years received particular attention under the impression that it yielded yellow bark, the true *C. Calisaya* having been wrongly looked upon as a form of *C. officinalis*. The plant is said to be hardy and a remarkably free grower, and it is believed by Mr. J. E. Howard to closely resemble *C. officinalis*, var. *Uritusinga*, a point that Mr. Morris hopes to clear up shortly. Meanwhile it is interesting to learn that a sample of trunk bark from this "hybrid," analysed by Mr. Howard, yielded 6·0 per cent. of quinine alkaloid, 0·73 per cent. of cinchonidine, 0·10 per cent. of cinchonine and 0·03 per cent. of quinidine. The plant which, as mentioned before, was by mistake included under *C. officinalis* has been identified both by Mr. J. E. Howard and Mr. Morris as true *C. Calisaya*, and samples of trunk bark from it yielded upon analysis to the former gentleman 3·7 per cent. of quinine alkaloid, and to the latter 5·38 per cent., together with a little cinchonidine, cinchonine and quinidine.

In one of the papers read before the British Pharmaceutical Conference at York last year, Mr. Greenish gave the results of an examination of some samples of jalap tuber grown in Jamaica. In the report above mentioned, Mr. D. Morris gives some further details as to this interesting experiment in acclimatization. The land devoted to the growth of jalap in Jamaica during the period stated was five acres, and the crop of green tubers harvested weighed 3400 lbs., and yielded 1077 lbs. of cured jalap. The principal difficulty appears to have been met with in the drying. The smaller tubers were dried whole in the sun, and although a considerable proportion of them was lost through fermentation and mouldiness, the result was considered to be on the whole satisfactory. The larger tubers were sliced or gashed, and in the drying of some of these an American fruit dryer was successfully utilized, although the operation required to be carefully conducted to prevent alteration of the starch grains. According to information since received from Mexico, the jalap tubers after being uprooted are in that country soaked for four hours in water saturated with lime and then dried in the sun. Afterwards they are covered with blankets for three days and then again dried; this is said to prevent them from moulding. One consignment of the Jamaica grown tubers was sent to London, and two others were sent to New York. Some objection seems to have been raised in the former market to the slice form, although the slices really contained the largest proportion of resin, but not in the latter. The returns did not amount to enough to pay the cost of the experiment, but another attempt is to be made and it is to be hoped that Mr. Morris's perseverance will meet with the reward it deserves.

In Sicily the Cavalière d'Amico has succeeded in acclimatizing *Cinchona succirubra*, *Indigofera tinctoria* and *Myrica cerifera*, the latter being the plant yielding the bark known to herbalists in this country as bayberry bark (*Nature*, p. 186).

About eighteen months since (*Pharm. Jour.*, xi., 897) Herr Teegarten published some notes on a sample of Bulgarian opium that contained 8 per cent. of morphia. The same chemist has recently had some other samples of opium produced in the principality submitted to him, which appear to have shown a considerable improvement in morphia strength. One sample from the Küstendil district presented exceptional characters. It was in lumps weighing 120 to 300 grams, had an unusually strong smell of opium and tasted very bitter. It was well dried, yielding 92·37 per cent. of dried opium, and 19·15 per cent. of morphia, or calculated on the dried drug 80·73 per cent. A sample from the Lowtscha district gave 89·61 per cent. of dry opium, and 11·90 (or 13·28) per cent. of morphia. Another, from the Halitz district, gave 89·14 per cent. of dried opium, but this yielded only 7·25 (or 8·13) per cent. of morphia. The amount of ash was very low, ranging from 2·69 to 2·85 per cent. There appears to be some uncertainty as to the extent of opium production in Bulgaria whilst the principality was under Turkish dominion; but Herr Teegarten has been informed that nearly the whole of it was used by local pharmacists, any surplus being bought by Jews and Turks at low prices and carried to Constantinople, where it was sold as Turkish opium.

The occasional bad quality of drugs offered in the drug market is notorious among those who have to buy them wholesale, and at a recent drug sale called forth severe comment. This month, no less than 1½ ton of ipecacuanha was put up for sale, which was so covered with mildew that very little else was to be seen except the contour of the root. This reduced the price of the drug from 5*s.* to less than 2*s.* The question which naturally occurs to those concerned is, what will become of all this? Will it be washed and offered for sale again, or will it be exported to India, where the drug is used as a sheet anchor in dysentery, or will it find its way into the army and navy stores after it has been cleaned and "polished up equal to new?" Ipecacuanha root when examined under the microscope may often be found to contain fungoid threads, and this fact and the variable quality of the wine made from the drug indicates the probable correctness of the supposition that damaged drugs are not destroyed in this country, but actually enter into commerce. This is a matter into which Government should look. It would have nothing to lose and much to gain by the appointment of an inspector whose duty it would be to examine imported drugs and to condemn and see that those unfit for use are destroyed. It is a matter no less important than the inspection of food. At the present moment it is said that owing to the scarcity of hops, quassia, chiretta and calumba are going up in price, and that spent hops which have been used in brewing in this country are being dried and exported to the Continent. In the United States the appointment of a Government officer for the inspection of drugs has almost entirely stopped the previously large exportation of inferior drugs to that country.

In a letter to the *British Medical Journal* (p. 714), R. W. W. complains of being much annoyed by constantly meeting with worthless specimens of cannabis indica and hyoscyamus. He remarks that there are always worthless drugs in the market, and medical men would do well to test their action more frequently than they do. It may also be asked, what becomes of the poisonous Japanese star-anise that is so frequently offered in large quantities, of the false buchu, of the worthless yellow cinchona bark, and of numerous other spurious or very inferior drugs?

Dr. Squibb gives some valuable results obtained by himself in experiments with aconite (*Ephemeris*, i., 123). He considers it a good test of the quality of the root, if eight out of ten roots, broken across the middle, give a tingling taste when a minute fragment is bitten off and chewed for a moment between the front teeth. He remarks concerning the alkaloids that pseudaconitine has a less tingling taste and more of a peppery heat in it, and is about ten times stronger than aconitia. In one European specimen of aconitine, the taste was so bitter that Dr. Squibb believed it to consist chiefly of a decomposition product, picraconitine. The relative strengths of four samples of alkaloids compared by him with a standard solution were as follows:—Aconitia of unknown maker, 1; Merck's aconitine, 8; Merck's pseudaconitine, 83; Duquesnel's aconitine, 111. He further remarks that the last-mentioned produces a very different impression on the mouth from that of either of the other aconitias and from that of the root of *A. napellus*, causing in a greater degree the tingling element which commences almost immediately, while that of pseudaconitia is delayed from five to ten minutes. It also diminishes rapidly, which is not the case with pseudaconitia. The paper is full of valuable information and deserves a careful perusal.

In a communication to *Ephemeris* (i., 116) Dr. Reiter states that he has had personal experience of the value of the seeds of the common burdock (*Arctium Lappa*) in the relief of psoriasis inveterata. The preparations used were made by steeping the seeds in whisky, or dilute alcohol. Dr. Squibb recommends for the former to place one pound of well-crushed fresh burdock seeds in a bottle with one gallon of good old whisky, and keep in a warm place, occasionally shaking it, for a fortnight. The maximum dose of the clear tincture is 4 fluid drachms, well diluted, three times a day immediately after meals; when the dose is a large one whisky is recommended as a menstruum, but for smaller doses proof spirit is preferred. Dr. Reiter considers the therapeutic action of the tincture to be that of an alterative stomachic and says it appears to improve all the nutritive, secretive and assimilative functions. This use of burdock is by no means new, the root being used by herbalists in this country as a common remedy for skin diseases. Gerarde in his 'Herbal' quotes the statement of Columella that it is good for the king's evil. In Japan the plant is cultivated as a vegetable under the name of "gobo," and, according to information furnished by Professor Kinch, grows much larger and finer than in this country. The root and the petioles are used for this purpose. Several varieties of the plant are known, and are called by the names of the districts in which they are cultivated. From the occurrence of the seed among Japanese drugs it may be presumed that it is employed medicinally in that country. Gerarde in his 'Herbal' figures *Xanthium strumarium* under the name of "the lesse burre docke," and remarks, "It seemeth to be called Xanthium of the effect, for the burre or fruite before it be fully withered being stamped and put into an earthen vessel and afterwards when need requireth the weight of two ounces thereof and somewhat more being steeped in warm water and rubbed on maketh the hairs of the head red; yet the head is first to be dressed or rubbed with niter as Dioscorides writeth," a statement which suggests the idea that this plant might have been used by the ancient Greeks to dye the hair of the much prized colour, ξανθὴ κόμη, a term applied to the hair of Achilles and other heroes.

In the *British Medical Journal* (p. 719) Dr. E. Mackey calls attention to the value of salicylate of soda as a remedy for tonsillitis, and in cases of gout as a local application, the salt being, at the same time, also given internally in 10 grain doses every four hours. He sometimes orders the salicylate of soda to be dissolved in liquor ammoniæ citratis, with which, he states, it should form a clear colourless solution, which agrees well with patients; but he adds, "When dispensed by some chemists, I have known it turn brown and cause irritation and vomiting." This probably results from the natural acid being used in some cases and the artificial in others; at all events the point requires to be cleared up by experiment.

Professor Rapon has published (*Wien. med. Wochensch.*, No. 30 and 31, 1882) an account of further experiences of the value of naphthol. He states that when patients suffering from scabies are once rubbed with an ointment of naphthol, and then well powdered and covered with woollen clothing, the cure is often effected in a single day. His formula for the ointment is—lard, 100; soft soap, 50; naphthol, 15; creta alb. pulv., 10 parts. In prurigo also this remedy is highly recommended, a 5 per cent. ointment being used. In eczema a very weak ointment is applied, as the naphthol proves very irritating; and in prolonged cases simple ointment is substituted every fourth week to avoid any possible risk of absorption (*Brit. Med. J.*, p. 750).

The *Lancet* (p. 540) calls attention to the successful use of ergot in reducing enlargement of the spleen. In a severe case, in which the spleen nearly filled the abdominal cavity, the reduction was effected by this remedy in a fortnight. In this case, 3 drops of the fluid extract were given three times a day.

Dr. Froumuller, of Fürth, recommends tannate of cannabine as an excellent hypnotic, stating that its use is free from danger; that it does not disturb the secretions, and if the dose be suitable does not produce intoxication (*Med. Press and Circular*, p. 268). He administers it in doses commencing at $1\frac{1}{2}$ grain in powder, mixed with sugar, or dissolved in water by the aid of a small quantity of alkali.

Experiments made by Hillier (*Zeits. f. kl. Med.*, September; *Med. Press and Circular*, p. 268) show that hypodermic injections of colocynthin, citrullin and cathartic acid produce too much pain to be of any value in therapeutics, whilst aloin administered in the same way does not cause this inconvenience, but is very unreliable.

M. Melsens, having observed that persons suffering from pulmonary disease derive good effect from the emanations of carbonate of ammonia in the atmosphere of stables, conceived the idea that a moderate inhalation of the vapour of this salt might be useful in other affections of the respiratory tract, and tried it on himself, after a serious attack of bronchitis, by suspending from his neck a little bag containing small pieces of that salt. From the first day relief was felt, and the cough soon disappeared entirely. Further experiments showed that this remedy gave relief also in cases of chronic bronchitis (*Med. Press and Circular*, p. 337).

Dr. Brown-Séquard has recently (*Nature*, p. 557) made the interesting discovery that in certain animals complete local anæsthesia of the larynx, accompanied by incomplete general anæsthesia, may be obtained by directing on to the upper part of that organ a rapid current of carbonic acid during a period of fifteen seconds to two or three minutes. The anæsthesia lasts from two to eight minutes after stopping the current. Dr. Séquard proposes to experiment on the human subject by introducing carbonic acid through the mouth or nostrils. This singular action of the acid may perhaps throw some light on the sedative action of aerated waters in vomiting and nausea.

In a paper on the treatment of chronic ringworm (*Brit. Med. Journ.*, Oct. 7, p. 682) Mr. Alder Smith recommends a preparation made by dissolving 10 parts of oleate of mercury in 90 parts of heavy petroleum oil as the most efficacious parasiticide he knows for chronic ringworm. He states that he has found it less liable to decomposition than the ordinary preparation of oleate dissolved in oleic acid and less irritant to the scalp. For children under seven years of age, if the 10 per cent. solution be found too strong, it can be further diluted with ordinary petroleum.

Sulphur ointment is suggested as a simple remedy for *Bacterium decalvans*, to which Dr. Thin attributes alopecia areata. In a number of cases described by Dr. Thin in the *British Medical Journal* (p. 784) the application of this ointment was found to result in preventing the spread of the disease, which it cured, a growth of down taking place within a month after commencement of the treatment. This action of sulphur may possibly explain the apparently beneficial results obtained by the use of various hair lotions containing sulphur. Dr. Thin, however, considers that the fat mechanically prevents the growth of bacteria on the surface of the scalp, while the sulphur acts destructively upon them. If further confirmation of these results be obtained, it seems probable that sulphur pomade may in future become a regular article of stock for pharmacists.

Some interesting facts have recently been collected by M. D'Abaddee to show that sulphur emanations exert a marked influence on malaria (*Lancet*, p. 676). In Sicily the labourers in the sulphur works in plains where malaria is common enjoy an almost complete immunity from intermittent fever, only 8 or 9 per cent. of the villagers suffer from it, while of those in neighbouring villages not engaged in this occupation 90 per cent. are attacked. According to M. Fouqué, the city of Zephyria, situated in a marshy plain where it is impossible to pass the night without being attacked with ague, dates its decadence from the discontinuance of the sulphur workings formerly carried on in its vicinity. Three hundred years ago the city was said to have forty thousand inhabitants, but when the sulphur works were given up paludal fever gradually destroyed the population, so that twenty years ago only two hundred inhabitants remained. In the portion of the marshy plain of Catania where sulphur works exist the inhabitants suffer but little, while a village not far off is deserted. Elephant hunters in Ethiopia are said to enjoy an almost complete immunity from the disease through using a fumigation of sulphur daily. Dr. Thin's results, and the known value of sulphur in destroying the fungus which attacks the hop, seem to point to the need of ascertaining to what this anti-bacteric action is due, whether to sulphurous acid, sulphuretted hydrogen, the vapour of sulphur itself or of some peculiar oxide of sulphur.

In the *British Medical Journal* (pp. 736, 786) Dr. H. Gibbes gives some further hints on the best mode of staining the bacillus tuberculosis for the microscopical examination of sputum, and points out possible sources of error which may occur if the sputum be not obtained under suitable circumstances, *e.g.*, if it comes not from the lungs, but from the throat, or if the chemicals used be not of a definite character.

The researches of Messrs. Schloesing and Müntz on the Continent, and of Mr. Warington in this country, have established the fact that the phenomenon of nitrification in the soil and in organic liquids is due to the action of microscopic organisms. On the other hand a communication recently made by Messrs. Gayon and Dupetit to the Academy of Sciences (*Comptes Rendus*, xcv., 644) seems to show that the inverse reaction, the reduction of nitrates, is also a physiological phenomenon. They state that when decomposed urine is added to sewage liquid, or neutralized chicken broth, containing 0·020 gram of potassium nitrate per litre, the nitrate gradually disappears and the liquid becomes full of microscopic organisms. If the mixture is sterilized by heat, or if chloroform or sulphate of copper be added, the action does not take place. But, very curiously, carbolic and salicylic acids, even in proportions considerably beyond those used generally for antiseptic purposes, do not retard the reduction; on the contrary, they are themselves attacked by the microbes and disappear with the nitrate. Under favourable conditions, at a temperature between 35° and 40° C., the fermentation is so energetic and the multiplication of the microbes so great that a gram of nitrate per litre is reduced daily. The gas given off is pure nitrogen; the oxygen remains in the liquor as carbonate. As to the organisms, they belong to the class called anaërobes by Pasteur, and when cultivated at the surface of the liquid, in contact with air, become inactive or nearly so.

Dr. Brockhaus, of Godesburg, has recently been experimenting (*Medical Times and Gazette*, p. 505) *in propriâ personâ* on the alcohols and allied bodies likely to occur in alcohol made from grain, with a view to determine the properties of each. It has long been known that alcohol containing fusel oil causes delirium tremens, while pure grape spirit is said not to do so. Aldehyde has a very powerful effect, persons who have drunk brandy highly charged with it falling senseless within a few minutes. To the presence of this substance Dr. Brockhaus attributes the intense and early intoxication produced by some new wines, which when matured are harmless. Many cases in which the persons are supposed to have been drugged may be explainable in this way. Paraldehyde and acetal were found to resemble aldehyde, but the taste and effects are milder, though the latter last longer. Propyl and isobutyl alcohols seemed to exert less influence on the mental, but greater influence on the digestive functions than the foregoing; allyl alcohol, besides producing effects similar to amyl alcohol caused a weakness of the limbs approaching paralysis. This alcohol is said to be used in Germany to render spirit unfit for drinking, as the crude methylic is with us. Dr. Brockhaus says that as the ordinary modes of purification are inadequate to the entire removal of the liquids above mentioned the sale of potable spirits for other uses than in the arts should be forbidden.

Amylic alcohol is sometimes used as an alkaloidal solvent, but an observation made by Herr Haitinger (*Monatshefte*, iii., 687) seems to show that some circumspection is necessary in using it for this purpose in delicate investigations. Having occasion to examine an article of food for the presence of alkaloids he sought to separate any present by shaking it with amylic alcohol. From the alcohol, subsequently, a small quantity of substance was obtained as a deliquescent hydrochlorate, which gave the general alkaloid reactions with iodo-potassic iodide solution, but did not answer to any of the better-known poisonous alkaloids. This led to the closer examination of the amylic alcohol used, and upon shaking it with dilute sulphuric acid a small quantity of a basic substance was separated, and a similar result was obtained with eight out of nine samples of amylic alcohol from different sources. A larger quantity (2 kilograms) of "pure" amylic alcohol was then repeatedly shaken with dilute sulphuric acid, and the watery liquid concentrated and distilled with excess of caustic potash. The distillate was strongly basic, smelt strongly of pyridine, and eventually yielded crystals corresponding in appearance and composition with the platinum double salt of pyridine. From other samples different bases were obtained, one differing in odour from pyridine, boiling at a much higher temperature, and forming a platinum salt with a composition that seemed to indicate that the base was bivalent. Probably this difference in the alkaloids present in different samples finds its explanation in the varying materials from which amylic alcohol is derived. The proportions found ranged from 0 to 0·1 per cent., the average being 0·04 per cent.

Selmi, in prosecuting his researches on the alkaloids found in the human body, has come to the conclusion that in fatal cases from paralysis, tetanus, etc., death is due to poisons of an alkaloidal character, produced by the progress of the disease. He has found such bodies in the urine of patients suffering from these maladies (*Nature*, p. 568).

It has been pointed out by Mr. Pedler that some snake poisons are rendered inert by platinic chloride, possibly through the formation of an insoluble compound with the active principle of the poison, which has been said to be of an alkaloidal character. Confirmatory of this theory, Professor Henry Croft (*Chem. News*, Oct. 13, p. 165), writing from Texas where rattlesnakes are common, says that a favourite antidote to snake bites in that country is a strong solution of iodine in iodide of potassium, applied immediately to the wound, and a few drops taken inwardly. He states that he has had the opportunity of proving the efficacy of the solution in two cases of "cascabel" bites, one on a buck and the other on a dog, and he conjectures that the action might be due to the formation of an insoluble iodo-compound. Upon adding a drop of iodine solution to some of the white opaque poison taken from the fangs of a rattlesnake a dense light-brown non-crystalline precipitate was immediately formed, similar to that produced by the same reagent with several alkaloids.

M. Carles reports (*Répertoire*, x., 443) that in using Personne's test for the estimation of potassium iodide, which is based upon the amount of mercuric chloride that can be added to an aqueous solution before the formation of a permanent red precipitate, he has sometimes failed to obtain constant results with the same specimen of iodide. This he found to be due to the decomposition of the double iodide of mercury and potassium by water, which takes place in proportion to the extent of dilution of the solutions. He therefore proposes to substitute for water dilute spirit (containing 17·5 per cent. of alcohol), which he says he has found to give good results.

A new test for albumen in urine, which appears to be a convenient one, has been described by Dr. W. Roberts (*Lancet*, October 14, p. 613). It is based upon the fact that when albuminous urine is treated with a saturated solution of common salt, slightly acidulated, the albumen is thrown down as a dense white cloud. The test liquor is readily prepared by mixing a fluid ounce of dilute hydrochloric, sulphuric, acetic or phosphoric acid with a pint of water, saturating the mixture with common salt, and filtering. The precipitate is, in this case, not due to coagulation, it being redissolved by shaking, unless the brine be present in excess. The method of applying the test recommended is similar to that followed with the nitric acid test. A portion of the suspected urine is placed in a test tube, the tube is held aslant, and the salt solution is allowed to trickle along the side of the tube to the bottom, so that it may form a distinct layer; or the proceeding may be reversed and the urine added carefully to the salt solution. If albumen be present a white cloudy zone appears at the junction of the two layers, and the test carried out in this way is said to be as delicate as the nitric acid test. Unlike that test, however, it throws down peptones, if present, but not white clouds of urates. When there is resin in the urine, as in the case of patients taking copaiba resin, a cloudiness is produced, but this may be distinguished from albumen in not disappearing when shaken with excess of urine.

Attention has also been called, by Mr. G. N. Stephen (*Lancet*, October 14, p. 614) to an improvement on the nitric acid test, in the direction of the volumetric estimation of albumen in urine, due to M. Tanret. It consists in the precipitation of the albumen from the urine, previously acidulated with acetic acid, by means of a solution of double iodide of mercury and potassium. The formula for the solution, 0·05 gram of which is calculated to precipitate 0·005 gram of albumen, is—potassium iodide, 3·22 gram; mercuric chloride, 1·35 gram; water to 100 c.c. In applying the test 10 c.c. of urine is taken, into which 2 c.c. of acetic acid is stirred with a glass rod, and the test liquor is run in from a pipette discharging 0·05 c.c. at a time, until the precipitate formed is no longer redissolved by stirring; when this point is reached, a drop of urine is taken after each fresh addition and placed in a watch-glass with a minute quantity of a 1 per cent. solution of mercuric chloride. The precipitation is completed when a yellowish-red colour is observed in the watch-glass, due to the formation of red iodide of mercury. The number of 0·05 c.c. added, after deducting three as having been used in excess, if reckoned as half-grams, will represent the quantity of albumen in a litre of the urine. The test may be affected by the presence of alkaloids in the urine, but the precipitate formed in consequence will dissolve either on the application of heat or the addition of alcohol.

A case of poisoning is reported from France (*Journ. Pharm. et Chim.*, [5], vi., 271), due to the substitution of a packet of barium chloride, kept for use in the analysis of plastered wines, for a packet of magnesium sulphate. About six grams were taken by a woman of middle age, and the effects were probably intensified by the fact that it was previously mixed with some hot broth. The acridity almost immediately drew attention to the mistake, and first an emetic was administered, then a saturated solution of magnesium sulphate and albumen mixed with water, followed by stimulating drinks taken internally and external rubbing with a mixture of ammonia and oil. The symptoms were vomiting and diarrhœa, general coldness, cramps limited to the lower limbs, and loss of sensation in the feet, which diminished in intensity in a few hours and disappeared in the course of the next day. There was, however, subsequent constipation.

The *Times* has given an abstract of a recent paper read before the Belgian Academy by M. Spring, on "The Origin of Thunderstorms." The author relates that in a hut on the Urenal (at a height of 2198 metres) he one night experienced a violent thunderstorm. There was, for about half an hour, terrific hail, without a single drop of rain, and whenever the hail grew momentarily more intense a vivid lightning flash occurred, and at the same moment loud thunder like the report of a powerful cannon. Before long some raindrops began to fall, and as they increased the flashes and peals became less and less frequent. M. Spring thus theorizes:—Each hailstone, of whatever size, is the result of union by regelation of many crystals of sleet. In this process an enormous free surface disappears in a body that is a non-conductor of electricity, viz., ice, and in presence of another non-conducting substance, viz., dry air. Experiment leads us to expect in such a process a large development of electricity, and to this has to be added electricity arising from friction of the hailstones with the air. Thus there would be a large number of electrified spheres near each other, and separated by an insulating medium, and these forming in some sort the surface of the region, should, according to Faraday's researches, acquire an electric charge equal to the sum of the charges of the central spheres; hence enormous electric tension in that superficial part, relieved from time to time by discharge between the hailstones and the air or the ground. It is stated that M. Spring supports his view by a variety of facts, observed both in Alpine regions and in the laboratory.

Professor W. F. Barrett read a paper at the recent British Association Meeting at Southampton "On the Alteration in the Dimension of the Magnetic Metals Produced by the Act of Magnetization." The author found that iron elongated ·00000368 of its length and that cobalt elongated ·00000235 of its length, while nickel contracted ·00000835 of its length. The volume of the nickel bar used appeared to undergo very slight shrinkage on demagnetization amounting to less than one ten-millionth of the whole volume of the bar. The author states that the "magnetic tick" was heard well with nickel and cobalt, with the latter especially so, the sound on making and breaking contact having a sharp metallic ring. It is suggested that this fact indicates the desirability of trying cobalt and nickel for telephone receivers. Further experiments are in progress to determine the effect of longitudinal tension and of temperature on the change of dimensions of the nickel and cobalt.

The Gas Committee of the Birmingham Town Council has just published one of the most valuable and elaborate reports that has yet been drawn up by any municipal body on the burning question of gas *v.* electric lighting. The report commences with an expression of opinion that the experiment of supplying electricity from a common centre, if tried in Birmingham, should be conducted under the most favourable circumstances, and that every facility should be afforded for it, consistent with the public convenience, welfare and safety, and without being hampered by any question as to the possibility of other interests being affected by its success. But the Committee has arrived at the conclusion that at present the advantages to be gained by the experiment of distributing electricity will not compensate for the loss and inconvenience which must follow the breaking up of the streets for this purpose in the busiest part of the town. The report proceeds to discuss (*a*) monopolies; (*b*) control of the streets; (*c*) profits on undertaking. Under the last head is quoted Mr. Crompton's statement in his evidence before the Parliamentary Committee on the Electric Lighting Bill, that no remunerative return was to be expected during the first seven years at least of the experiment, as well as a statement made by Mr. Gainsford, in a recent debate in the Sheffield Town Council, based upon experience gained in collieries with which he is connected, that electricity cannot be produced at the cost of gas, even when the motive power is provided free. Estimates of Dr. Siemens for a quarter of a square mile area, and of Mr. Crompton, Dr. Hopkinson and Mr. Johnson for one square mile area are given. Dr. Siemens allows 24,000 to 30,000 incandescent lamps in his area and 70 arc lamps, and estimates the cost at £100,000; the other authorities allow 50,000 incandescent lamps and give the cost as £200,000. Nearly all the witnesses agreed that nothing but a large experiment from a common centre would properly determine the question of cost. In another part of the report, it is stated that the prime cost of the conductor from Messrs. Winfield's works to the Town Hall, about 500 yards in length, amounted to more than £800 or equal to £3000 a mile, without services. This sum appears tremendous, and until something is done to reduce the cost of this essential of electric lighting progress will be retarded very greatly. The Committee has framed estimates for the supply of gas and of electricity for the Market Hall Ward, covering an area of 1000 yards square and using at a moderate computation 120,000 lights.

The cost of gas works, mains and services for this consumption is stated as £170,000 as a maximum and £100,000 as a minimum. The cost of electric light plant for about 100,000 lights is given as £423,500. The cost of meters is left out in both statements, as it is not known that a practical electric meter has been devised. The report concludes with a number of practical suggestions, the main drift of which is that it is not advisable for the local authority to apply for powers of supply, but that the Committee be authorized to enter on negotiations with the companies applying for such powers.

PRECIPITATES IN FLUID EXTRACTS.*

BY J. U. LLOYD.

(*Concluded from page* 326.)

After a precipitate has formed in a tincture or a fluid extract it is generally accepted as permanent. All will admit that precipitates often continue to deposit for months and even years, but I cannot find it recorded that they disappear. It is true, however, that a line of precipitates may form and then decrease in size, only to form and waste away again. This growth and reduction is readily understood when we consider the cause of their production, and to do this I beg leave to refer to my last communication on this subject (Proceedings for 1881). I there called attention to the fact that a percolate was a mixture of solutions, and that continuous precipitation resulted after the percolate was mixed from inability of the mixture to dissolve substances which were perfectly soluble in the fractions of the percolate at various stages of its production. From this reason I argued that with ordinary hydro-alcoholic menstruums we could not expect a line of permanent fluid extracts. This explanation, however, is insufficient to carry the production of precipitates beyond certain moderate periods, and we know from experience that the act of precipitation may continue indefinitely, independent of evaporation of menstruum. It has never been stated, that I can find, in connection with this point, that at intervals the precipitate to a greater or less extent will dissolve, yet such is the case. Were it otherwise, a point would be reached when all of the dissolved matter would be thrown from solution, and consequently no further deposition could occur.

To illustrate how precipitates may increase and decrease, let us suppose that a fluid extract of senna has remained in an even temperature until an equilibrium has resulted and the menstruum is capable of holding in solution every particle of the dissolved matters which remain above the sediment; perfect rest will now result and precipitation cease. A change in solvent power of the solution must take place before further precipitation can follow, and a change of temperature will be followed by either decreased or increased solvent power, and consequently by more or less precipitation, or re-solution of the precipitate.

Let us accept the former, that there is a decrease of temperature after a precipitate has ceased to form under a constant temperature. Another precipitate will result which is entirely different from the former, and this precipitate can to the greater extent redissolve in the menstruum when the temperature increases. This precipitate during the low temperature settles to the bottom of the bottle, and upon an increase of temperature redissolves, giving us a dense layer of solution upon the bottom of the bottle. The solvent properties of this layer of solution differ from the liquid above, and as a consequence certain portions of the precipitate previously cast down will dissolve. This dense warm liquid acts upon other constituents of the precipitate, and as these dissolve the solvent power of the solution changes and other portions of the precipitate dissolve until finally a considerable amount of the precipitate has disappeared. During this time circulation of the liquid has formed, perhaps, more than one stratum at the bottom of the container, and then by the circulation I have exemplified in my previous experiments, there is a starting upward of this lower solution, and a downward motion of the upper. Finally, a condition will be reached in some portion of the liquid where, by the intermingling of the lower and the upper solutions, certain principles that were dissolved from the precipitate will become insoluble. This state is usually indicated by a cloudiness at the point of contact of two stratums, and the result is the formation of a precipitate. This precipitate will continue to form until the composition of the liquid within the container is again uniform and the strata have disappeared. Such a final state of affairs can only be reached under an unchanged temperature, and we know that under ordinary circumstances an even temperature for any length of time is impracticable. As a consequence we may expect to have more or less of strata in our containers, and repeated precipitation and re-solution. Our precipitates will come and go with the changes of temperature, and there can be no rest. Thus is explained, as I stated at the commencement of this article, how "continuous precipitation may be taking place without depleting the liquid of dissolved matters, and may continue for an indefinite period."

There is some difficulty in accurately studying the above-named phenomena, unless the experimenter will select some article that will yield much extractive and little colouring matter, but all who have observed the action of fluid extracts and examined their precipitates at different stages will recall many instances where the foregoing description of phenomena can be applied. In connection with this subject I shall now introduce the notes of an experiment which illustrates the formation of a precipitate by the gradual admixture of different portions of a transparent percolate, and which will show us the workings of the strata currents under ordinary conditions.

May 5, 1881. Eight troy ounces of powdered capsicum were properly moistened with dilute alcohol and packed in a cylindrical percolator. The receiving vessel was an ordinary 2-gallon bottle. Into the mouth of this the percolator was inserted, and to the exit of the percolator a rubber tube was attached. This tube extended to the bottom of the bottle, and the lower end of it was fixed to a cork, so that as percolation progressed the floating cork would hold the exit of the tube at the surface of the liquid. By this arrangement the percolate was collected in the order obtained and without mixing, the lightest liquid being on top.

Description of Percolate.—The percolate passed transparent from the beginning until the end of the act of percolation. The lower portion of the liquid was dark red in thin section, black as viewed in bulk. From the upper part of this dark layer the colour became gradually less and less in shade, until it passed to a light straw colour. This point was reached at a height of 4 inches above the dark layer; the remainder of the container (6 inches) was of a uniform light straw colour, and doubtless would have remained so had the act of percolation been continued for days. This percolate consisted then of three parts, a lower solution rich in dissolved matters, a central solution, where there was a marked and rapid decrease in colour from below upward, and an upper liquid of uniform colour; the proportion being as 3, 4 and 6. Undoubtedly the bottom of the lower section was most concentrated, although the colour of the first 3 inches of solution was so deep as to forbid a comparison by the colour test. However, the entire percolate had two points of distinct division, one where the colour rapidly decreased from dark red to light red, and the other where the change was rapid from light red to yellow.

Changes.—The container was retained in the laboratory

* Read at the meeting of the American Pharmaceutical Association held at Niagara Falls, 1882.

in the position where the act of percolation was accomplished. In two hours from the time of the cessation of percolation a muddy layer of liquid appeared between the dark red (lower) and light red (overlying) solutions. In four hours the entire light red percolate was muddy; in six hours it had resolved itself into three sections, each with distinct lines of demarcation. After twenty-four hours particles of yellow precipitate appeared abundantly in the upper of these sections and gradually settled to the surface of the second section; here there was a retardation of the motion of the particles and a diminution in the amount of precipitate, but finally it collected in large particles and fell through the second dividing plane. As the precipitate passed through this second section it decreased and finally entered the heavy dark lower liquid, *where it entirely dissolved.* After seven days the three central strata had resolved into two sections and had become transparent, throughout which were clots of precipitates. The upper portion of the liquid in the bottle was very muddy, and gave rise to a constant rain of precipitates that gradually settled through the lower strata, dissolving as they passed, until only a very small amount reached the bottom of the bottle. These appearances were maintained for ninety days, at which time the liquid in the bottle had become transparent and of one colour and composition, the strata and lines of demarcation had disappeared, a uniform yellow precipitate covered the bottom of the bottle, and a layer of oil globules overspread the surface of the liquid.

Analysis of Phenomena.—The examination we have given the changes which occurred in the tube makes this example simple and readily understood. The percolate from the capsicum formed a liquid in the bottle that was concentrated at the bottom, and which became dilute with more or less regularity as we passed towards the surface. This association of different liquids under the influence of change of temperature resulted in the formation of strata, and each stratum was circulating upon the principle of those of our tube, excepting that, as the temperature changed regularly over the surface of the entire cylinder, the circulation was from the outside of each section towards the centre of the bottle. This circulation even without the aid of diffusion gradually transferred the various portions of the liquid, effecting an even mixture.

Cause of Precipitation.—By referring to our article in the Proceedings of this Society for 1881, it will be found that when different portions of ordinary percolates are mixed precipitation is likely to result. Now, the precipitate under present consideration followed from the usual cause, a mixing of percolates. The concentrated solution at the bottom of the bottle was gradually transferred to the dilute solution above, and *vice versâ.* This caused a precipitation of substances insoluble in the new solvents, and as the greatest change or strain results from the rapid dilution of the heavy solution, precipitation was most rapid at intermediate parts or the upper portion of the liquid.

Re-solution of the Precipitate.—It will be noticed that after the precipitate was formed in the upper part of the liquid, it disappeared as it progressed towards the bottom of the bottle. This re-solution resulted from the fact that the lower strata were solvents for bodies that the upper could not hold in solution. Hence the gradual formation of the precipitate in the upper part of the bottle was followed by the re-solution of the larger part as it slowly settled towards the bottom. Indeed, after seven days had passed these aggregations of precipitate in the third stratum were in pieces as large as the first joint of the little finger, but these for a long time were almost entirely dissolved in their passage through the underlying strata, only reaching into the top of the lower liquid. It must be remembered that the lower solution gradually became more dilute, and that finally its solvent action was so decreased as to permit more or less of the precipitate to reach the bottom of the container.

The points I desire to present in this paper as a step further in our study of fluid extracts may be summed up as follows:—

We cannot hope to produce by percolation a line of permanent fluid extracts or tinctures, for most percolates will precipitate more or less owing to aforementioned causes, even without a change in temperature. Theoretically this precipitation, if we could maintain an unchangeable temperature, would continue until an equilibrium was established, and then the liquid could hold in solution all the dissolved principles. However, an unchangeable temperature is not practical under ordinary circumstances, hence it follows that occasionally the sediment is increased by a precipitation which results simply from low temperature. This precipitate will redissolve when the temperature increases, the solution formed may act upon and dissolve more or less of the precipitate already present, and this stratum of liquid by diffusion and circulation will reach the upper portions of the container, to be altered in composition and precipitate again. Thus we find that from natural causes precipitation in fluid extracts made by percolation may continue indefinitely, and that these precipitates may periodically continue to increase or decrease, and that there is little chance for absolute rest. It follows also that even though we may prepare a fluid extract with great care and shake the same until it is a uniform mixture, after a period it may be very different at the top and bottom of a container. This is explained by the fact that after a decrease of temperature a precipitate is formed, then an increase of temperature redissolves it, giving a lower stratum of liquid, perhaps *very* rich in some proximate principle.

There are other phases connected with this subject, and, from the manner in which my last article to the Society was received by pharmacists and manufacturers of pharmaceuticals, I am let to believe they would prove very interesting, but to consider them at this time would lengthen the paper and perhaps make it wearisome.

COMMERCIAL BISMUTH PREPARATIONS.*

BY PROFESSOR P. W. BEDFORD.

At the time this query was accepted (as even now) the United States Pharmacopœia of 1870 was the guide by which this query should be replied.

The writer has, however, made his experiments in the light of the more exact and definite tests of the Pharmacopœia of 1880.

The impurities sought for were lead, copper, silver, arsenic, alkaline earths, ammonia, chlorine, sulphuric acid.

Besides the salts, the writer examined specimens of metallic bismuth, one sample being from the new Australian source.

As the examination was so thoroughly satisfactory as to the medicinal quality, no enumeration will be made as the results of the examination of each individual maker, but the results may be embodied in a general statement. This may be stated as follows:—That each of the samples of subnitrate and subcarbonate of bismuth examined are fully equal to the requirements of the Pharmacopœia of 1880; that in none of the specimens examined is there any lead, copper, silver, chlorine, or sulphuric acid. By a more rigid test than the United States Pharmacopœia exacts, there were traces of ammonia in two samples, in all there were traces of alkaline earths or salts, both due, undoubtedly, to imperfect washing of the precipitates in process of manufacture, yet in both the quantities were so minute, that they were practically not noticeable in an analysis beyond "a trace."

The same may be said about arsenic, though in this a quantitative determination was made. The amounts present of arsenic varied from less than $\frac{1}{10}$ grain to 3 grains in 1000 grains.

The specimen of Australian bismuth gave evidences of a trace of copper and arsenic, but neither were estimated.

* Read at the meeting of the American Pharmaceutical Association held at Niagara Falls, 1882.

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DR. GREENHOW'S REPORT ON THE EXAMINATIONS.

THE reports presented annually to the Privy Council by the visitors appointed under the provisions of the Pharmacy Act, 1868, to attend the examinations conducted in London and Edinburgh, always command respectful attention, not only because they are the embodiment of official opinion as to the manner in which the Pharmaceutical Society performs the important duty confided to it in the interest of the public, but also because the reporters are gentlemen of mature experience, intimately acquainted with the nature of the work to be done by the examining boards, and at the same time viewing it from a position outside purely pharmaceutical influences. It was, therefore, natural that when the latest report of Dr. GREENHOW, through the courtesy of the Lords of the Council, came under the notice of the Pharmaceutical Council at its recent meeting, it should give rise to considerable discussion, though possibly some of the speculations as to what Dr. GREENHOW might or might not mean to imply in the last sentence, concerning a subject upon which he just previously declares his intention to defer offering an opinion, may turn out to have been superfluous. There is, however, plenty that is definite and unmistakable in the report which is worthy of the most careful consideration.

As in previous years, Dr. GREENHOW gives to statistics a prominent place in his report, and these are the more acceptable because they furnish some details, respecting the subjects in which failures occurred, not published elsewhere. Referring first to the Preliminary examination, he points out that the percentage of failures in 1881 was unusually large, amounting to 56·8 per cent. of the 1187 candidates examined. This unfavourable result he does not attribute to an excessive stringency of the examination, but to the very inadequate early education of the candidates, an opinion which certainly finds corroboration in the fact that by far the largest proportion of failures was in arithmetic. Moreover, large as was the percentage of unsuccessful candidates, it may be said to find a parallel in the case of the Oxford and Cambridge Local Examinations. According to the joint annual report on this subject, recently issued by the Universities, the number of candidates who presented themselves at the different centres in the past year was 734, and of these 350, or nearly 48 per cent., failed to obtain a certificate. But it appears that one out of every three of the successful candidates had already passed the examination on a previous occasion, and if this be taken in consideration in connection with the fact that the candidates as a rule are scholars selected from various schools on account of their presumed fitness, it will be seen that the indication furnished by the Universities Local Examinations as to the quality of the middle class education throughout the country is hardly more favourable than that given by the Preliminary examination conducted under the provisions of the Pharmacy Act.

The fact that there were more than 50 per cent. of failures in the Minor examination, Dr. GREENHOW attributes, as in former years, to the very defective training the men had received during the three years they had passed in a chemist's shop prior to presenting themselves. Unfortunately it is too true that many of the candidates have had but "scanty opportunities for practically learning to read prescriptions written in Latin or to dispense and compound medicines;" but this is mainly attributable to a condition of affairs over which pharmacists have little control, namely, the relative absence in many cases of that portion of their work which they are supposed to have been specially trained to perform. The report gives the number of failures in the different subjects of the Minor, from which it appears that chemistry was by far the weakest subject, whilst the failures in prescription and practical dispensing, notwithstanding the defective training commented upon, were comparatively few. However, it must be remembered that the figures quoted only partially reveal the facts, since a candidate who fails to a certain extent is not carried further, and therefore they must necessarily be affected by the order in which the subjects are taken. In respect of the Major examination also, the figures quoted show that the largest proportion of failures was in chemistry.

Dr. GREENHOW abstains from offering any comment at present on the proceedings of the Council in respect to the report of the Special Committee appointed to consider the relation to each other of pharmaceutical education and the pharmaceutical examinations, and contents himself with alluding to the recommendations and pointing out that the first two adopted, providing for a three years' apprenticeship or pupilage, and the previous passing of the Preliminary examination, are in accord with views expressed by him in previous reports. With respect to the fourth recommendation, as to the division of the Minor examination into two parts, it may be remarked that although Dr. GREENHOW is quite correct in saying that it was not adopted, the opposition to it was not based upon disapproval of the principle that there should be such a division, but was directed chiefly against some alterations that had been introduced as to the manner in which it should be carried out.

EXTRA-JUDICIAL UTTERANCES OF CORONERS.

A case reported on another page well illustrates the capricious manner in which every now and then a coroner oversteps his proper functions and inflicts such a penalty as is involved in censure by a prominent public officer upon no other basis than his own notion of what the law is or ought to be. In this case, in the course of an inquiry as to the cause of death of a man, who it was at first erroneously supposed had died from the effects of poison, it came out that he had been supplied by a chemist and druggist in Belfast with an ounce and a half of laudanum. The seller had not only complied with the requirements of the law as to labelling, but had exceeded them by making inquiry as to the purpose for which the poison was required and had received a reasonably satisfactory answer. This, however, did not satisfy the coroner, and having first alleged that the law provides that the name and address of the buyer shall be taken in the case of a sale of laudanum, and been corrected, he then affirmed that it ought to be done. If Dr. Dill thinks that laudanum should be included in the first part of the poison schedule he has a right to say so, and he belongs to a class of functionaries whose opinions upon such a subject are entitled to respect, but his expression of opinion involved an act of injustice, inasmuch as it took the form of an unwarranted censure of a person who had even exceeded the precautions with which Parliament has surrounded the sale of laudanum, when sold as such and not as a patent medicine. The suggestion that a chemist and druggist should sell a diluted article while taking the price of one of full strength, if made by Dr. Dill, as reported, is beneath criticism, even if such a practice has the sanction of custom in surgeries. But it would seem to show that he must be ignorant of the existence of another public functionary, whose opinion in respect to such a practice would be of greater importance than even that of a coroner.

THE INSTITUTE OF CHEMISTRY.

Last week a meeting of members of the Institute of Chemistry was held in Birmingham. The proceedings commenced on Friday morning with a visit to the alkali works of Messrs. Chance and Co., where the new process of sulphur recovery invented by Messrs. Schaffner and Helbig (see *Pharm. Jour.*, xii., 969) is in operation, and another to the Earl of Dudley's Round Oak iron works.

In the evening the members dined together at the Great Western Hotel, under the presidency of Professor Abel. In responding to the toast of the evening, Professor Abel traced the history of the Institute, which he said had had its origin seven years ago in the want that was recognized by a considerable section of the Chemical Society of an organization through which the status of the profession of chemistry could be definitely established, and he expressed an opinion that although the present was only the sixth year of the existence of the Institute, the Fellows might venture to believe that its future prosperity and utility to the profession were fully secured.

On Saturday, the meeting was brought to a close by visits to Messrs. Chance's Glass Works, the Corporation Gas Works, the Birmingham Mint, and Messrs. Elkington's electro-plating works.

THE NEXT EVENING MEETING.

An Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, November 1, when a paper will be read on "The Orchard Alum Spring," by Dr. Thresh. The chair will be taken at half-past eight o'clock.

CHEMICAL SOCIETY.

The first meeting of this Society for the new session will be held on Thursday next, November 2, when the following papers are to be read:—"On some Halogen Compounds of Acetylene," by Dr. R. T. Plimpton; "On Dihydroxybenzoic Acids and Iodosalicylic Acids," by Dr. A. K. Miller; "Crystalline Molecular Compounds of Naphthalene and Benzene with Antimony Chloride," by Watson Smith and G. W. Davis; "Additional Evidence that Quinoline belongs to the Aromatic Series of Organic Substances," by Watson Smith and G. W. Davis; "On Orcin and some of the other Dioxytoluols," by R. H. P. Nevile and Dr. A. Winter.

THE SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

It affords us pleasure to call the attention of past and present students in the School at Bloomsbury Square to the announcement that the first meeting of the School of Pharmacy Students' Association in the new session will be held on Thursday evening, November 16, when an address will be delivered by the President, Professor Attfield. The Associasion is one that is entitled to the best wishes of pharmacists, since it has for its object the encouragement of study and original work in the sciences upon which pharmacy is based, and there has also been founded in connection with it a "research fund" for rendering aid to students in the investigation of subjects of direct pharmaceutical interest. At a time when there is a marked dearth of first-class pharmaceutical research, as evidenced in the paucity of communications to the Evening Meetings of the Pharmaceutical Society and other bodies, both in town and country, associations which, like this one, foster a taste for original investigation among the rising generation of pharmacists, are doing most useful service.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

October, 1882.

Present on each day—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Gale, Greenish, Linford, Martindale, Plowman, Southall, Taylor and Thresh.

Dr. Greenhow attended on the 19th and 26th, on behalf of the Privy Council.

October 18.

MAJOR EXAMINATION.

Eight candidates were examined. *Six* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Fletcher, James Edward.........Saltley.
Foden, Edwin ....Eccles.

MINOR EXAMINATION.

Seventeen candidates were examined. *Twelve* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Betts, Charles Ernest Oscar ...Woodbridge.
Bray, William ....Redruth.
Brough, Frank Thompson ......Northampton.
Cardwell, Augustus ....Derby.
Cooper, Harry Stanley ....London.

MODIFIED EXAMINATION.

Three candidates were examined. *Two* failed. The undermentioned passed, and was declared qualified to be registered as a Chemist and Druggist:—

Colvin, John Thomson ....Bodmin.

October 19.

MAJOR EXAMINATION.

Six candidates were examined. *Four* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

MacDermott, Robert John......London.
Parker, William Henry ....Hitchin.

MINOR EXAMINATION.

Twenty candidates were examined. *Twelve* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Dadson, Horace Charles ....King's Lynn.
Deacon, Frederick George ......Frome.
Dodsworth, Martin ....Harrogate.
Dunn, George Stewart ....Landport.
Dye, Charles Page ....Bury St. Edmund's.
East, William Alfred ....Princes Risboro'.
Fawssett, Theodore ....London.
Gummow, James Freeman......London.

October 25.

MAJOR EXAMINATION.

Seven candidates were examined. *Two* failed. The undermentioned *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Roper, Robert Francis............East Stonehouse.
Rouw, Theodore John.............Ruthin.
Steel, Alexander ....Torquay.
Thornley, Frederick...............Devizes.
Wakefield, John ....Birmingham.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Sixteen* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Heynes, Thomas Edward ......Maidenhead.
Maddox, Frank Walter ....Ealing.
Millward, Rowland Donne......Ashbourne.
Norman, William Francis ......Towcester.
Rees, David ....Haverfordwest.

October 26.

MINOR EXAMINATION.

Twenty-four candidates were examined. *Thirteen* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Hudson, Tom ....Wells.
Pell, Alfred ....Wisbeach.
Pinchen, William John ....Norwich.
Prothero, George Rees ....Pontypridd.
Rees, Rice William ....Swansea.
Robertson, John ....Aberdeen.
Salmon, Ernest Frederick ......London.
Surman, Thomas William ......Bristol.
Tottle, Henry John ....Bath.
Treharne, Frederick Gwilym...Weston-super-Mare.
Yates, George Albert ....Manchester.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's examination:—

Certificates of the College of Preceptors.

Hathaway, Fredk. Hy. Wm. ...Lydney.
Hemens, Frank......................Hutton,
Wookey, Lionel ....Bath.

Certificate of the Incorporated Law Society.

Lewis, Rees Martin ....Cheltenham.

Certificates of the University of Cambridge.

Chater, Arthur Brand............Elmdon.
Corder, Edward ....Norwich.
Harrison, Rd. Caswell Clark...Birmingham,
March, Thomas Frederick ......New Brompton.
Midgley, Walter ....Keighley.
Shenton, Arthur Holland ......Birkenhead.

Certificates of the University of Oxford.

Minchin, William..................Bedford.
Oldershaw, John ....Nottingham.
Wyatt, Harold ....Bootle.

EXAMINATIONS IN EDINBURGH.

October, 1882.

Present on each day—Messrs. Ainslie, Baildon, Clark, Gibson, Gilmour, Kininmont, Nesbit and Stephenson.

Professor Maclagan was present on the 19th, on behalf of the Privy Council.

October 18.

MAJOR EXAMINATION.

One candidates was examined, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Wright, Robert.....................Buxton.

MINOR EXAMINATION.

Twelve candidates were examined. *Seven* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Brown, Alexander..................Dumbarton.
Cobden, Alfred George ....London.
Cunningham, John James ......Cambuslang.
Law, Thomas Wm. Thorburn...Falkirk.
McNeilage, Alexander............Greenock.

October 19.

MINOR EXAMINATION.

Thirteen candidates were examined. *Eight* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Moore, Frank Philip ....Aberdeen.
Ombler, William Henry ....Windsor.
Rowand, Robert ....Glasgow.
Watson, Robert William.........Maryport.
Young, William Ferguson ....Elgin.

PRELIMINARY EXAMINATION.

The undermentioned certificate was received in lieu of the Society's Examination:—

Certificate of the University of Edinburgh.

Pirie, John ....Edinburgh.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held on Wednesday, October 25, 1882, the report of the College of Preceptors on the examination held on October 3rd was received.

Two hundred and forty-eight candidates had presented themselves for examination, of whom *one hundred and seventeen* had failed. The following *one hundred and thirty-one* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

(Arranged alphabetically.)

Abbott, Herbert E. Tripp ......Lowestoft.
Allan, Hy. Wemyss F............Glasgow.
Arthur, Arthur......................Carmarthen.
Baker, Wm. Weaver ....London.
Barnes, Fredk. Walter............London.
Barstow, William ....Marple.
Beale, Charles Henry ....Chard.
Bennet, Andrew R. ....Uphall.
Bennett, Albert Edward ....Leigh.
Bertram, David Paul J. ....London.
Birrell, Robert ....Forfar.
Bones, Arthur Anderson ....Manchester.
Booth, George Hy. W.............Alfreton.
Bransby, Chas. Kirby ....Manchester.
Brook, Thomas Turner ....Elland.
Bugden, William Beale ....Blandford.
Burton, Robert Charles ....Kendal.
Bygott, John William............Huddersfield.
Caldwell, John......................Edinburgh.
Campbell, Peter, jun. ....Leven.
Carrie, Robert Smith ....Kirkcaldy.
Cartwright, William Henry ...Whitchurch, Salop.
Chatterton, Benjamin ....Sheffield.
Clarkson, Thos. Edward ....Wibsey.
Clatworthy, Wm. Jno. Hicks ...Saltash.
Cobb, Herbert Ernest ....Bury St. Edmunds.
Cornell, Henry Currie............King's Lynn.
Crockett, Henry ....East Grinstead.
Cullwick, John Henry............Birmingham.
Cupit, Alfred Henry ....Loughborough.
Curtis, Joseph Levi ....Huntly.
Dalton, Edwin T....................Hull.
Darnbrough, Arthur...............Southport.
Dean, John Thomas...............Haslingden.
Denny, John Harvey ....Woodbridge.
Donald, John Martin ....Perth.
Duncan, William ....Elgin.
Edmondson, Thomas ....Cockermouth.
Eyval, Thomas Brown............Edinburgh.
Felton, William ....Maidstone.
Forsyth, Ebenezer ....Edinburgh.
Fowler, Geoge Ross................Edinburgh.
Freeman, Thomas ....Beverley.
Funnell, Richard ....Whitlesea.
Gaddes, Andrew ....Penrith.
Graham, Joseph ....South Shields.
Gregson, Joseph ....Manchester.
Griffiths, Charles John ....Shanklin.
Griffiths, John Egbert............London.
Grime, James ....Darwen.
Hall, Alfred Eves...................Sevenoaks.
Hanson, Arthur William.........Devonport.
Hendry, Fred. Harry ....Hull.
Hendry, Robert Love ....Edinburgh.
Heyhoe, Horace James ....Swaffham.
Holt, James Hartley ....Ormskirk.
Hornby, Louis Francis ....Great Harwood.
Hucklebridge, Wilfred ....London.
Hudson, George Charlton ......London.
Hudson, James......................Dumbarton.
Hughes, John ....Carnarvon.
Hull, Robert S. ....Sunderland.
Hurst, Herbert Frederic R. ...Colchester.
Jones, David Lloyd ....Eglwyswrw.
Jones, Richard Alan ....Holyhead.
Jones, Thomas ....Swansea.
Jones, Thomas ....London.
Jones, Thomas John ....Holyhead.
Lewis, John Lloyd ....Llandyssul.
Lloyd, Walter George ....Cardiff.
Lobbett, James Godfrey.........Hingham.
Lomax, William Henry ....Darwen.
Lowe, Albert John ....Guernsey.
McDonald, James ....Lochee.
McKilligin, Hay Grant ....Portsoy.
McMurtrie, John ....Glasgow.
Mahood, Trevor Corry ....London.
Marsh, Charles David ....Devizes.
Mason, John Henry...............Wirksworth.
Massey, Samuel Jeffrey ....Purston.
Miller, Alex. Sunderland ......Edinburgh.
Mills, William Henry ....Walsall.
Milton, William, jun. ....Edinburgh.
Moir, William Sinclair ....Aberdeen.
Morley, William Henry ....London.
Morrison, Andrew ....Glasgow.
Morrow, George ....Hornsea.
Mossop, Henry......................Whitehaven.
Nicholson, John...................Broughton-in-Furness
Noyes, Edward T. ....Wokingham.
Owen, Henry ....Carnarvon.
Owen, John Lewis .... Holyhead.
Palmer, Frank Hermann ......Hull.
Park, John ....Aberdeen.
Payne, Charles Frederick ......Ramsgate.
Peck, Henry Fredrick............London.
Peebles, Thomas Smith ....Dundee.
Pennington, John Noble.........Ulverston.
Perrett, George Stanley ....Bath.
Porter, Caleb Thomas Geo.......London.
Potter, Herbert Mills ....Walsall.
Prosser, Evan Charles ....Colchester.
Raine, James Arthur ....Over Darwen.
Reid, Neil ....London.
Reith, Alexander ....Aberdeen.
Ridley, Albert Paul................Ipswich.
Roberts, Alfred Dean ....Lincoln.
Rudd, Henry Bulmer ....Bradford.
Rutter, William ....Masham.
Seccombe, Maurice Otto ....Tavistock.
Smith, John Henry ....Coventry.
Spry, Richard ....London.
Thirsk, Arthur Thomas ....Hull.
Thomas, James......................Newcastle Emlyn.
Thomas, Joseph ....Garstang.
Thompson, Henry Clarence ...Belford.
Underwood, George...............Whitby.
Veitch, Alexander ....Edinburgh.
Vivian, Richard ....Penzance.
Walton, James Thomas ....West Hartlepool.
Weir, Robert.........................Campbeltown.
Wells, Thomas Peter ....Blackburn.
Whitmore, William Fryer ......Hoddesdon.
Whitworth, James William ...Oldham.
Wilkes, Thomas ....Shrewsbury.
Williams, David ....Cardigan.

Williams, William Pierce ......Llanberis.
Wilson, James B. ....Nottingham.
Wilson, Joseph Harwood ......Wigan.
Wright, Charles Rowland ......Portsmouth.
Yuill, Stephen ....Belfast.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates. Examined.	Passed.	Failed.		Candidates. Examined.	Passed.	Failed.
Aberdeen	9	5	4	Inverness	2	1	1
Birmingham......	9	4	5	Lancaster	6	4	2
Brighton	1	1	0	Leeds	14	5	9
Bristol	6	2	4	Lincoln............	6	1	5
Cambridge	4	0	4	Liverpool	9	4	5
Canterbury	4	2	2	London..............	39	19	20
Cardiff	9	2	7	Manchester	20	12	8
Carlisle............	3	3	0	Newcastle-on-T.	3	2	1
Carmarthen	7	5	2	Norwich	7	6	1
Carnarvon	7	6	1	Nottingham	9	4	5
Darlington	2	2	0	Peterborough ...	2	1	1
Dundee...........	7	4	3	Sheffield	4	1	3
Edinburgh	16	10	6	Shrewsbury	3	1	2
Exeter	7	4	3	Southampton ..	4	3	1
Glasgow	9	7	2	Truro	4	1	3
Guernsey	1	1	0	Worcester	3	0	3
Hull	6	6	0	York...............	6	2	4

The questions for examination were as follows:—

Time allowed: Three Hours for the three subjects.

I. LATIN.

1. Translate into English:—

(i.) Trium mensium molita cibaria sibi quemque domo efferre jubet. (ii.) Hoc toto prœlio aversum hostem videre nemo potuit. (iii.) Eos ita dicere: Non esse fas Germanos superare, si ante novam lunam prœlio contendissent. (iv.) Hoc prœlio trans Rhenum nuntiato, Suevi, qui ad ripas Rheni venerant, domum reverti cœperunt. (v.) Hoc prœlio facto, reliquas copias Helvetiorum ut consequi posset, pontem in Arare faciendum curat atque ita exercitum transducit. Helvetii, repentino ejus adventu commoti, quum id, quod ipsi diebus viginti ægerrime confecerant, ut flumen transirent, illum uno die fecisse intelligerent, legatos ad eum mittunt; cujus legationis Divico princeps fuit, qui bello Cassiano dux Helvetiorum fuerat.

2. To what classes of verbs do *potuit, consequi, transducit, fuit,* respectively, belong? Write in full the indicative perfect and subjunctive present of these verbs.

3. Give some rule for the use of the subjunctive mood.

4. Translate into Latin:—(i.) They had done Cæsar great injury. (ii.) Cæsar set out for Italy and came to Rome. (iii.) A river separated the two armies. (iv.) Who does not love peace more than war? (v.) Having pitched his camp, he waited till the enemy should attack.

II. ARITHMETIC.

[The working of these examples, as well as the answers, must be written out in full.]

1. How many yards of carpet, 25 inches wide, will it take to cover a floor that is 19 feet 7 inches long by 18 feet 9 inches wide?

2. Multiply the sum of 1, $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{3}{4}$ by the difference of $\frac{4}{15}$ and $\frac{3}{20}$, and divide that product by the double of $21\frac{7}{9}$.

3. Multiply ·285 by 4·02; divide 2·961 by ·007; and find the value of 2·778125 of 6*s.* 8*d.*

4. If, after selling $\frac{3}{4}$ of an estate, I sell $\frac{2}{3}$ of $\frac{7}{9}$ of the remainder for $\frac{3}{5}$ of $\frac{7}{8}$ of £$200\frac{5}{8}$, what is the value of $\frac{2}{3}$ of the estate.

5. If a sack of corn, containing 1 hectol. 20 lit., cost 18 francs; what ought to be paid for a sack of corn of the same quality containing 1 hectol. 60 lit.?

III. ENGLISH.

1. Define *case.* What indications of it are there in English?

2. Give the perfect tense and past participle of the verbs *sew, read, throw, rise, lie, strive.*

3. Correct the following sentences, giving your reasons in each case:—

(i.) Neither of them had a sixpence of their own.
(ii.) Avoid those kind of things.
(iii.) Who did you give that book to?
(iv.) That was the man whom I saw was to blame.

4. Parse the words in italics in the following passage:—

"You take *my* house *when* you *do take* the prop
That doth sustain my house; you take my life
When you do take the *means whereby* I live."

5. Write a short composition on one of the following subjects:—"Waste of Time," "The Study of the Laws of Health," "Patience"; or give an account of some remarkable place or of some distinguished writer.

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

A general meeting was held in the Society's Rooms, on Wednesday evening, October 11. Mr. Preston, President, in the chair. There was a moderate attendance.

The minutes of the previous meeting were confirmed.

The President, after alluding to his pleasant visit to the Pharmaceutical Conference at Southampton, called upon Mr. Furness to read his paper on "Our Trade and Professional Interests."

Mr. Furness commenced his remarks by referring to the composite nature of the business of a chemist and druggist, and defined it as a mixture of the professional and trade elements, in which the latter greatly predominated. The trade element had been and was being assailed on all sides, and the dealing in a number of articles which used to lie almost exclusively in the chemist's hands had now been diverted into other and possibly more legitimate channels. But chemists could not be so indifferent now that the trade in drugs, patent medicines, specialties, sundries, dietetic articles, etc., was so seriously threatened. Simple articles, such as salts and senna, had long been supplied by small shopkeepers in villages and other places; but these persons had generally maintained the prices, and moreover the public had been able to recognize the superior quality of the articles sold by chemists. But now the trade was grievously assailed by large grocers, drapers, and "stores," who supplied patent medicines, and specialties, and nine-tenths of the Pharmacopœia, and even in some cases made arrangements to dispense prescriptions and deal in poisons at reduced prices. With respect to patent medicines and similar articles the public could not be expected to pay 25 or 30 per cent. more at one shop than they would at another a few yards off, but it was not to the interest of chemists to sell these articles at cost price. It was, however, useless to look to the Government, the Pharmaceutical Society or the Trade Association for the remedy of this vexed state of things. Chemists must rely upon their individual tact and learning to supply the income lost in this direction, and must rely upon their collective strength and exertions to destroy the trust the public had acquired for patent medicines. Chemists had made this trade assume the dimensions it had. They had recommended these "patents," kept them in stock, distributed hand bills, exhibited show cards, lent their windows for gratuitous advertisements, and now, having established them thus firmly, were entirely ignored, saving when some new enterprise was endeavouring to secure public favour. But the same means that had been instrumental in building up this trade could be used in combating the evil, and if the proprietors would not help to maintain the interests of chemists they must combine to help themselves. As to the sale of drugs, there were many of the articles and preparations in the British Pharmacopœia which were not absolutely poisonous, but the supply of which still required supervision by a responsible person. This was illustrated by a case which had come under the speaker's notice, where a solid had been supplied for "sal volatile" and the buyer told to take two teaspoonfuls, resulting in the inconvenience attending the swallowing of about two drachms of carbonate of ammonia; and by another case where nitrate of potash had been supplied for Epsom salts. He was of opinion that the supply to the public of all the chemical and Galenical preparations, the mineral and animal substances and the majority of the vegetable products in the British Pharmacopœia, as well as the dispensing of prescriptions, ought to be exclusively in the hands of chemists and druggists, and he wished to see an amendment of the Pharmacy Act in this sense. It could easily be demonstrated that such an alteration would be for the public benefit, and it would be simple justice to a respectable and deserving body. This end could be best attained by joining the local associations, supporting the Trade Association, and influencing the constitution of the Council of the Pharmaceutical Society, both of these last-mentioned bodies possessing great influence if they could only be got to work in the proper direction. The speaker then briefly referred to the subject of pharmaceutical education. Although he considered the examinations were sufficiently comprehensive and stringent as compared with the position of the pharmacist, he was of opinion that if it were understood that all persons presenting themselves for instruction had previously attended a suitable course of instruction, it would strengthen the hands of the examiners, and they would be better able to make allowances and draw inferences with respect to the individuals coming before them. It was necessary there should be some suitable provincial education established, easily and cheaply procurable at recognized centres. If this could not be done to be self-supporting, some other scheme must be adopted. Arrangements might be made with the Science and Art Department, which had organizations in many provincial towns, or terms might be arrived at with such educational bodies as Frith College, Yorkshire College of Science, and Owens College, etc., to establish a course of lectures similar to those delivered at Bloomsbury Square. The reading of the paper was brought to a close by a reference to the relation of chemists and druggists to the public and the medical profession.

The President remarked that there was a large field for discussion, and proposed a vote of thanks to Mr. Furness for his valuable paper.

A discussion then followed on the various topics of the paper, in which Messrs. Ellinor, Newsholme, Lowe, Fox and Mould took part.

LIVERPOOL CHEMISTS' ASSOCIATION.

The first general meeting of the above Association was held at the Royal Institution on Thursday, October 12, 1882, the President, Mr. Joseph Woodcock, in the chair.

The minutes of the last meeting were read and confirmed, and the following donations announced:—The *Pharmaceutical Journal*, from the Society; List of Foreign Correspondents of the Smithsonian Institution, from the Institution.

Mr. J. E. Saul was elected an associate.

Mr. Shaw showed an "Electric Gas Lighter." This instrument, which is said to be capable of lighting a gas jet thirty thousand times before it requires recharging, costs primarily 30*s*. If this statement is correct it will, therefore, be seen that, independently of the small cost of recharging, which is a few shillings, it is, for this purpose, very little more expensive than wax matches.

The President then delivered his inaugural address. After welcoming the members at the commencement of the thirty-fourth session, he referred to various causes that had tended to deprive the Association of some of the classes formerly represented in it and had somewhat altered its character. He then continued:—

"This probably places us in our true position as chemists and pharmacists, and we shall not fail to remain efficient, successful and self-existing, provided we supply papers, discussions and miscellaneous contributions calculated to advance our calling from a professional aspect. In the first place we must never lose sight of the fact that we are a recognized educational body, and that we should provide lectures in our School of Pharmacy for the education of our apprentices. We have hitherto done so, but it is requisite an adequate number of students should present themselves to defray the necessary cost, and in this we have not always been successful, more especially since the introduction of the much-to-be-lamented system of 'cram.' But let us hope its last days are numbered.

"The subject that has perhaps above all others occupied the attention of British pharmacists during the last twelve months has been the question of establishing a more satisfactory relationship between the education of embryo-pharmacists and their examination, and when the time arrives that a compulsory curriculum is enforced no doubt our school provision will be in demand. At the some time we may congratulate ourselves that we are not the only body that suffers from the same cause. The recent report of the Liverpool School of Medicine states that the members of the medical profession did not increase in equal ratio with the population; not only was there no increase, but a slight diminution in the numbers of students throughout the country, and the same statement applies to the numbers of those examined at Bloomsbury Square. No doubt this is caused by the increased stringency of examinations. But this should not deter us; we must rather advocate, and advocate strongly, a sufficiently compulsory curriculum as the test for education, rather than recognize the supply of a cursory, transient and superficial knowledge merely intended for the purpose of enabling the student to surmount an examination which otherwise would not be overcome.

"And here let us give a word of praise to Professor Attfield for his long-continued and successful endeavours to attain the desirable result that is now likely to be accomplished and crown his wishes. From the time he inaugurated the advocacy of a recognized compulsory curriculum at the Pharmaceutical Conference at Brighton, ten years ago, to the present, his exertions have been unceasing. His able, instructive and comprehensive speech at Manchester; his pamphlet, which he distributed amongst our own body broad-cast over the country, and which contained a very large number of arguments for the proposed change, that were practically unanswerable, all entitle him to our highest appreciation, warmest gratitude and sincerest thanks.

"I have read with much interest the long and able discussion of the Council of the Pharmaceutical Society upon the various recommendations their Committee had advanced with reference to the "Relation to each other of Education and Examination," and it is noteworthy that the subject was considered of such importance by the leaders of our profession that every member of the Council contributed thoughtful and powerful expressions of opinion on that occasion. But holding to a great extent the views of the majority of that Committee, I must confess myself disappointed at the rejection by the Council of the *fourth* recommendation. I have been very much pleased by the recent decision to refer the whole subject back to a committee for reconsideration, and personally I trust the fourth recommendation, or one similar to it in purport, will be finally adopted by the Council. There can be no doubt that the student by concentrating his attention on a lesser number of subjects would be likely to attain a more thorough knowledge of all and acquire a more perfect acquaintance with their details.

"I am quite of opinion that the first portion need not necessarily be passed in London. At present few students think of systematically commencing their studies till they have completed their apprenticeship and attained their majority; they then rush off to the metropolis to avail themselves of those so-called educational systems and learn merely for the sake of passing their examination, without reference to that higher end to which examination should always be subservient, namely, the acquiring a thorough knowledge of their future calling with its allied sciences, and, the qualifying Minor surmounted, cast their studies on one side for ever. This first portion of the examination should, I consider, also be passed previously to leaving the master with whom the candidate has been articled, and before accepting a situation in London or elsewhere; a dominant idea being to attain London and gravitate towards the schools; this system already exists on the Continent, the employer being compelled to complete the education of his apprentice if he should fail in fulfilling the requirements of the examiners. It would not only stimulate young men to study hard during their apprenticeship, but would also compel their masters to take more interest in their pharmaceutical education. Numbers of employers only think of the work they can obtain from their apprentices, without fulfilling their covenants and teaching them the art and mystery of their profession. Many influential persons imagine that immediately an apprentice has passed his Preliminary he will devote himself during the whole period of his apprenticeship to qualify for the distant Minor; this unfortunately is not the case. Few lads at that age will, without great external pressure, begin a series of studies at such a long period anterior to the time when they will be eligible to present themselves for examination. When first apprenticed they are only too glad at having escaped the irksome trammels of school and are most unwilling to recommence a system of study, in addition to performing the practical work of their business.

"In speaking of the deficiency displayed by Minor candidates in their knowledge of dispensing, some have considered that the fault lay altogether in the very small number of prescriptions many of the students have been called upon to dispense during their apprenticeship. There is, no doubt, a considerable amount of truth in this belief, but I think the matter has been overrated. It is notorious that the majority of prescriptions given to candates to dispense at Bloomsbury Square are such as would never, or very rarely, occur in actual practice. If students were to devote more attention to what I may call the *theory* of dispensing there would be a great diminution in the number of failures on that particular subject. For the study of this 'theoretical dispensing,' I can recommend nothing superior to an examination and judicious tabulation of the various queries and replies that have appeared during the last four or five years in the *Pharmaceutical Journal* under the head of Dispensing Memoranda, I would recommend that especial attention be devoted to the able summary written by an accomplished pharmacist which appears in the Journal every month.

"It is to be regretted that proceedings in Parliament have rendered the passage or even the introduction of a revised Pharmacy Bill a matter of impossibility. But it is to be hoped future legislation will result in having the Pharmacy Act more fully extended and more strictly fulfilled, for if pharmacists are willing to obtain a suitable and costly education, and are required to possess exceptional and superior attainments for the benefit and advantage of the State and the public they are at least entitled to receive equivalents and sureties that their labour has not been in vain. It is abundantly obvious that medicines should only be handed to the public by persons who, from education are well acquainted with their properties, and that the mere restricting of the sale to qualified persons of a very limited number of poisons, which in most cases are rarely if ever demanded, is no suitable recompense for his labour and expense, and cannot be called just to the pharmacist. If the public interests require, which they certainly do, that he should undergo an expensive system of education, and obtain a high degree of qualification, legislation should not be for the public to the detriment of the pharmacist, and hence the necessity has arisen that the latter should enlist public sympathy and rouse public feeling against his province being invaded and trespassed upon by unprincipled traders and that, a technical examination being compulsory, adequate legal protection should be granted.

"The subject of the sale of poisons has been attracting considerable attention during the year, not only in the pharmaceutical world but amongst the public generally. A writer entirely outside our own circle has recently said:—'By the Pharmacy Act very stringent restrictions are placed on the sale of poisons. No one, unless he be a medical man, can obtain any of the more potent poisons without very considerable difficulty, such as giving name and address, stating purposes for which they are required, signing his name before witnesses, etc. The less virulent poisons are also put under restrictions, such as labelling distinctly the name of the substance, with the name of the seller and also the word "poison." The seller in both cases requiring to be on the Register of Chemists and Druggists. All patent medicine vendors are, however, exempt from these restrictions. It is open to any one, even the most ignorant, to put up and sell those powerful medicines (poisons they may be) in any quantity and of any strength, without control by Government or guarantee of any kind as to the ingredients. It will, we think, strike most minds that the proverbial coach-and-six may be driven under such circumstances with some facility through this Act of Parliament.' The warning thus given as to a certain class of patent medicines does not come too soon. They have been increasing to a very great extent in recent years, in fact supplanting very much the old well-known family medicines; and owing to the success of one or two comparatively innocent and even efficacious preparations, others of a baleful tendency have unfortunately become popular.

"Proprietary medicines are not only put up in this country, but as vendors we have actually to supply to the public what other countries choose to advertise. As an instance of this, I may mention an article now being freely advertised under the catching title "Rough on Rats." It cannot be supposed that vendors are to open and examine the innumerable proprietary articles that come from America. In this instance nothing but an examination by a qualified chemist would lead the public to suppose they were simply purchasing 'coloured arsenic.' How are we as vendors to know that we are liable to impeachment if we do not register the sale in the usual way?

"The desirability of including stamped proprietary medicines under the same liability as other drugs with reference to the poison regulations is now practically admitted by the medical and pharmaceutical professions and by the public generally, and let us hope will be easy of attainment. It will behove the Pharmaceutical Society to be watchful that the Government or some private legislator does not introduce a Bill having clauses inimical to the interests of pharmacy when dealing with this all-important question.

"The attention of pharmacists has recently been drawn to the refusal of the Privy Council to support the Pharmaceutical Society in its endeavour to place some restriction on the sale of several powerful chemicals which have been the cause of many an unfortunate and painful death. That refusal, I think, can be justified, however, by the explanation of their lordships that as Parliamentary legislation was impending, it would be advisable to refrain from taking action just at present. The recent statement of a correspondent of the *Chemist and Druggist* that this refusal to sanction the resolution was a snub to the Council of the Society is sufficiently disposed of on this ground. And when due consideration is given to the fact that the resolution has excited the violent opposition of numerous interested and powerful trades, it will be immediately apparent that there was very little possibility of a body like the Privy Council, not possessing legislative functions, interferin in the matter.

"The Pharmaceutical Council have, in my opinion, scarcely acted wisely on the principle they have adopted, when drawing up the schedule of articles which they consider are entitled to rank as poisons within the meaning of the Pharmacy Act. It has evidently been considered that they would be serving the interests of the public best by including in the list only such virulent and destructive substances as are in common demand, omitting not only all that are not exceptionally poisonous but also many powerful bodies, which, although recognized by the Pharmacopœia, are not frequently made use of by would-be murderers and suicides. I may mention as an instance of this latter objection the case of calabar bean and its preparations, which are certainly as poisonous as most of the scheduled articles, and I cannot but think that if when first drawing up their list they had included all the corrosive acids, together with any pharmacopœial or other substances possessing poisonous or even moderately poisonous properties, they would not have found the Privy Council Committee of that date unwilling to ratify their action.

"But, as Professor Attfield has said, 'All drugs are more or less poisons,' and instead of scheduling a few powerful poisons it would be much wiser to draw up a list of such drugs as are quite innocuous, or that it would be an inconvenience to the public if the sale were restricted.

"Turning now more directly to what may be called the internal politics of our body, there is unfortunately little cause for congratulation, or even moderate satisfaction. Chemists have been proverbially disunited, jealous and suspicious of each other. To this very day they have never been able materially to shorten the hours of labour, which had they been more cosmopolitan and less selfish would almost as a matter of course have followed the foundation of the Pharmaceutical Society. As several eminent pharmacists have frequently said the great want of the day in our body is to awaken individual interest and arouse individual action. A stride, and a long one, in the right direction might be made if pharmacists by passing their examination became not only qualified in the eye of the law, but also necessarily members of a United Association. It has been long on the *tapis*, and has even been advocated by Dr. Greenhow, the representative of the Privy Council, that the term *Fellow* should be used instead of Member of the Society as heretofore. There is not much doubt that if this very desirable change were effected students would be far more inclined to press on for the higher qualification than they now are and the public would appreciate the difference between Fellow and Associate far more than they at present do between Member and Associate, which by many fairly informed persons are considered as synonymous terms. If by passing the Major examination this degree of Fellow of the Pharmaceutical Society were obtained, it would undoubtedly induce a larger number of candidates to come forward, and by that means the examination fee for the higher qualification might in course of time be done away with and a small annual subscription rendered compulsory in its stead.

"The recent meeting of the British Pharmaceutical Conference, at Southampton, was signalled and honoured by the presence in the presidential chair of one whose labours have been as unremitting as they were valuable in the cause of pharmaceutical progress, and there are few who, after reading the masterly address delivered by Professor Attfield, will not unhesitatingly assert that as an elaborate treatise upon the present position and future prospects of pharmacy in our country, it was emphatically a masterpiece; there can be little doubt that, whilst being the first, it was also the most important of all the literary contributions presented on that more than usually interesting occasion. Agreeing almost entirely with the Professor's ably advocated conclusions, it may not be altogether inappropriate that this evening I should make a few remarks suggested by special points occurring in the course of his address.

"One suggestion is the establishment throughout the country of drug farms on a larger scale than is the case at present. This is an excellent idea, but, as it would not directly affect the general body of pharmacists, perhaps is of minor moment. I think that if country druggists, instead of devoting their gardens entirely to flowers, fruit and vegetables, were to separate a space for the cultivation of small quantities of aconite, belladonna, henbane and other indigenous and easily grown medicinal plants, they would be able not merely to make many of their own preparations with a considerable saving in cost, but it would be of unusual advantage as an educational medium, not only to the pharmacist himself, but to his assistants and apprentices, who would only be too glad to spend a little time daily in cultivating the plants. With the exception of the more expensive and intricate processes, chemists should be encouraged to prepare their own medicines and be thus able to offer a personal guarantee of their strength and integrity. It would not only keep themselves in practice, but would also be a capital school for their *employés* and would undoubtedly be a powerful means of raising pharmacy in Great Britain to a level with that of other countries. They should also devote more attention to ascertaining the quality of important drugs than I fear they at present do. They should not allow such an article as opium or cinchona bark to pass their inspection without submitting it to a quantitative assay. The great disparity that exists in the amount of quinine present in the official yellow cinchona bark, for example, should place every pharmacist on his guard, as it is well known that those barks which are discarded by quinine manufacturers as being deficient in alkaloidal strength are the kinds frequently supplied to retail pharmacists for distribution to their customers; and until wholesale druggists adopt the practice of affixing a guaranteed table of assay to all packages of important drugs supplied, as is already done by a few of their number, the utmost care and supervision should be exerised.

"Reference to cinchona calls to mind the appearance in commerce of a new bark, differing from all known cinchonas in its aspect, density, texture and colour, etc., but which contains alkaloids characteristic of the true cinchonas (called cinchona cuprea). Mr. D. Howard announced to the Chemical Society in December last that, in conjunction with Mr. Hodgkin, he had extracted from the bark of cinchona cuprea an alkaloid closely resembling quinine in its general properties. It differs in the solubility of its salts and the readiness with which the alkaloid crystallizes from ether. This newly discovered alkaloid of the cinchonæ, or most probably of the *Remijiæ* (an allied genus), they named homo-quinine; it is found as yet only in this cuprea bark, and, except for a somewhat shorter crystal, exactly resembles quinine in appearance. It is also a remarkable fact that Mr. Whiffen, Dr. Paul, and Mr. Cownley, in this country, and Dr. Hesse, in Germany, isolated this alkaloid almost at the same time and quite independently of each other. From a commercial aspect this article has turned the bark market upside down.

"The suggestion that in sparsely populated districts which could not possibly support a qualified pharmacist, it should be allowable for agents to retail in unbroken packages, guaranteed and, of course, innocuous drugs, is a good one; but it should, I think, be stipulated that they might only be supplied to the agent by a duly qualified man resident in the district, who would thus be almost personally responsible. In the case of the more powerful medicines this course should not be adopted, as I think it would be no hardship for a person to undertake a journey to the nearest qualified pharmacist when it would be necessary to procure them.

"In passing, I may just refer to a statement made by Professor Redwood at the Pharmaceutical Conference, with reference to an early re-issue of the British Pharmacopœia. From the tone of the Professor's speech, I should imagine that there can be little doubt that the boon—in fact, right—so long desired by pharmacists, will at length be conceded, and the Pharmaceutical Society will be invited to delegate some of the leaders of our profession as members of the Committee appointed by the General Medical Council for that purpose. I think that British pharmacists have reason to congratulate themselves on the progress they have made in this matter, and let us trust that this step upwards will never be retraced.

"The next Pharmaceutical Conference will be held at Southport, and I hope our members will give their encouragement and support, not only by their presence but with their contributions.

"The associated soirée will also be held, as is now usual, at St. George's Hall, and we must hope to maintain the prestige our own Association has hitherto held, by contributing exhibits of a suitable character, and helping in other ways that may be deemed desirable.

"The coming session promises well for success; papers have already been promised by Messrs. A. C. Abraham, T. F. Abraham, Conroy, Davies, Haddock, Mason, Sumner and Symes, and I hope everyone will endeavour to aid. All communications and inquiries stimulate interest, and we are here, as a body, to give you any information we can afford. If you have any doubt, try us."

The President then made some remarks upon the subject of the proposed compulsory notification of disease in Liverpool and concluded a lengthy address by expressing a hope that the officers might be cheered during the coming session by liberal offers of papers and interesting objects for exhibition.

Mr. Conroy moved a vote of thanks to the President for his most interesting address, and confirmed the President's remarks respecting "Rough on Rats," which he had found to be simply arsenic slightly coloured.

This motion was seconded by Mr. Shaw, who referred to the difficulty young men engaged in pharmacy experienced, owing to the fact that the first-rate houses did not receive apprentices.

The motion was supported by Mr. R. M. Sumner, who thought that apprentices would receive more personal instruction in the smaller houses than in the large ones, where the business was carried on by assistants. As "Rough on Rats" had been mentioned, he might say that he thought that the President had been "rough on wholesale druggists," who he believed were anxious to supply the best articles to anyone who would pay the necessary price.

Mr. A. H. Samuel referred to the prospect before a well-educated chemist, and thought that it was not to the credit of the English that so many of their manufactories should be presided over by German chemists.

Mr. A. H. Mason (Vice-President), in conveying the vote of thanks to the President, added additional testimony to the pleasure with which he had listened to the address. He was not disposed to criticize it, but desired to remind the members that in pressing for action to be taken with respect to those illegal traders who trespassed upon the dearly attained privileges of the pharmacist, it was absolutely necessary to educate the public to agitate for their defence. If the Pharmaceutical Society went to Government for protection they would be looked upon simply as a trade body, and legislation was always in favour of the public benefit and not to protect any class of traders. He hardly agreed with the President that drug farms would not affect the body of pharmacists, but was of opinion that if sufficient capital were obtained and a company formed for the protection and cultivation of indigenous medicinal plants, with appliances for the careful collection, drying, distillation, etc., it would eventually be a lucrative concern; besides, British pharmacy would be raised and the quality of English medicines in their efficacy would be maintained; they could be produced in such quantities as would enable them to meet foreign competition. If such an organization had existed at the present time, would English oil of lavender be at the present enormous price, besides running the risk of being an article of the past? He quite agreed that it was desirable that pharmacists should make their own pharmaceutical preparations, but there were many instances in which the quantities required were so small that it was not profitable for them to do so, and although they purchased these articles it did not follow that they were incompetent to manufacture them. It seemed to be overlooked by those who were rather inclined to condemn the wholesale manufacture of these articles, that most of the wholesale manufacturers were themselves pharmaceutical chemists and many of them prize medalists, and that they also gave employment to hundreds of pharmaceutical chemists, and further the mild insinuation of deception on the part of wholesale manufacturers was unjust, for it must not be overlooked that in maintaining their reputation they had by far a larger pecuniary interest at stake than any retailer. The President rather advocated the purchase of assayed drugs. To his mind, those who quoted such articles in their price lists rather cast a reflection upon the purchasers, and in carrying out this principle it was not likely the purchaser would further assay for himself, therefore the object of Professor Attfield's suggestions would be destroyed. Respecting the notification of infectious diseases, he was of opinion that it was not fair to throw the whole onus of notification upon the medical man.

The President, in reply, said he had occupied so much time that evening in reading his address that he would not on that occasion enter into further discussion. It was sufficient recompense to him that it had evoked so much favourable approval, and such only fair criticism. The opinions expressed were individual and it was only by the clashings of opinion that right judgment was arrived at. At some future time some of the subjects mentioned might fairly occupy the attention of the Association.

ABERDEEN CHEMISTS' ASSISTANTS' MUTUAL IMPROVEMENT ASSOCIATION.

On Friday, October 20, a meeting of Aberdeen chemists' assistants and apprentices was held in the Café Buildings, Shiprow, for the purpose of forming a Mutual Improvement Association. Mr. Kidd occupied the chair, and there was a large attendance. A very satisfactory report was submitted by a committee that had been appointed to arrange as to preliminaries. This report was approved of, and the formation of a Mutual Improvement Association followed, after which a considerable number of members were enrolled.

The following were elected a Committee of Management:—Messrs. Peter Smith, Angus, Kidd, Wilson, Anderson, Mackenzie, Davidson, Watson, and Moir. Mr. G. Bowie was elected secretary, and Mr. Mathieson, treasurer. A number of the employers have consented to become honorary members.

The members will meet weekly for the discussion of matters relating to their business, and several gentlemen from the south are expected to give lectures at intervals during the winter.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Wednesday, October 18, 1882, at 4 p.m. Present—Professor Attfield, F.R.S., President, in the chair; Messrs. Bentley, Brady, Carteighe, Ekin, Groves, Naylor, Southall, Squire, Taylor, Dr. Thresh, and Messrs. Benger and Plowman (Hon. Secs.).

The minutes of the previous meeting were read and confirmed.

Letters of apology for non-attendance were read from Messrs. Kinninmont and Young.

The question of the cost of entertainment of visitors incurred by the towns in which the meetings of the Conference are held was considered. It was deemed advisable that the practice of the British Association should be followed as nearly as possible. It was therefore resolved:—

"That it be a general instruction to the local committees of towns in which the Annual Conference is to be held, that their arrangements, both in respect to the business of the Conference and the entertainment of its members be approved by the Executive before publication, and that the attention of local committees should be called to the report of the Executive after the Sheffield meeting, in so far as it relates to questions of entertainment."

Respecting the place of meeting for 1883, the President reported that he had received a letter from Oxford, which he had been directed by a previous Committee to acknowledge. It was from Mr. Geo. T. Prior, who wrote to the effect that in the case of Oxford being selected as the town in which the British Pharmaceutical Conference would meet in 1883, the chemists of that city had deputed him to say that they would be glad to receive the Conference, and would do their best to help the Executive Committee in organizing the meeting. They were too few in number to offer the hospitality that the members had received in other towns, but they would engage a meeting room, arrange for hotel accommodation, and would endeavour to promote the objects and welfare of the Conference and the comfort and convenience of visiting members.

The following is the President's reply:—

"To Mr. G. T. Prior, Oxford.

"My dear Sir,—I am directed by the Executive Committee of the British Pharmaceutical Conference, to thank the chemists of Oxford for their kind offer to give their best assistance in organizing any meeting of the Conference that may be held in Oxford, in 1883. I am also desired to acknowledge the kindness of Mr. Thomas Houghton in allowing himself to be put in nomination as a Vice-President of the Conference, Mr. Charles Gerrard Hitchcock for consenting to be a member of the Executive Committee, yourself for agreeing to act as a Local Secretary, and Mr. H. Thurland for being willing to perform the duties of an Auditor. I am further to add that the Executive Committee was quite gratified to find that the pharmacists of Oxford purposed receiving the members of the Conference in a manner strictly in accord with the objects of the Conference, and with the already published wishes of the Committee. I, in common with the other members of the Committee regret that the unforeseen circumstances which render Oxford unable to carry out the arranged meeting of the British Association in 1883 have obliged the Conference to postpone any decision respecting our own place of meeting for that year, for as a rule the Conference and the Association meet in the same town. For the same reason also we must postpone the acceptance of the services of yourself and colleagues. I shall doubtless again have the pleasure of corresponding with you after the Executive Committee has held a meeting.

"Yours faithfully, JOHN ATTFIELD."

A letter from the chemists of Southport was read, inviting the Conference to meet in their town in 1883. It was unanimously agreed to accept this invitation.

Respecting the invitation to meet in Aberdeen, as it was offered for 1884 as well as 1883, its consideration was postponed.

The following four officers, which the General Meeting had given power to this Committee to appoint, were then elected:—Vice-President, Mr. W. V. Radley, Southport; Member of Executive Committee, Mr. James Kershaw; Local Secretary, Mr. William Ashton; Auditor, Mr. Thomas H. Sykes.

Fifteen gentlemen were elected to membership.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting held on Wednesday evening last, October 25, at 32A, George Street, Mr. W. A. Wrenn in the chair, a paper on "Cinchona Barks of Commerce" was read by Mr. W. Elborne, who gave a very interesting account of the various kinds of barks of commerce.

There was a good discussion, in which Messrs. R. W. Giles, R. H. Parker, W. A. Wrenn, J. O. Braithwaite, and others took part; after which a hearty vote of thanks was proposed by Mr. Hartridge and seconded by Mr. Parker, to which Mr. Elborne made a suitable reply.

Parliamentary and Law Proceedings.

A CORONER ON THE SALE OF LAUDANUM.

On Friday, October 20, an inquest was held in the Royal Hospital, Belfast, by the borough coroner, Dr. Dill, concerning the death of Thomas Thompson, a publican, who had been admitted to the hospital on the previous Tuesday, suffering from the effects of an overdose of laudanum, and who died on Friday morniug.

After other evidence had been given, John Patrick Henry, chemist, 97, Donegall Street, Belfast, stated that on Tuesday, about three o'clock, a man whom he believed to be the deceased came into his business establishment, and asked for sixpennyworth of laudanum. Witness inquired what it was for, and he said for a horse that was ailing. The deceased then got a bottle with an 1½ ounce of laudanum, and witness labelled it "Laudanum—poison," with his name and address. Witness thought from the appearance of the deceased that he had something to do with the management of horses. The deceased had not the slightest appearance of having taken drink. Witness did not consider it necessary to inquire the name and address.

A Juror thought that when such a dangerous thing as laudanum was asked for there should be more inquiries made than had been done by the witness.

Witness: I did more in the matter than the law directs, for I not only labelled the article, but inquired the purpose for which it was intended.

The Coroner: But the law provides that you should take the name and address of the purchaser.

Witness: Excuse me; it does not in the case of laudanum.

The Coroner: I know that, but it is a great mistake not to do it.

Witness: But the taking of his name and addr would not have prevented this man from committing act that he did. There are plenty of druggists in Belfa and he had only to got a pennyworth of a number them and he would have had as much as he wanted.

The Coroner: I am sure that intending suicides abroad in the neighbourhood of Belfast will be thankful to you for the information you have given.

The Coroner said when Mr. Henry went the length of asking the man's name he might have gone further, as the asking for such a quantity of laudanum looked very suspicious.

Mr. Henry: I thought I did all that was necessary; I had no idea that the laudanum was intended for any other purpose than that told to me.

The Coroner: Would you do the same thing again?

Witness: I would rather not sell laudanum at all.

The Coroner: I wish you never had sold it. If you had not done so you would not have got into trouble.

Witness: The man was as sober-looking as any of the jury are at this minute.

The Coroner: The only point in the matter is the selling of such a quantity to a stranger without making yourself thoroughly acquainted with the purpose for which it was intended. My impression is that the law should be a little more stringent than it is with regard to a drug like laudanum. I have heard of people going into surgeries and not being given more than a pennyworth, and that not full strength.

Witness: If I mixed it I could be prosecuted.

The Coroner: As you say yourself, you would rather not sell laudanum, and I wish you did give it up, for there are too many in Belfast dealing in this poison.

In reply to a juror, the wife of the deceased stated that her husband was in the habit of taking laudanum in pennyworths to produce sleep, as when he was drinking he never got any rest at night.

Robert Campbell, druggist, 15, Bridge Street, stated that a person named Thompson received an ounce and three-quarters of laudanum in his shop between three and half-past three o'clock on Tuesday. Witness took his name and address, which he gave correctly. He said he wanted the laudanum for a horse. There was nothing in his appearance that could lead one to believe that he was under the influence of drink.

The Coroner: What made you ask him for his name and address?

Witness: I always make it a point to take the names and addresses of persons receiving half an ounce of laudanum or anything beyond that.

The Coroner; Did you ever sell anything like this for a horse before?

Witness: Yes; I have often, and have known a horse to get 2 ounces.

In reply to a juror, Mrs. Thompson stated that she never heard her husband threatening to commit suicide. He was a little annoyed about the sale of a house that he had lost some money over, and was occasionally depressed in spirits.

Head-Constable Furey said that when the deceased was brought to the police office and searched, four bottles which had contained laudanum were found in his pocket. As soon as this was discovered witness feared that he had poisoned himself, and had him removed at once to the Royal Hospital. Two of the bottles were labelled Haslett and Co., North Street. Witness inquired there about the matter, but they were unable to say whether any laudanum had been sold to the deceased.

Dr. James Barron, House Surgeon, deposed that death resulted from congestion of the lungs. The deceased was insensible when admitted, but after the effects of the morphia had disappeared he regained his senses, which he preserved up to within a short time before his death. He told witness that he had only taken a pennyworth of laudanum to cause him to sleep. Witness believed that at the time when the deceased took the narcotic poison the deceased was not aware of what he was doing.

The Coroner said he was not at all satisfied that the deceased took the laudanum with any suicidal intention. He was in an unfit state to take care of himself, and appeared to have fallen back on the old idea of the pennyworth of laudanum to produce sleep. To his (the Coroner's) mind, the man did not know what he was doing.

Dr. Barron said that was his impression also.

The Coroner having summed up the evidence, the Jury returned a verdict to the effect that death resulted from congestion of the lungs, accelerated by heavy drinking and the excessive use of laudanum.—*Belfast Evening News.*

Poisoning by Vermin Killer.

An inquest has been held by the Middlesbrough Coroner, Mr. Belk, touching the death of Mr. A. Woodford, late cashier to the firm of Swan Brothers, Middlesbrough.

Mr. H. H. Taylor proved selling deceased sixpennyworth of "Battle's Vermin Killer," which deceased said he wanted "to destroy some nocturnal friends." He had purchased what contained 6 to 8 grains of strychnia, or enough to kill a dozen men.

Dr. Walker testified to being sent for on Wednesday night, when deceased owned to having taken vermin killer, and though every effort was made to save his life, he died in a quarter of an hour after he was called.

The Coroner having summed up, the Jury returned a verdict "that deceased had taken 'Battle's Vermin Killer,' containing strychnia, while in an unsound state of mind."—*Leeds Mercury.*

Review.

Adolph Strecker's Short Text-Book of Organic Chemistry. By Dr. Johannes Wislicenus, Professor of Chemistry in the University of Würzburg. Translated and Edited, with Extensive Additions, by W. R. Hodgkinson, Ph.D., and A. J. Greenaway, F.C.S. London: Kegan Paul, French and Co. 1881.

At the beginning of this century, chemists could almost count upon their fingers the organic substances with the properties of which they were acquainted, and even within recent years it was not so difficult to include, within one moderate volume, a full account of all that was known about organic chemistry. Now it is different, and the author of a text-book has to undertake the arduous task of picking and sifting what he thinks will be useful to his readers from what he thinks they do not want. He cannot expect to satisfy all, but must be content to cater to the wants of a particular class of readers. In this way text-books of organic chemistry come to be separable into distinct species. There is the *elementary* book, the object of which is to explain the leading principles of the science, the general group characteristics, and so forth, the properties of individual substances being only so far discussed as they exemplify general laws. Of this class one of the best representatives is Armstrong's volume in the science series published by Longman. Then there is the *cram* book, which gives the student, in concise form, all the facts he need burden his memory with prior to examination; an example of which is Piner's Repetitorium. A third species may be called the *dictionary* text-book, whose chief requisites are that it shall be well up to date, omit nothing, and give full references to original papers, and which is the invaluable companion of the more advanced chemist. We do not here include the various forms of pharmaceutical text-books, nor those known as technical text-books, for they in reality can hardly be classed under the head of organic chemistry as understood by scientific chemists. Now the book before us does not belong to the elementary, the cram-book or the dictionary species, but must be placed in a separate group. Professor Wislicenus himself says, "it is neither a primer nor a dictionary," and he certainly would not allow that it was written purely for examination purposes. So the question arises, what is the class of men for whom such a book is written? and we cannot but come to the conclusion that there is really no class likely to profit greatly by its publication. No teacher would prescribe such a book to a student new to organic chemistry, or, if he did, the student would fail to understand it; while anyone sufficiently far advanced to use the book would certainly find it insufficient for his purpose. We think that the same criticism is applicable to other and similar text-books, which are too full to be read by the student, yet not full enough to be consulted by the chemist. As an example of how useless it may be for consultation, let us imagine a chemist looking up this book for a method of making dichloracetic acid. He turns to p. 455, and finds that it is "prepared by the action of equal molecules of chloral hydrate and potassic cyanide." The extraordinary construction which assumes that molecules of these two bodies can, under any circumstances whatever, be equal, is probably due to careless translation, *molecule for molecule* being, of course, what is meant. But what we chiefly object to here is that the above sentence is merely a verbal interpretation of the equation which follows it. No one could learn from it how to make dichloracetic acid, nor is there any reference to original papers which might enlighten him. Similarly on p. 366 we read that "ethylic acetate" (acetic ether) "is *best prepared* by distilling 10 parts of sodic acetate with a mixture of 15 parts of sulphuric acid and 6 parts of alcohol," no reference being made to the advantage derived from first dehydrating and fusing the sodic acetate. While dealing with practical details, we notice that under the head of chloroform, its ready decomposition in some circumstances is attributed, at least in part, to the *presence* of alcohol. One characteristic of the book is its large dealing with graphic formulæ. These are, no doubt, of great assistance, being, in fact, at present, the organic chemist's special language. But, as has been so often pointed out, there is considerable danger attending the use of them by the student, who is apt to forget that they are, after all, but an imperfect representation on paper of some of tho properties of substances; to forget, for instance, that alcohol is a liquid boiling at 79° C., and to think of it as a combination of letters and strokes. In one or two cases this book errs in this direction, as when (p. 36) it says "of the many instances of isomerism of the second kind . . . there may be mentioned

$$CH_3-CH_2-CH_2-CH_2-OH \text{ and}$$

$$\begin{matrix} CH_3 \searrow \\ CH_3 \nearrow \end{matrix} CH-CH_2-OH\text{"}$$

No names are given—nothing more is said. Surely one may fairly say that this is not mentioning instances but drawing diagrams. This kind of error, however, is far less common throughout the book than the author's extensive use of graphic formulæ might lead one to expect. Indeed one of the best chapters in it, and one which will be found really useful, is that which treats of isomerism among the aromatic compounds, for here the student will find well described the practical distinctions between ortho, meta and para compounds, as well as the causes which theory assigns to these differences. It is not uncommon to find a student well up in the latter, but totally ignorant of the former. Some parts of the introduction, also, are worth reading; but it is by no means free from errors. Thus it is asserted (p. 41) that the atomic volume of oxygen, when combined as in alcohol, is 6·4. This might have been put down as a misprint for 7·8, but, unfortunately, two of the calculations on the next page are based upon the assumption of this erroneous value. So also the atomic volume of nitrogen when combined as in cyanogen is given as 28·0, whereas it is only 17, that of cyanogen itself being 28·0. The three pages dealing with this subject of specific volumes might, with advantage, be entirely rewritten.

We have mentioned some of the bad points of this book. That it has many good ones, the names on the title page are a sufficient guarantee; but we fear it will be found, as we say, too difficult for the student, too meagre for the chemist. If, indeed, there does exist an intermediate class of readers, we may recommend it to them as neither much better nor much worse than others of its kind. The translation is good, except in a few cases where German idiom has been allowed to creep in and spoil the English.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Percentage of Morphia in Liquid Extract of Opium, and Commercial Silver Nitrate.

Sir,—Not being present at the British Pharmaceutical Conference when my papers were read, will you allow me to state the method by which I calculated the percentage of morphia in liquid extract of opium, data of which were required by Mr. Plowman.

On reference to the figures obtained I find that ·58 was the percentage of morphia that should have been stated and not ·38 as appeared in the paper. About 21·5 grs. of solid extract are contained in each fluid ounce of the liquid form, the average specific gravity of which I found to be ·972, and the average yield of opium (of 8 per cent. of morphia quality) in extract to be 66 per cent. Therefore in 66 grains of this solid extract there would be 8 grs. of morphia. One fluid ounce of the liquid extract, specific gravity ·972 will weigh 450 grs. and in this 450 grs. are dissolved 21·5 grs. of solid extract (66 grs. of which contain 8 of morphia), and if 66 grs.contain 8 then 21·5 grs. will contain 2·6, so that if 450 grs. of the liquid extract contain 2·6 of morphia the percentage will be ·58; on looking at the residues of the ten samples which I examined I find deposits in eight of them; whether these deposits contain morphia or not I have not yet determined.

I had hoped to have been present at the Conference to to ask if any maker of liquid extract of opium could explain why the percentage of morphia was so much under the average in this preparation, but could not reach Southampton from the Shetland Islands in time.

In answer to Mr. Mason respecting the source of the samples of nitrate of silver, the two found pure were obtained from Messrs. Herring and Co., and Messrs. Rouse and Co., Wigmore Street respectively; one I received for analysis from a former pupil of mine, and three I purchased from itinerant photographers. Seeing Mr. Williams's remarks relative to his experience of these crystals I have forwarded to him through the courtesy of the editor of the *British Journal of Photography*, two samples containing as an impurity nitrate of potassium, which were also purchased from itinerant photographers.

Grosvenor Villa, Devonport Road, Uxbridge Road, W. JOHN WOODLAND.

Junior.—In one case the word is placed in the accusative as the direct object of the verb; in the other it is in the genitive, some such phrase as "a sufficiency of" being understood.

"*Succus.*"—The percentage of citric acid in raw lime juice is variable. As to the average strength, see two papers by Mr. Warington, in the present series of this Journal, vol. vi., pp. 385 and 768.

"*Pertinctus.*"—"38° B." would stand for the density represented by 38 degrees of Beaumé's hydrometer. The equivalent specific gravities may be found in Squire's 'Companion' and many other works; that of 38° B. is specific gravity 1·333.

"*Dispenser.*—The ointment should be quite a creamy white when made, but changes to a yellow colour when kept.

Junior.—The formula is not suitable for pills. The aniline liquifies the camphor and the result is a soft paste.

Student.—Nitric acid, "azote" being used to designate nitrogen.

W. R. F.—(1) Pharmaceutical chemists have no special exemption from special constable service. (2) Such a practice would involve an illegality.

Communications, Letters, etc., have been received from Messrs. Tichborne, Keyworth, Gravill, Surfleet, Jones, C. J. S. T.

THE ORCHARD ALUM SPRING.*

BY DR. THRESH.

The examination of all substances used in curing or alleviating disease, whether they be of mineral or vegetable origin, falls within the province of the pharmacist, and where the remedy consists of a number of proximate constituents it is his duty to isolate these, and if possible to ascertain to which of them its efficacy is due. As the water of the spring giving the title to this paper has long had a local reputation, I have made a somewhat careful examination of it, and as it is being constantly employed as a curative agent, it has been deemed a suitable subject for a contribution to this Society.

The spring, which appears to be a "descending" one, originates in a disused coal mine, near the summit of Axe Edge, the highest point in the Peak country. To get rid of this water a narrow tunnel has been bored through the side of the hill, just over the Staffordshire border, and about five miles from Buxton, and the water flows from the open end of this conduit into a tributary of the Dane. As the farm on the hillside is known as the Orchard (a most singular name for such a bleak and desolate spot), and the water has a strongly astringent taste, the spring is usually called the Orchard Alum Spring.

The country people round have great faith in the virtues of the water, and not only make use of it themselves but frequently bottle it to send long distances to their friends or others who arrange with them so to do. It is chiefly valued as a vermifuge, and no matter what may be the description of the parasite, nor whether it infest young or old, human beings or cattle, one or more doses of this remedy is said to bring about the desired result. It is for this purpose usually taken fasting. Cattle, after being kept without food and water for some time, are allowed to drink as much of the fluid as they will, and the effect produced is frequently described as astonishing. As a tonic its reputation is waning, continued use of it even in small quantities producing obstinate constipation, and generally doing much more harm than good. I am informed that years ago many members of the medical profession in the neighbouring towns and villages prescribed it frequently, but I do not think such is the case at the present time.

Applied externally it is said to cure ringworm, and it is largely used by the farmers as an outward application for various skin diseases on cattle.

The water has a very decided red tint, varying in depth according to the character of the season. The sample analysed was collected after a period of continuous rain, and was not near so dark as it is usually seen, yet when placed in a wine glass it looked like a pale sherry. Seen in larger volumes, in the deeper portions of the stream, it has the colour of blood. It reddens litmus paper, but contains no free acid. When heated to about 150° F., it becomes quite opaque from the separation of a basic ferric sulphate, but if allowed to evaporate on the water-bath nearly to dryness, the basic salt redissolves and a yellow vitreous residue remains. When heated so as to cause the above salt to deposit, the supernatant fluid is quite colourless.

The mean of two concordant determinations of the specific gravity gave 1·00351 as compared with pure water at the same temperature, and each gallon was found to contain—

$Fe_2 3SO_4$	174·426	grains.
Fe_2O_3	6·275	"
$Al_2 3SO_4$	72·908	"
$MgSO_4$	21·055	"
$CaSO_4$	14·381	"
$FeSO_4$	1·596	"
Na_2SO_4	·537	"
K_2SO_4	·822	"
$AlPO_4$	·456	"
KCl	·282	"
NH_4Cl	·125	"
KNO_3	·170	"
SiO_2	5·776	"
	298·809	"

The results from which these quantities are calculated are tabulated at the end of the paper, and with regard thereto it may be remarked that in the first estimation of the phosphoric acid, the dried and weighed mixture of ferric and aluminic oxides and phosphates was fused with six times its weight of a mixture of 4 parts of sodium carbonate and 1 of silicic acid. The mass was exhausted with water containing a little ammonia carbonate, traces of silica removed by evaporation with acid, and the phosphoric acid precipitated with magnesia mixture. In the second determination the mixed oxides, etc., were dissolved in nitric acid, and the phosphoric acid removed by aid of ammonium molybdate.

Reference to the composition of the water, as given above, shows that the medicinal properties of the spring are due to the ferric and aluminic sulphates of which it contains so large a quantity. Undoubtedly it is of too powerful a character for internal use unless very considerably diluted, but even then as a tonic its value is impaired by the presence of the sulphate of aluminium. Its acid reaction, of course, is due to the presence of these salts, and the excess of ferric oxide explains the decomposition which takes place when the water is heated. It is somewhat singular, however, that when carefully evaporated, the basic salt first deposited redissolves, yielding a residue which can be diluted, forming a very nearly colourless solution. The acidulous and basylous radicals in this latter case can scarcely be in the same state of combination as in the original water.

We have not far to look for the source of the more abundant constituents. The spring rises or rather issues from the hillside immediately above the upper surface of the millstone grit formation, which is here exposed and forms the bed of the rivulet into which the water flows. Overlying the sandstone is a layer of aluminous shale of a blue-grey colour, and doubtless by the action of the air and water this suffers such decomposition as to produce the soluble salts found in the spring. The exposed edges of this shale are encrusted with ferric oxide, and here and there after rain the water dripping off is seen to be distinctly coloured. Usually water passing through such a stratum contains a considerable amount of ferrous sulphate, together with aluminic sulphate and a smaller or larger proportion of ferric salts, the formation of the first named being represented by the equation—

$$2FeS_2 + 7O_2 + 2H_2O = 2FeSO_4 + 2H_2SO_4.$$

The sulphuric acid then reacting upon the clay will form the aluminic sulphate. On the opposite side of the hill, the water flowing from a similar

* Read at an Evening Meeting of the Pharmaceutical Society, November 1, 1882.

mine contains ferrous salt equivalent to 50 grains of crystallized ferrous sulphate to the gallon, with only a trace of ferric salt, and doubtless this is derived, by some such decomposition as the above equation represents, from the pyrites in the surrounding strata. To account for the formation of the ferric salt the oxidation must be carried further, the reaction being represented as follows:—

$$4FeS_2 + 15O_2 + 2H_2O = 2Fe_2\,3SO_4 + 2H_2SO_4.$$

Further, by action of the ferric sulphate on the magnesium and calcium carbonates, with which doubtless the water comes in contact in some part of its course, the sulphates of magnesium and calcium would be formed together with ferric oxide and the basic ferric salt. An illustration of this decomposition is furnished by the stream into which the alum water flows. A few yards beyond the point where the iron water enters it, it receives another little tributary. The water in the latter appears to be rich in calcium carbonate, for where it falls into the larger stream the whole of the mixed water becomes perfectly muddy and for a considerable distance below the bed of the stream is thickly coated with an ochry deposit.

The only water of a similar character of which I can find an analysis occurs in a mine belonging to the Luzerne Company (*Dingl. polyt. J.*, ccxviii., 267), but this only contains 122 grains of solids per gallon, whilst as much as 23 grains of free sulphuric acid occur therein.

By way of conclusion it may be remarked that a water of this kind proves in a marked degree the futility of attempting to check the analytical results by comparison with the amount of solid residue left upon evaporation of a given quantity, whatever may be the temperature at which the residue is finally dried. The whole of the water could only be driven off in this case by heating to such a degree that the ferric sulphate began to decompose, and the residue then was so hygroscopic that an accurate weighing was impossible.

Table of amounts of products obtained during the analyses calculated as from 10,000 parts of water.*

	Portion of residue soluble in water.	Portion insoluble in water.	Total.	Total Estimation.	Mean.
SiO_2		·825			·825
$BaSO_4$	67·188	2·334	69·522	69·406	69·464
AgCl	·080			·076	·078
HNO_3				·015	·015
CaO	·449	·391	·840	·853	·846
$Mg_2P_2O_7$ (for magnesia estimation	2·742			2·822	2·782
NaCl				·063	·063
KCl				·159	·159
NH_3				·006	·006
Mn_3O_4	Minute trace.				
FeO				·108	·108
$Mg_2P_2O_7$ (phosphates) . . .	·093			·088	·090
$Al_2O_3 + PO_4 + Fe_2O_3$	12·428	·398	12·826	12·968	12·897
Fe_2O_3				9·580	9·607
Al_2O_3				3·204	3·213
Albuminoid NH_3 .				·001	·001

[*The discussion on this paper is printed at p.* 376.]

* *Vide Journ. Chem. Soc.*, April, 1882.

NOTE UPON THE USE OF OXALIC ACID AS A TEST FOR ARSENIATES IN ALKALINE SALTS.*

BY C. PATROUILLARD, GISORS.

In an interesting memoir presented recently at the meeting of the British Pharmaceutical Conference, and published in the *Pharmaceutical Journal* of the 16th of September last, Messrs. Naylor and Braithwaite give an account of several experiments made by them with considerable care, and affirm that they have recognized afresh that oxalic acid does not exercise any reducing action upon arsenic acid, and, after having quoted a few lines from the memoir in which I published the result of my researches, they express the opinion that, under the conditions described by me, nothing of that which I have announced takes place.

Nevertheless, I maintain that which I wrote in 1874, and which I have repeated many times since in the testing of salts employed in my pharmacy; it may be summarized as follows:—When a *salt* contains at least 1 to 2 per cent. of an *arseniate*, if it be boiled with oxalic acid or oxalate of ammonia for a few minutes, sulphydrate of ammonia or sulphuretted hydrogen, after the addition of a few drops of pure sulphuric acid, will produce in it, at the end of an interval more or less long, a yellow precipitate of trisulphide of arsenic. This precipitate may be accompanied by a varying quantity of sulphur. If the proportion of arseniate contained in the salt amount to 5 or 10 per cent., and especially if the mixture be still sufficiently hot, the precipitate is produced *immediately*.

In my previous experiments I have always employed salts such as nitrate of potash, the sulphates of soda and magnesia, the bicarbonates of potash and soda, etc., to which had been added either biarseniate of potash or arseniate of soda. I have noted in my laboratory register a large number of testings, as varied as possible, and checked in such a manner as not to allow of error. The precipitating agent has been sometimes sulphydric acid, and more frequently sulphydrate of ammonia, which is more easily kept ready in a good state of preservation, provided that it be dissolved in glycerine. In any case, in order not to be led into error by a precipitate of sulphur, which might mask a small quantity of trisulphide of arsenic, it is always advisable to make at the same time a comparative test with a specimen of a salt which is known to be pure.

The following are some new experiments that I have made since reading the memoir of Messrs. Naylor and Braithwaite.

Five grams of arsenic acid were dissolved in 100 grams of distilled water, and the solution was divided into two equal parts. The first part was heated to boiling during five minutes with 0·50 gram of oxalic acid; the second part, after having been exactly neutralized with caustic soda, was treated in the same manner. To the two liquids were afterwards added a few drops of sulphuric acid and then sulphydrate of ammonia. In both cases a precipitate was produced *immediately*: in the acid liquid a greyish-yellow one of sulphur; in the neutral liquid a distinctly yellow one of trisulphide of arsenic.

I have also repeated an experiment that I had already made previously. One gram of neutral

* Read at an Evening Meeting of the Pharmaceutical Society, November 1, 1882.

arseniate of soda, dissolved in 50 grams of distilled water, was boiled during ten minutes with 1 gram of oxalate of lime; the hot liquid, filtered and acidulated, yielded *at once* a precipitate of trisulphide of arsenic of a fine yellow colour.

A mixture of solutions of neutral arseniate of soda and oxalate of ammonia, boiled during two or three minutes only, then acidulated, gives with sulphydrate of ammonia a yellow precipitate. The same mixture, not boiled, but acidulated, gives with sulphydrate of ammonia a milky turbidity of sulphur, which by boiling is contracted into greyish-yellow flocks. The reactions have appeared to me so distinct that I have not thought it necessary to study them more minutely.

From the experiments of Messrs. Naylor and Braithwaite, and my own, I conclude that oxalic acid does not exercise a reducing action upon free arsenic acid; but that when that acid is combined with an alkali it is reduced by oxalic acid to arsenious acid, and the reduction is more complete in proportion to the perfectness of the neutrality of the medium in which it is effected. So that the gentlemen who have contradicted me, notwithstanding their good intention, have failed to place themselves within the conditions described by me.

The idea never occurred to me to examine the action of oxalic acid upon uncombined arsenic acid: *à priori*, I should have thought, I must say, that it was the same as upon arseniates. My original memoir, published in the *Bulletin No.* 1 *de la Société des Pharmaciens de l'Eure*, which is in the library of the Pharmaceutical Society, is entitled, "Recherche des Arséniates dans les Sels alcalins." The extract which was published in the *Répertoire de Pharmacie*, in 1875, is entitled, "Recherche des Composés arsénicaux dans les Sels alcalins." Lastly, in the book to which Messrs. Naylor and Braithwaite have made allusion, in every place where arsenic acid is in question, it is always understood that it is the acid combined with alkalies that is referred to; it could hardly be found mixed with other salts except in that state.

[*The discussion on this paper is printed at p.* 377.]

NOTE ON TINCTURA CAMPHORÆ COMPOSITA.*

BY J. BLAND.

For some years past I have had a difficulty in preparing this tincture, which has, I daresay, occurred to others.

By a little care in the manipulation, the whole of the oil of anise should be soluble in the proof spirit directed by the Pharmacopœia, as was shown by Mr. Ince in an early volume of the *Pharmaceutical Journal*, and until about the time of the issue of the first British Pharmacopœia I had no trouble in getting a satisfactory solution. Since then I have found that a great part of the oil of anise separated, and although the deposit could by the aid of the powdered opium be readily filtered out, it was yet evident that a part only of the oil of anise was contained in the finished tincture.

After many failures to account for this result, it struck me that the oils of *Pimpinella anisum* and *Illicium anisatum*, though similar, might not be identical; and this proved to be the case.

In the London Pharmacopœia, the oil of *Pimpinella anisum* alone is official, and is stated by Phillips to be sometimes "adulterated" with oil of star-anise; the B.P. recognizes both oils as official, and, from the difficulty I had in procuring an authentic sample of the former oil, I infer that practically the whole of the oil of aniseed of commerce is derived from star-anise.

Whether the chemical and therapeutical properties of the two oils are identical, perhaps requires further investigation, but considering the statements that have been made as to the poisonous properties of the oil of the *Illicium religiosum*, and the comparative insolubility of the oil of star-anise in proof spirit, I would suggest that the oil of *Pimpinella anisum* should be preferred for medicinal use.

[*The discussion on this paper is printed at p.* 378.]

* Read at an Evening Meeting of the Pharmaceutical Society, November 1, 1882.

THE AVERAGE AMOUNT OF CAFFEINE IN THE GUARANA OF COMMERCE AS COMPARED WITH THAT IN THE SEEDS, ETC.*

BY J. H. FEEMSTER, CINCINNATI.

In reply to this query I shall take up three questions in the order presented:

1. What is the average amount of caffeine in the guarana of commerce as compared with that of the seeds?

From a select sample of seeds procured from Messrs. Lehn and Fink, of New York, I obtained five and eight-hundredths (5·08) per cent. of caffeine. Taking this as a basis of comparison five samples of guarana of the usual cylindrical form were purchased from as many dealers, and with these analyses were conducted with the appended results. Five hundred grains guarana used in each case.

No. 1	yielded 21 grs. caffeine, or	. .	4·2	per cent.
No. 2	„ 25 „ „	. .	5·0	„
No. 3	„ 21 „ „	. .	4·2	„
No. 4	„ 19·5 „ „	. .	3·9	„
No. 5	„ 21·5 „ „	. .	4·3	„

The aggregate yield of caffeine from the five samples was one hundred and eight (108) grains, making the average per cent. of the five determinations four and thirty-two (4·32) hundredths.

2. Determine a rapid and pharmaceutically correct method of getting at the percentage of caffeine from guarana.

The process employed in securing the above result was that recommended by Professor E. S. Wayne, for the extraction of caffeine from tea (*American Journal of Pharmacy*, 1875, p. 135), and afterwards used so successfully upon guarana by Francis V. Greene, U. S. Navy (*American Journ. Pharm.*, 1877, p. 337; *Pharm. Journ.*, [3], viii., 87).

The directions for conducting the analysis are so full and explicit in the article of Mr. Greene, that it would seem unnecessary to repeat them, but I will mention that the addition of a few drops of liquor plumbi subacet. to the boiling mixture of guarana, litharge and water, when the colour begins to disappear from the solution, seems to facilitate the deposition of the insoluble portion, and to leave the liquid more free from colouring matter.

The crystals of caffeine from the solution thus treated are so white that recrystallizing from diluted alcohol is done away with.

The guarana and litharge require to be boiled about three hours before the solution upon the subsidence of the solid matter remains clear, and I was surprised to find when operating with the seeds that the change takes place in less than one hour.

The cause of this I leave open for future investigation

* Read at the meeting of the American Pharmaceutical Association held at Niagara Falls, 1882.

A plan for the extraction of caffeine from guarana tea or coffee, more free from objection than the one proposed by Professor Wayne, would be found with difficulty.

It is so free from complications, and can be conducted with such rapidity and accuracy, that it is without hesitation I recommend it as the one best answering the second portion of this query.

3. Give the most desirable alcoholic menstruum that is adapted to the extraction of caffeine and the preparation of fluid extract of guarana.

Sixteen troy ounces of guarana in moderately fine powder was moistened with two (2) ounces of menstruum composed of alcohol, three (3) fluid ounces, glycerine, four (4) fluid ounces, and water five (5) fluid ounces.

The drug was packed in a conical glass percolator, the remainder of the 12 fluid ounces of menstruum poured on, and after the liquid had disappeared from the surface it was followed with a mixture of alcohol, 4 fluid ounces, and water 12 fluid ounces.

When the liquid began to drop from the lower orifice a cork was inserted, and maceration continued for two days. The percolation was then proceeded with, the first 12 fluid ounces reserved, and 2 pints more of percolate collected, the last portion of which was void of colour and taste. This was evaporated to 3 fluid ounces added to 1 ounce of alcohol and mixed with the 12 fluid ounces reserved, to make 1 pint of finished fluid extract.

The finished fluid extract kept bright and free from deposit for several months, but after that time a heavy chocolate-coloured precipitate formed, and upon examination was found to contain groups of crystals of caffeine. (Sample submitted.)

The exhausted guarana was removed from the percolator, and after drying thoroughly, tested for caffeine yielding about 1 per cent.

Four additional experiments were made with the following menstrua:—No. 2 contained five (5) fluid ounces of alcohol; No. 3, six (6) ounces; No. 4, seven (7) ounces, and No. 5, eight (8) ounces; the proportion of glycerine corresponding in each case to that used in experiment No. 1.

What I have said concerning experiment No. 1, can be repeated as to Nos. 2, 3, and 4, except that the deposit was diminished as the quantity of alcohol was increased, No. 4 being very slight.

No. 5 containing fifty (50) per cent. of alcohol and four (4) fluid ounces of glycerine to the pint makes a fluid extract which I regard as a true representative of the drug, and the menstruum as containing the least quantity of alcohol in association with glycerine that can be credited with giving good results. Dilute alcohol without glycerine is not free from the objection mentioned in connection with menstrua Nos. 1, 2, 3 and 4, viz., its liability to deposit.

In proof of this I submit a sample from a lot made in November, 1880, containing 50 per cent. alcohol, but without glycerine.

THE HISTORY OF CITRINE OINTMENT.*

BY R. A. CRIPPS,

Bell Scholar in the School of Pharmacy of the Pharmaceutical Society.

A short time ago I was asked by Professor Attfield to reply to some queries which had been put to him by Mr. Adolf G. Vogeler, of Chicago, respecting citrine ointment. I gladly undertook the work, and the outcome is the present paper. Mr. Vogeler concurs in my wish to read it before this Association.

The preparation known as citrine ointment has from time to time been prepared from numerous and widely-differing formulæ.

The first notice of it is found in the 'London Pharmacopœia of 1650, a most complicated formula being given to it; among the ingredients may be mentioned white coral, limpet shells, tragacanth, quartz, white marble and white lead, made upon a basis of hog's lard, suet and hen's grease. How such substances could be made into a presentable ointment is difficult to imagine, when we remember how little apparatus was at the command of the pharmacist of that day. It is said to have been used in many skin diseases and for freckles.

In the London Pharmacopœia of 1668 the formula remains the same, while in those of 1678 and 1682 several of the ingredients are omitted, sugar of lead replaces carbonate, and rose water, frankincense, and citron bark are added. The Edinburgh Pharmacopœia of 1722 orders under the same name an ointment of an entirely different nature, the formula being:—

℞ Hydrargyri . . . . . . unciam unam.
Spiritus nitri . . . . . . q.s.
Ut fiat solutionem, cui adde paulatim
Axungiæ porcinæ liquefactæ. libram unam.
Misce. Fiat unguentum.

It was not till long after this that a citrine ointment containing mercury was admitted to the London Pharmacopœia, perhaps from the fact that with a formula such as the above very varying results were naturally obtained; indeed we find no mention whatever of it in the London Pharmacopœia of 1724, while in that of 1746 it is similar to resin ointment with the addition of 1 oz. of yellow wax to each 8 ozs.

Quincy, in the 'London Dispensatory' of 1730, gives a similar formula, viz.:—

Yellow resin . . . . $\frac{1}{2}$ lb.
Sheep's suet . . . . 4 ozs.
Turpentine . . . . 2 ozs.

To be melted together and strained. No doubt the pharmacist thought this a vast improvement on the former ointment so difficult to prepare; but he was not long to remain in this state of ease as regards citrine ointment, for in the London Pharmacopœia of 1787 a new formula was given to it which bade fair to cause him more trouble than the last.

Some say it was introduced in imitation of the well-known "golden eye salve," but others state that it was of French origin, having been used in Paris for the cure of the itch. If the former were the case, it was not satisfactory, "golden eye salve" being an ointment of yellow oxide of mercury.

The formula was:—

℞ Hydrargyri pur. . . . . . unciam unam.
Acidi nitrosi . . . . . . uncias duas.
Axungiæ præp. . . . . . . libram unam.

Dissolve the mercury in the acid, and then mix the boiling liquid with the lard previously melted, remove from the dish and allow to cool. The same formula was used in the Edinburgh Pharmacopœia of 1792, but it was ordered to be stirred diligently during the cooling; a milder ointment was also official, containing half the quantity of lard. In 1803 the Edinburgh Pharmacopœia ordered 12 ozs. of lard instead of 16, the milder ointment containing three times that amount. Notwithstanding these continued alterations the ointment was still very unsatisfactory, it varied greatly with the temperature employed in preparing it, and after keeping usually became grey with greenish patches, and so hard that it could sometimes be powdered. This was stated to be due to the oxidation of the lard by the nitric acid, and many other substances were tried as a basis, among which the most important were butter, olive oil, and neat's foot oil. Accordingly we find in the Edinburgh Pharmacopœias of 1807, 1809, 1813 and 1817 a formula having as a basis 1 part lard to 3 parts of olive oil; in that of Dublin, 1807, 1 of lard to 4 of oil; and London, 1809, 2 parts oil to 3 of lard: still the results were quite unsatisfactory, and many were the theories propounded to account for the changes to which it was liable, excess of nitric acid, deficiency of nitric acid, too high or too low

* Paper read before the School of Pharmacy Students' Association, June 22, 1882.

a temperature, the presence of salt in the lard, impure mercury, and a fatty basis of unsuitable nature, all received their supporters. Acting upon the first of these theories the authorities of the London Pharmacopœias of 1817, 1824, 1836, and 1851 ordered 11 drachms of acid in place of 2 ounces, the formula of the last being:—

℞ Hydrarg. pur.	℥j,
Acid. nitric.	ʒxj.
Ol. olivæ	℥iv.
Adipis præp.	ʒviij.

Ft. unguent.

They also ordered a milder ointment, containing 1 part of strong ointment to 7 of lard. The Dublin Pharmacopœia of 1850 also orders less acid, while those of Edinburgh, 1839 and 1841, direct a larger quantity.

The British Pharmacopœia of 1864 gives the following formula:—

Take of—

Mercury	4 ounces.
Nitric acid, sp. gr. 1·5 . . .	8 „
Lard	15 „
Olive oil	32 „

Dissolve the mercury in the acid with the aid of a gentle heat, melt the lard in the oil, by a steam or water-bath in a porcelain vessel capable of holding six times the quantity, and while the mixture is hot, add the solution of mercury, also hot, mixing them thoroughly; if the mixture does not froth up, heat till this occurs.

The B.P. of 1867 orders 12 ounces of nitric acid, sp. gr. 1·42.

This formula will give an excellent ointment, and when complaints are made of the result it will be found that the fault is in the operator not in the formula. The instructions must be strictly adhered to, or a failure will probably result, and especial regard must be paid to the temperature at which the mixture is made, which should range from 180°–200° F., and should not be too long continued, but only until the ointment froths up well; if large quantities be made the temperature may be a little lower. As thus prepared it is of a fine lemon-yellow colour, and keeps for a fair length of time, perfectly good.

Such are the varied formulæ which have from time to time been given to this interesting ointment; but before leaving the subject I should like to devote a short notice to the chemistry of the preparation.

The views of chemists regarding the chemical composition of the ointment vary considerably. Evidently the original idea was to obtain an ointment of mercuric nitrate; hence the name given to it in the Pharmacopœias. But this was entirely a failure, for on adding the acid solution of nitrate to the melted lard chemical decomposition occurs, as indicated by the frothing. Still, this was considered as simply the result of the oxidation of the fat by the excess of acid; but Mr. Schacht, who made a number of experiments in the laboratories of the School of Pharmacy, showed that the ointment, when carefully prepared, is soluble in ether, thus indicating that the mercury exists as some compound with a fatty acid, the nitric acid in combination with the mercury being in some way retained while the excess is evolved during effervescence. In Mr. Schacht's valuable paper (which will be found in the *Pharmaceutical Journal*, [1], vol. iv., p. 450), he also states that the failure in obtaining a good ointment is not due to the presence of salt in the lard, or of lead in the mercury, and that ointment spoiled by keeping may be restored by warming with nitric acid, thus indicating that nitric acid is essential to its preservation, and that by keeping some of the acid is lost.

But in the *Pharmaceutical Journal*, [3], vol. vi., p. 708, in a paper by Mr. Fredigke, of Chicago, it is stated that a superior ointment both in appearance and in durability may be prepared by oxidizing the fat by nitric acid, previous to adding the mercurial solution. This would seem to show that the oxidized fat forms a compound with the mercuric nitrate, the colour being due to the elaidin formed by reaction of fat and acid.

Such then are the results of their experiments; but as they are to a great extent conflicting, it is impossible to arrive at any definite conclusions without experimental research, and pressure of time debarred me from such a course, so that I have been obliged to leave the subject with this historical sketch.

THE POISONOUS CONSTITUENT OF ANDROMEDA JAPONICA, THUNBERG.*

BY PROFESSOR J. F. EYKMAN.

Among the many plants belonging to the natural family Ericaceæ and the genus Andromeda, indigenous to Japan and China, is *Andromeda japonica*, Thunberg, an arboraceous shrub, commonly regarded as poisonous by the Japanese, and mentioned as such even in the oldest Japanese works on natural history. The investigation of this plant appeared to be very interesting, from a toxicological point of view, since the natural family of Ericaceæ furnishes only a limited number of poisons, and those but little known.

What is recorded in the Japanese or Chinese literature regarding this plant may be comprised in the following:—

The oblong, bitter, and astringent leaves are poisonous and have a stupefying or deadly effect upon horses and cows which eat them. Hence the plant is named *basuiboku*, *makuwasu*, also *shikaku kuwasu*, and *sishi kuwasu*.†

A decoction of the leaves kills insects and worms, also the pediculus capitis.‡ It is used as a wash in ulcerations and in scabies, and as an antidote against *fugu*.§ The finely-powdered leaves are used as a remedy in snake-bite; and the odour of a decoction of the leaves causes headache to human beings.||

The plant grows everywhere upon the mountains, is evergreen, and is, for this reason, used as an ornamental plant. It reaches a height not exceeding seven, and usually only two metres. A whole series of names is used for it in the different provinces; they are chiefly recorded in the 'Honzokomoku keimo of Ono.'¶

Of these, *asebu* and *basuiboku* are the Chinese names most in use; *shin-boku* and *tin-shu-kwa* are names given from the globular form of the flower;** and *bei-han-kwa*,†† from the resemblance of the flower to boiled rice.

E. Kaempfer, in his 'Amœnitates Exoticæ,'‡‡ describes this plant already in a somewhat detailed manner, under the names *asjebo* and *asjemi*; but Thunberg was the first who gave a complete description, besides a good illustration of the flowering plant.§§

* Translated from the author's manuscript. Reprinted from *New Remedies*, October, 1882.

† *Ba*, horse; *sui*, stunning; *boku*, tree.—'*ma*' horse; *kuwasu*, not eat.—*shikaku*, deer;—*sishi* is a collective name for wild animals, also wild hogs and for lion. Thunberg, in his 'Flora Japonica,' mentions also the name *sishi-gakure*; *gakure*=to conceal, to hide one's self, on account of the dense foliage of the shrub.

‡ According to the 'Honzokomoku keimo' (the commentary of the 'Honzokomoku' by Li-shi-shin).

§ From this it is also called *fugu shiba*; *fugu*, poison-fish; *shiba*, plant.

|| According to the 'Yudoku somoku susetsu' (Explanation and Illustration of Poisonous Plants). It is also stated in this work, that deer, after eating the leaves suddenly lose their antlers. In Li-shi-shin's 'Honzokomoku' is also found the statement that a decoction of the leaves drives off the impure blood, in women, after childbed.

¶ On all these works, and some others of similar nature, see the article on Japanese Medicine and Pharmacy, *Pharm. Journ.* [3], vii., 674.

** *Tin*, peculiar; *shu*, ball; *kwa*, flower.

†† *Bei*, rice; *han*, food; *kwa*, flower.

‡‡ 'Fascic.,' v., p. 896, Pl. 1712.

§§ 'Flora Japonica,' p. 181, Pl. 1784.

The poisonous principle is extracted from the fresh leaves in the following manner:—

The leaves are infused with water, and the strained liquid evaporated on a steam-bath to a thin syrup. The latter, which has a brownish-red colour, is filtered and then shaken, several times in succession, with chloroform. The chloroformic solution, which has a faint greenish-yellow colour, is reduced, by distillation, to a small volume, and petroleum spirit added to the residue, until nothing further is thrown down by it. The separated amorphous substance is dried, and then dissolved in ether containing alcohol; this solution is shaken with water, the watery liquid, which is almost entirely colourless, separated from the yellow ethereal layer, and evaporated at a moderate heat. There is left, as residue, a soft, light yellow, amorphous mass, which, by a gentle heat, dries up to a transparent substance, colourless in thin layers. I have tried in various ways and by using different solvents, to cause this substance to crystallize, but at no time could there be observed even a trace of crystals. The substance is always obtained in the same condition, so that I considered myself justified in assuming to have under my hand a pure, homogeneous substance. In addition to the above treatment, the powdered substance was thoroughly extracted with petroleum spirit, and afterwards with benzol, the residuary powder again dissolved in ether mixed with some alcohol, and the colourless solution once more shaken with water. Upon evaporation of the aqueous liquid, at a moderate temperature, there was again obtained an amorphous substance of precisely the same properties as before. After having been partially dried on the water-bath, it was reduced to powder, and the latter subjected to ultimate analysis (I. and II.). Another portion was partially extracted with absolute ether (free from alcohol) in which it is only slightly soluble, and thus divided into two fractions. Analyses were also made both of the fraction left undissolved by the ether (III.), and of that which the latter had dissolved and left behind on evaporation (IV.).

I obtained the following results:—

I. 0·2732 gram, dried at 110° to 115° C., yielded 0·2631 gram of dry substance, and after combustion, 0·5815 gram of CO_2 and 0·1983 gram of H_2O.

II. 0·3288 gram, dried at 110° to 115° C., yielded 0·3181 gram, and after combustion, 0·7073 gram of CO_2 and 0·2087 gram of H_2O.

III. 0·3575 gram of the fraction left undissolved by ether after being dried at 110° to 115° C., yielded 0·7929 gram CO_2 and 0·2368 gram H_2O.

IV. 0·3898 gram of the fraction dissolved by ether, after being dried at 110° to 115° C., yielded 0·8651 gram of CO_2 and 0·2610 gram H_2O.

These results, expressed in percentage, calculated upon the *dry* substance, represent:—

	I.	II.	III.	IV.	MEAN.
Carbon (C=12)	60·28	60·64	60·49	60·52	60·48
Hydrogen (H=1)	7·53	7·29	7·36	7·44	7·405
Oxygen (O=16).	32·19	32·17	32·15	32·04	32·115
	100·00	100·10	100 00	100·00	100·000

The agreement of the figures under III. and IV. among themselves and also with those under I. and II. confirm the belief that we have here a homogeneous definite principle, and not a mere mixture.

I have chosen the name *asebotoxin* for the substance.

Properties of Asebotoxin.—It is a colourless substance, soft while moist, but brittle and transparent when dried at a gentle heat. When covered with water, it cakes together, becomes soft below 100° C., but does not melt until the temperature 120° C. is reached, and then forms a transparent light-brown mass. It is only slightly soluble in cold, more readily in hot water, and very easily in alcohol, amylic alcohol, glacial acetic acid, and chloroform. These solutions have a neutral reaction. Ether, free from alcohol or water, dissolves it but sparingly; but it is readily soluble in ether mixed with alcohol. Petroleum spirit, benzol, and disulphide of carbon do not dissolve it at all, or only in very small quantity.

Water of ammonia dissolves it tolerably well, solution of soda less easily. The watery solution is neither precipitated nor altered by ferric chloride, sulphate of copper, mercuric chloride, chloride of gold, nitrate of silver, or even solution of acetate of lead. But basic acetate of lead causes a white flocculent precipitate.

When heated with alkaline copper solution, and still more, after being first heated with diluted sulphuric acid (the resinous precipitate being removed by filtration), it causes a separation of red cuprous oxide (Cu_2O). Asebotoxin, therefore, belongs to the glucosides; it contains no nitrogen. On combustion it produces vapours which excite coughing, then chars, and is consumed without leaving a residue. The aqueous solution has a bitter taste, and produces a strong tingling upon the tongue.

I found the fatal dose for rabbits to be 3 milligrams (about $\frac{1}{20}$th grain) for each kilogram of the animal, by hypodermic injection.

Weight of rabbit in kilos.	Asebotoxin injected in aqueous solution.	Dose calculated for each kilo of the animal.	Result.
3·24	9·5 milligr.	2·9 milligr.	Death in 1¾ hour.
2·80	5·5 „	2·0 „	Recovery after several hours.
1·35	4·5 „	3·3 „	Death in 1 hour.
1·28	3·6 „	2·8 „	Death in 3 hours.
1·25	2·5 „	2·0 „	Recovery after several hours.

The observed external symptoms are chiefly the following:—After administering a dose, of about the fatal limit, the rabbit is seized, in about fifteen to twenty minutes, by a strong trembling, and begins, while producing snarling or groaning sounds, to make slight retractive motions with the head. These become gradually more intense; the forward movement of the head being made with wide-open mouth, and accompanied by a smacking, sucking sound; the nostrils being widely opened. Sometimes diuresis or defecation are observed. Now and then the animal suddenly springs up and runs around anxious and groaning. The temperature of the body diminishes sensibly; by degrees, the animal loses its power of motion, and lies on one side. Next, there appear symptoms of paralysis in the extremities, the mucous membranes of mouth and nostrils appear very anæmic, and exude mucus, and, after some convulsions, the mouth and nostrils being wide open, death supervenes, under symptoms of cyanosis, apparently by suffocation.

In the rabbit which weighed 3·24 kilos, I observed, shortly before death, a strong exudation of a milky turbid liquid in the eye.

Dogs begin to vomit soon after the poison is injected.

The differences are entirely analogous to those which are observed after injecting a watery infusion of the fresh leaves. One cubic centimetre of this infusion, corresponding to about 200 milligrams of fresh leaves, kills rabbits of about 1·25 kilo within a few hours, and, therefore, agrees in effect with 3 to 4 milligrams of asebotoxin.

Asebotoxin exhibits some fine colour-reactions, which are of importance toxicologically. If an alcoholic solution of the substance be poured into a watch-glass and strong hydrochloric acid be added, a *magnificent blue* *colour* is gradually developed, and, at the same time, a peculiar odour resembling that of *Spiræa ulmaria*. On evaporating the blue solution on a water-bath, a fine violet-red tint developes itself at the edge of the liquid. If the blue solution be left to itself, it turns after some time to reddish-grey, and the liquid becomes turbid from the separation of a bluish-grey substance. Concentrated sulphuric acid dissolves asebotoxin with a red colour, which becomes, after some time, fine rose-red, while the liquid is rendered turbid from the separation of a bluish-grey substance. If asebotoxin be boiled with diluted hydrochloric acid, the liquid assumes a fine rose-red colour, and a brown resinous substance separates. The same effect is produced by diluted sulphuric acid. The above mentioned peculiar odour is also noticeable during the last named reactions.

CITRATE OF IRON AND QUINIA.*

Complaint is very often made of the difficult solubility of the officinal citrate of iron and quinia. of the United States Pharmacopœia, and it is very often erroneously said to be insoluble. Such complaints and statements are simply due to the faulty teachings in materia medica and pharmacy and faulty practice in therapeutics.

As long ago as the revision of the Pharmacopœia of 1860 it was recognized that the bitterness of quinia preparations, both to the palate and in the stomach, was in many cases destructive of appetite in sensitive patients, and, therefore, when given as a tonic this bitterness in a measure defeated the quinia. Hence a preparation of iron and quinia was adopted, containing a large and effective proportion of quinia, which, when well dried, was so slowly soluble that it could be easily given, either in form of pill or powder or suspended in syrup, to women and children, or in the most delicate conditions of palate or stomach, with but slight bitterness. Such a preparation passed over the palate easily, and when in the stomach dissolved and was assimilated slowly and easily with the least possible shock—for intense bitterness is as shocking and as disturbing to many stomachs as intense acidity or alkalinity is. This preparation, when taken between the teeth, feels almost like so much sand, and its solubility and bitterness are developed so slowly that although containing about 11 per cent. of quinia, it is often condemned as containing no quinia at all. And when stirred up with water it at once settles out, leaving the water colourless and tasteless, or nearly so, in proportion to the time allowed, and it is often at once discarded as useless, and letters written about it which have some of the bitterness in which it is supposed to be deficient, the fact being all the while that it is entirely soluble even in its own weight of water, but only very slowly soluble, as it should be and was intended to be. For a long time after its introduction to the Pharmacopœia it was used as was intended in powder, pill or syrup, and attained the high character which it has always so well deserved, but gradually, through defective teaching or through want of thought, physicians began to make the mistake of prescribing it in solution. Then those physicians and pharmacists who had skill enough and patience enough to get it into solution by tying it up in a cloth and suspending it in the water and setting it in a warm place for some hours, found they had a dreadfully bitter solution, and one which in a short time became mouldy, as all salts with organic acids will. To avoid this slow and troublesome solubility and some of the intensity of bitterness, the manufacturers soon supplied a preparation by exactly the same name, wherein, by the addition of citrate of ammonia, a readily soluble salt of similar appearance with less bitterness was supplied at a lower price. Of course this contained a smaller proportion of both iron and quinia and a larger proportion of citric acid and water; but this escaped attention so long as the preparation had the desired solubility, the diminished bitterness in solution, and was sold at a lower price. This new preparation, unofficinal, though called by the officinal name, was for a time designated as soluble citrate of iron and quinia —not so much for the purpose of indicating any difference of composition as for the purpose of distinguishing it in order so as to avoid the objectionable insoluble salt of the Pharmacopœia. But after a while it almost entirely usurped the place as well as the name of the better preparation, and it holds these at this time so firmly that perhaps a hundred ounces of it are sold to one of the original officinal preparation, while the latter is really much more valuable, and as valuable, therapeutically, to-day as it was in 1860, when adopted by the Pharmacopœia; and the reasons for its adoption are as good and as sound to-day as they were then, only the pecuniary profits upon it are less than on the more dilute and soluble preparation. So little is the better agent used now in proportion to the weaker one that in the present revision of the Pharmacopœia there was but a feeble opposition to the adoption of a formula for the weaker preparation, while some effort was needed to prevent the dismissal of the older and better salt.

The ground that the Pharmacopœia must follow the usage and requirements of physicians in general, even when the latter do fall into errors, may be the only safe general rule; but unless there be a multitude of exceptions it is not a good rule for the highest and best interests of the art of medicine. It has always been the rule of the manufacturer and is well illustrated in the history of citrate of iron and quinia, but this history also illustrates that what is a good rule for the manufacturer may even satisfy a large majority of physicians, without being a good rule for their patients.

Beside all this, there is one point in the history of this preparation that is difficult to comprehend. The officinal salt is tasteless when given in a well-made uncoated pill, and is very nearly tasteless when in powder or suspended extemporaneously in any thick liquid as mucilage or syrup, and the constant demand of late has been for tasteless medicines, or, at least, those which are not nauseous. So prominent is this demand that physicians are often heard to complain that they lose their practice to homœopathy, etc., because their medicines are not made less disagreeable. Yet here in the case of this valuable agent, within twenty years a large majority of the whole profession has abandoned the tasteless form of it, and gone over to an inferior preparation, so as to give it in a solution which is very bitter, and which would be very justly objectionable to their patients if these knew they could take a better preparation in a nearly tasteless condition.

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INFLUENCE OF PEPTONES AND CERTAIN INORGANIC SALTS ON THE DIASTATIC ACTION OF SALIVA.*

BY R. H. CHITTENDEN AND J. S. ELY.

Recent experiments† on the diastatic action of saliva under various conditions have revealed the fact that human mixed saliva in the presence of an equal volume of artificial gastric juice containing 0·05 per cent. of hydrochloric acid, is capable of forming, from a given quantity of starch, a much larger amount of sugar than the same quantity of saliva alone can do under a like degree of dilution; this being the more remarkable when it is remembered that the same percentage of acid by itself greatly retards the diastatic action. This somewhat curious fact has led us to study the individual

* From the *American Chemical Journal*.

† Chittenden and Griswold, *American Chemical Journal*, iii., 305.

influence of several bodies of physiological importance on salivary fermentation. It is our conviction that many of the digestive processes of the body are more dependent for their fullest action on the stimulating or other influence caused by the mere presence of many of the digestive products than has hitherto been supposed. Experiment, to be sure, has revealed the fact that several of the products of digestion when present in the digestive mixture in excess, notably sugar in the case of salivary digestion and peptones in gastric digestion, retard the digestive process. Under ordinary circumstances, however, all conditions are favourable, in the normal body, for a rapid absorption of the digestive products, and thus any excessive accumulation is prevented. Schmidt-Mülheim* found in his recent study of proteid digestion, that in the case of dogs, the quantity of peptones present in the stomach was practically the same at all times during the digestion; thus, one, four, and six hours after feeding a dog, 61 grams of albumin, the stomach contained 3·08 grams, 3·31 grams, and 2·91 grams of peptones respectively, which would seem to indicate that after the formation of a definite quantity of the digestive products the transportation of these bodies keeps pace with the digestion. Again, there are no facts to warrant the belief that the products of one digestive process necessarily hinder the action of some other allied ferment; indeed, it is ordinarily understood that any accumulation of the digestive products simply hinders the action of that particular ferment by clogging the digestive fluid.

There is nothing inconsistent then in the statement that the products of one digestion may act as a stimulant to some other digestive process. The results of the experiments about to be described show plainly that *peptones, a product of gastric digestion, exercise a decided influence on salivary digestion, stimulating the ferment to increased action, particularly in the presence of acid which by itself completely prevents the conversion of starch into sugar.* If now we are led, in virtue of this fact, to infer that there may be a possible continuation of salivary digestion in the stomach, it follows that the ferment must act at the first period of digestion, when the acid fluids are exceedingly weak. The fact that the quantity of peptones present in the stomach at this stage of digestion may be quite small offers no objection whatever to a possible action of the peptones, since the experiments already quoted, and those about to be described, well illustrate how extremely sensitive the saliva is to a change of conditions, however slight; thus even minute quantities of inorganic salts, even to the extent of only 0·015 per cent., exercise a decided influence on ferment action.

We may also reasonably infer that the saliva is, to a certain extent, a type of the other diastatic fluids of the body, and that the ferment itself is doubtless similar in its action to other like ferments, notably the ferment or ferments of the liver, which presumably convert the glycogen of the hepatic cells into sugar. Thus conditions which modify the diastatic action of saliva may not be wholly without similar influence on other like ferments. It has, therefore, seemed to us that the results of our work may have some bearing upon the recently published experiments of Seegen,† of Vienna, who found that when an aqueous solution of peptones was poured over a small piece of fresh liver, the quantity of sugar formed in a specified time was greater than in a piece of the same liver treated in a like manner but without peptones; at the same time, however, the total amount of carbohydrate matter appeared to be increased in the presence of the peptones. Finding that the peptones themselves had no diastatic action on glycogen, Seegen then concluded that the liver possesses the power of transforming peptones into sugar and carbohydrates which are capable of being converted into sugar. While our results may in nowise affect Seegen's conclusions, they certainly suggest the possibility that the increase of sugar noticed in the presence of the peptones may be due, in part at least, to some cause other than that attributed by Seegen.

We have attempted at first in our experiments to ascertain whether by themselves or under such conditions as may presumably exist in the body, peptones have any influence on the conversion of amylaceous matter into sugar by the saliva. The amylaceous material employed was starch and glycogen, while the diastatic agent was human mixed saliva, which was usually collected in quantities of 150–250 c.c. by the chewing of some tasteless substance, then filtered and thoroughly mixed before using. The saliva was ordinarily used an hour or two after collecting, and being as a rule always furnished by the same person, possessed approximately the same strength, although control experiments with starch and saliva alone under a like degree of dilution were made in each case. The method employed consisted in dissolving a weighed amount of starch or glycogen in 25 c.c. of water, then adding 50 c.c. of water or other fluid in which a weighed quantity of peptone or other substance was dissolved, and lastly, 25 c.c. of filtered saliva. The mixture, consisting of 100 c.c. of fluid, was then warmed for a definite time, usually forty-five minutes, at 40° C., when further action was prevented by boiling the mixture. The fluid was then diluted with water to 500 c.c., and when thoroughly mixed, 50 c.c., or one-tenth of the filtered fluid, was precipitated by cupro-potassium tartrate according to the method of Maercker, described in another place.* The copper was weighed as metallic copper, from which the percentage of reducing substance calculated as dextrose was determined by the use of Maercker's tables.

Influence of Peptones in Aqueous Solution.

The peptones employed were prepared especially for the purpose and were made as pure as possible. Three samples were prepared from thoroughly washed blood-fibrin by the action of an active gastric juice made from a glycerine extract of pepsin and 0·2 per cent. hydrochloric acid, while the fourth was made from coagulated egg-albumin by the use of a similar gastric juice. All four preparations were the products of an active digestion, and were therefore free from syntonin or other preliminary products. The peptones were purified by repeated precipitation and standing under alcohol and ether, while the fourth was especially purified from soluble salts by dialysis. The following results show plainly the action of the peptones. In each experiment 1 gram of the dried peptones dissolved in 50 c.c. of water was added to 1 gram of starch previously boiled with 25 c.c. of water, the 25 c.c. of saliva making a digestive mixture of 100 c.c., in which the peptones were present to the extent of 1 per cent. In the control experiment the mixture was made up to the same volume with water. Different saliva was used in each experiment.

	Without peptones.		With peptones.	
Number of experiment.	Wt. Cu in one-tenth. Gram.	Total amount of sugar. Gram.	Wt. Cu in one-tenth. Gram.	Total amount of sugar. Gram.
1.	0·0896	0·4557	0·0962	0·4893
2.	0·0911	0·4633	0·0974	0·4954
3.	0·0915	0·4654	0·1045	0·5315
4.	0·0904	0·4598	0·0977	0·4969
5.	0·0856	0·4354	0·0937	0·4766
6.	0·0835	0·4247	0·0949	0·4826

(*To be continued.*)

* *Untersuchungen über die Verdauung der Eiweisskörper*, Du Bois Reymond's *Archiv f. Physiologie*, 1879, 39.

† *Die Einwirkung der Leber auf Pepton*, Pflüger's *Archiv*, xxv., 165.

* *American Chemical Journal*, iii., 307.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 4, 1882.

SPURIOUS AND WORTHLESS DRUGS.

We are glad to learn, from the report of the proceedings at the meeting of the Council on Wednesday last, that a subject to which attention has been called repeatedly in the pages of this Journal, namely, the frequent appearance of parcels of inferior or misnamed drugs in the market, is provoking consideration with a view to the practice being energetically dealt with. It was brought under the notice of the Council by Mr. Williams, who quoted as instances the mouldy ipecacuanha to which reference was made in this Journal last week, some jalap tubers that had been exhausted of resin, and balsam of tolu containing 40 per cent. of common rosin. These three examples fairly represent three varieties of objectionable drugs that are met with,—those that have become deteriorated from more or less natural causes, those that have been deprived of their active principles, and those that have been sophisticated by the addition of some extraneous substances. To these may be added parcels of drugs of vegetable origin which consist either partly or wholly of something which is not represented by the name given to them, such as the spurious senna, concerning which a warning was first given in this Journal some time since, the substitution of Japanese for star-anise, and the adulterations of senega and other drugs that have been since referred to. Mr. Williams further stated that several gentlemen connected with the wholesale trade wished the Society to take the matter up and use its influence in securing such measures as would put some check upon the questionable practice.

The question seems to have given rise to considerable discussion, which was terminated by the Council appointing a Committee to consider the subject of the sale by auction of spurious and worthless drugs and to report on a future occasion as to the steps it would recommend to be taken with a view of checking the practice. It will be obvious that this was a discreet course; for the subject will require to be carefully considered from every point of view, and before arriving at any conclusion the Committee will have to estimate not only its bearing on the object professedly in view, but also its influence in many other ways. Many of these points could not be well discussed in a formal public debate, and will stand a much better chance of having due weight given to them in the more informal proceedings of a committee. For instance, the proposition to appoint an inspector of drugs, with power to condemn and destroy what he might deem to be worthless or hurtful, is one that may well be looked upon with anxiety in respect to the powers that would have to be entrusted to such an officer in order to enable him to perform such a duty effectually. Then there is the difficulty of defining what should be deemed worthless or deleterious, a point that evidently would often depend upon the use to which the substance is put after its sale has been effected. For it must be admitted that whilst the appearance of a quantity of damaged drugs in the market might justly arouse suspicion, and their use for some purposes would deserve condemnation, nevertheless for other purposes they might be justifiably used, and, therefore, it would be hard to deprive their owners of their market value. Beyond this, there is a decided indisposition in the present day to interfere between sellers and buyers in restraint of trade in any way.

There is another consideration, too, that must not be lost sight of, and that is, the manner in which the demand for an inspector of drugs would affect public opinion as to the position and qualification of pharmacists. It is admitted that the members of the wholesale trade are not likely to be betrayed into purchasing as of good quality such articles as those to which reference has been made, and it is implied, perhaps, rather than stated distinctly, that the suggested appointment would be for the protection of the chemist and druggist who is unable or too busy to protect himself. But the question arises: How far will it be wise on the part of the chemist and druggist to accept such a position, especially at the present moment? It is true that after the crude drug is ground or otherwise disguised it may be more difficult to distinguish sophistications or substitutions. But will it be wise for the pharmacist, whilst on the one hand he claims to be entitled to take a higher status than the ordinary tradesman on account of the superior education and training that he has undergone with a view to specially qualifying him to deal in powerful drugs, on the other to declare that without extraneous assistance from the State he is as helpless, or nearly so, as the grocer or the manager of a co-operative store? The subject is a difficult one, but we do not think that it could be more fitly taken in hand by any body than the Committee to which it has been referred.

THE LOCAL GOVERNMENT BOARD ON THE SALE OF FOOD AND DRUGS ACT.

The Eleventh Annual Report of the Local Government Board, which was issued last week, includes the usual reference to proceedings taken under the Sale of Food and Drugs Act. In the first place it appears that there has been during the year a considerable increase in the number of municipal corporations which have complied with the provisions of the statute as regards the appointment of public analysts. In previous reports the Board had been able to say that all the county authorities and the several vestries and district boards of works in the metropolis had made such appointments, but up to the end of the year 1880 only 156 municipal corporations had done so; now we learn that, as the result of steps taken by the Board, additional appointments have been made, and at the end of last year the total number of districts in which public analysts were acting was 260. In connection with this subject a question has arisen as to the duty of a town council that has entered into an agreement with the county authority for the "watching" of the town, concerning which the Board has been advised that in such a case it devolves upon the town council either to appoint an analyst or make an arrangement for the performance of analyses by an analyst holding an appointment in a neighbouring borough or for the county.

It would appear that the provisions of the Act as to the analysis of articles bought by private individuals are still almost ignored by the public, and the operation of the Act depends principally upon the extent to which the local authorities choose to exercise their power of procuring samples for analysis, only 358 having been purchased by private individuals during the year. The result is said to be that while in some districts the Act is well enforced, in others it is almost a dead letter, and it is remarked that the town councils, of the smaller boroughs especially, appear generally very unwilling to entertain a suspicion that the articles sold in their districts may possibly be adulterated.

The total number of analyses reported upon during the year 1881 by public analysts in their official capacity was 17,283, and of these 5039, or two-sevenths, were made in the metropolis. Outside the metropolitan district the standard suggested by the Board, of the analysis of at least one sample for every thousand inhabitants of a district, was attained only in three counties and twenty-nine boroughs. On the other hand, the analyses reported from twelve counties only numbered fifty altogether, whilst from sixty-six boroughs the returns were absolutely *nil*. Of the 17,283 samples analysed, 2613, or 14·7 per cent. were reported as adulterated, being the lowest average percentage in any year since the Act has been in force, and 1 per cent. less than in 1880. The highest percentage of ascertained adulteration (28·4) is reported in "spirits other than gin" and next follows gin (25·9). Then at some distance (19·5 per cent.) comes milk, of which nearly seven thousand samples were reported upon, and next coffee (18·3 per cent.).

With respect to the foregoing classes, there is some precision as to the individuality of the articles examined and of their probable source, as well as of the nature of the adulterants, but there is no indication of one or the other under the heading "drugs." It is simply stated that the number of samples reported upon (398) is still much smaller than is, in the opinion of the Board, desirable, and that the percentage of adulteration (15·0) continues very large. That these points, however, might have an important bearing upon the results is at least suggested by some figures that appear in the tabular abstract of reports found in the appendix. For instance, it appears that of 107 samples of "drugs" analysed in the metropolitan district, only 8 were reported to be adulterated. In the county of Lincoln 37 samples of drugs were examined and all reported genuine; and in Lancaster, too, of 47 samples none were reported adulterated; but in the neighbouring county of Durham, out of 51 samples 22 were reported adulterated, or more than one-third of the total number of samples of drugs reported upon adversely throughout England and Wales. Can it be pretended, therefore, that these figures represent even approximately the relative degrees of purity in drugs which obtain in the districts mentioned? Indeed, the Board itself admits a doubt whether the relative prevalence of adulteration is accurately represented by the figures given, the doubt being induced by the fact that in the case of milk the limit of an area in which an adulterated article is supplied appears frequently to be coincident with the boundary of the sanitary district.

With respect to the samples purchased privately and submitted to the public analyst, it is stated that a much larger proportion of them were reported to be adulterated than of those obtained by officers of local authorities. This is what might be expected, as a private individual would not be likely to incur the cost and trouble involved if he were not fairly confident that the article sold to him is not genuine. In order to encourage a greater development of the Act in this direction the authorities in Bristol, Salford and some other boroughs have made arrangements with the analyst to analyse samples for the public at 2*s*. 6*d*. each, instead of the half-guinea fee mentioned in the Act. It will be evident, however, that any movement in this direction will require to be made with discretion.

THE NORTH BRITISH BRANCH.

On Wednesday evening next, November 8, the North British Branch of the Pharmaceutical Society will commence a new session. The President of the Branch, Mr. Alexander Napier, will open the proceedings with an Address, and this will be followed by the reading of a "Note on the Solubility of Morphia Salts," by Mr. D. B. Dott.

THE CHEMISTS' BALL.

On Monday evening next, November 6, at 9 o'clock, a meeting will be held at 17, Bloomsbury Square, for the purpose of making the preliminary arrangements for the usual Chemists' Ball. Gentlemen who are desirous of becoming Stewards, but who will be unable to attend the meeting, are requested to communicate with the Honorary Secretary, Mr. J. F. Savory, 143, New Bond Street, W.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association will be held at 32a, George Street, Hanover Square, on Wednesday evening next, November 8, when a paper on "Subnitrate of Bismuth" will be read by Mr. F. H. Alcock.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, November 1, 1882.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, W. Hills, Radley, Richardson, Robbins, Savage, Schacht, P. W. Squire, Symes, Williams, Woolley and Young.

The minutes of the last meeting were read and confirmed.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Fletcher, James Edward.
Foden, Edwin.
MacDermott, Robert John.
Parker, William Henry.
Roper, Robert Francis.
Rouw, Theodore John.
Steel, Alexander.
Thornley, Frederiek.
Wakefield, John.
Wright, Robert.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Roper, Robert Francis............London.
Steel, Alexander ....London.
Wakefield, John ....Birmingham.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Dye, Charles Page ....Bury St. Edmunds.
Fawssett, Theodore ....London.
Heynes, Thomas Edward ......Maidenhead.
Hudson, Tom ....Wells.
Prothero, George Rees ....Pontypridd.
Rees, Rice William ....Swansea.
Robertson, John ....Aberdeen.
Salmon, Ernest Frederick ......London.
Surman, Thomas William ......Bristol.
Treharne, Frederick Gwilym...Weston-super-Mare.
Yates, George Albert ....Manchester.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Axford, Sidney Bertram.........London.
Hatfield, George William ......London.
Richards, John William ....Pontypridd.
Thiele, Johann F....................London.
Wright, Charles Rowland ......Portsmouth.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Mr. William Broom was appointed Local Secretary and Superintendent of Written Examinations for Exeter, in the room of Mr. George Delves, who has resigned.

Addition to the Register.

The Registrar reported that—

John Mitchell Humble, Marsh House, Rothwell, near Leeds,

having made the statutory declaration that he was in business before the passing of the Pharmacy Act, 1868, and this declaration having been supported by a duly qualified practitioner, his name had been placed on the Register.

Reports of Committees.

FINANCE.

The report and recommendations of this Committee were received and adopted, and several accounts were ordered to be paid.

LIBRARY, MUSEUM, LABORATORY AND HOUSE.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

	Attendance.	Total.	Highest.	Lowest.	Average.
July	Day	429	24	6	16
	Evening	108	10	1	5
August	Day	113	9	0	4

Circulation of books.	No. of Entries. Town.	Country.	Total.
July	155	98	253
August	51	54	105

Carriage paid	£	s.	d.
July	2	5	4
August	1	5	11
September	0	10	0

The Librarian had also reported that in making the annual inspection of the Library, he had found that the undermentioned book was missing:—

Glasgow University Calendar, 1881.

The number of volumes and pamphlets in the Library on September 30, was 8513.

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Liverpool Chemists' Association, Reports, 1852-81. From the Association.

Flückiger (F. A.), Pharmakognosie des Pflanzenreiches, 2e Aufl., 2e Lief., 1882. From the Author.

Dragendorff (G.), Beiträge zur gerichtlichen Chemie, 1882.

Sitzungsberichte der Dorpater-Naturforscher Gesellschaft, 1882. Separat-Abzug. From Professor Dragendorff.

Thompson (E. S.), Oration delivered before the Medical Society of London, 1882. From the Author.

Kinch (E.), The soy bean. From the Author.

Guermonprez (Fr.), Doigtier metallique pour le traitement des plaies des doigts.

— Notes cliniques sur quelques plaies des doigts, 1881.

— Simulation des douleurs d'origine traumatique, 1881.

— Revue de zoologie médicale, 1881.

— Étude sur les indications thérapeutiques dans le traitement des ascarides lombricoïdes, 1882. From the Author.

Smithsonian Institution, List of foreign correspondents, 1882. From the Institution.

Tommasi (D.) & G. Pellizzari, Action du temps sur l'hydrate ferrique. From Dr. Tommasi.

Tommasi (D.), Réduction du bromure d'argent par la lumière.

— Action de l'aluminium sur le chlorure cuivrique.

— Sur un nouvel appareil destiné à montrer la dissociation des sels ammoniacaux.

Tommasi (D.), Electrolyse de l'eau, 1881.
— Appareil différentiel pour le dosage de l'ozone dans l'air.
— Sur l'électrolyse de l'eau distillée.
— Sur l'électrolyse.
— Sur le travail chimique produit par la pile. Two pamphlets.
— De l'influence de l'électrode positive de la pile sur son travail chimique.
— Réponse à M. Berthelot sur la force électromotrice d'un couple zinc-charbon.
— Relations numériques entre les données thermiques.
— Sur la loi des constantes thermiques de substitution. From the AUTHOR.
Hamberg (N. P.), Aix les Bains och några andra kurorter i Savojen, 1882. From the AUTHOR.
Gille (N.), Onguent égyptiac, 1882. From the AUTHOR.

The Committee recommended the purchase of the undermentioned books:—

Pharmacopœa Germanica, editio altera, 1882. 2 *copies.*
Christy (T.), New Commercial Plants and Drugs, parts 1–6. To be continued.
Smith (J.), Dictionary of Popular Names of Economic Plants, 1882.
Taylor (E. B.), Anthropology, 1881.

The Librarian had presented his report on the fifth annual meeting of the Library Association of the United Kingdom, held in Cambridge, September 5 to 8.

Curator's Report.

The Curator had reported the average attendance in the Museum to have been—

Attendance.		Total.	Highest.	Lowest.	Average.
July	Morning	276	27	0	10
	Evening	57	6	0	3

August—Total attendance during the first four days, 14 in the morning and 2 in the evening.

The following donations to the Museum had been received and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimens of the flowers of *Inula britannica* and *Artemisia judaica*; the root of *Camphorosma monspeliaca*; a fragrant oil from Colombo (*Lavandula sp?*); new Copal from Calcutta; bark of *Cinchona pubescens*; an original bundle of white Ipecacuanha; crystals of Tincal; Vegetable Tallow Seeds and the fat obtained from them, from Singapore; and Mauritius Anime. From Mons. C. CHANTRE.
Herbarium specimen of the Japanese Peppermint Plant. From Messrs. T. CHRISTY and Co.
Herbarium specimens of the Damiana plants, *Turnera aphrodisiaca* and *T. diffusa*; specimens of Juglandin (*Juglans cinerea*); Euonymin from the root and stem bark respectively; Irisin (*Iris versicolor*); Baptisin; Leptandrin; Barosmin (from root bark of *B. crenulata*); Pepsin in scales; Desiccated Oxgall. From Messrs. PARKE, DAVIS and Co.
Specimen of the volatile oil of *Eucalyptus dumosa*. From Messrs. HEARON, SQUIRE and FRANCIS.
Specimens of the Dyak Arrow Poison of Borneo. From Mr. R. JAMIE, of Singapore.
Specimen of the root of *Camphorosma monspeliaca*. From Mr. H. COCKSEDGE.
Specimen of the original deposit of crystals of Terpin Hydrate and selected crystals of the same. From Mr. W. ADAMS, Shrewsbury.
Specimens of Terpin Hydrate, with crystals and wooden models illustrating their crystallography. From Mr. R. H. PARKER.
Fine specimen of Cuprea bark. From Messrs. BURGOYNE, BURBIDGES, CYRIAX and FARRIES.

That the following specimens for distribution to provincial associations, etc., had been purchased:—Adulterated Saffron, Japanese Star-anise, Bengal Cardamoms.

Professors Bentley and Attfield had attended the Committee and reported satisfactorily as to their respective classes.

The report and recommendations of the Committee were received and adopted.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grant:—

£10 to the widow of a registered chemist and druggist.

One application had been deferred until the next meeting, and another case the Committee had declined to entertain.

It was also recommended that the list of contributors to the Benevolent Fund be published in the *Pharmaceutical Journal* in January, and that a copy of that number be sent to each chemist and druggist on the Register.

The Council went into committee to discuss some of the details of the above report.

On resuming, the report and recommendations, with the exception of the case which the Committee had declined to entertain, were adopted. The case alluded to was referred back for further inquiries.

Mr. ROBBINS suggested that the Committee should be instructed to take into consideration the appropriation of the interest on certain gas shares which he had given in January last, on condition that the proceeds be given to such annuitant as had in former years contributed most to the Fund. He said he had intended to provide for a yearly sum of £5, but in the present year he found the interest amounted to £6 15*s.* 2*d.*, leaving a reserve of £1 15*s.* 2*d.* for any future deficiency.

Mr. RICHARDSON accordingly moved a resolution that the Committee take this matter into consideration, which was carried unanimously.

GENERAL PURPOSES.

The report of this Committee included the usual report from the Solicitor as to cases which had been placed in his hands. It stated that Mr. J. F. Craig, of Blackfriars Street, Manchester, who had been proceeded against for a breach of the Pharmacy Act, had paid the penalty and costs without action.

Several other cases of alleged infringement of the Act had been considered by the Committee, and in the majority of them it was recommended that proceedings be commenced.

The Council, as usual, went into committee to consider the above report.

On resuming, the report and recommendations were received and adopted.

REPORT OF EXAMINATIONS.

October, 1882.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major (18th)	8	2	6
„ (19th)	6	2	4
„ (25th)	7	5	2
	—21	—9	—12
Minor (18th)	17	5	12
„ (19th)	20	8	12
„ (25th)	21	5	16
„ (26th)	24	11	13
	—82	—29	—53
Modified (18th) . . .	3	1	2
	106	39	67

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major (18th)	1	1	0
Minor (18th)	12	5	7
„ (19th)	13	5	8
	—25	—10	—15
	26	11	15

Preliminary Examination.

	Candidates. Examined.	Passed.	Failed.
October 4th	248	131	117

Fourteen certificates were received in lieu of the Society's examination:—

3 College of Preceptors.
1 Incorporated Law Society.
6 University of Cambridge.
3 „ Oxford.
1 „ Edinburgh.

SPURIOUS AND WORTHLESS DRUGS.

Mr. WILLIAMS said there was a matter which he wished to bring before the Council with reference to the public sale in London of spurious and worthless drugs. Not long ago it was brought to his attention that upwards of a ton and a half of ipecacuanha was offered for sale, which, on examination was obviously worthless and rotten, but which still found a purchaser at a comparatively high price. This was not by any means the only case. He would pass round a sample of jalap, which no doubt was genuine jalap at one time, and he had endeavoured to ascertain its history. It appeared that this had been imported from Paris, where the jalapin had all been extracted from it; it had then been dried and sent to this market again, where it found purchasers as jalap. Several wholesale druggists had drawn attention not only to these cases but others; in one case there was some balsam of tolu, which contained 40 per cent. of resin, and such things he had been informed occurred at nearly every drug sale. In America, the government appointed inspectors of drugs, and prohibited the importation of any drugs unless they came up to certain standards. Now such a measure as that would, he feared, be very injurious to a market like the London market; nearly all the drugs in the world came either to England or to Hamburg, and he feared if anything like the American system were established, a great many drugs which were useful would leave this market and go to another. At the same time it was considered by many in the wholesale trade that there ought to be a power to destroy absolutely spurious and injurious drugs, in the same way as spurious tea or unwholesome fish or meat were destroyed. Some of the wholesale druggists thought the Society might assist very materially by going to the Government on public grounds, and asking for the establishment of a system under which inspection should be enforced under certain conditions, and that there should be a power to prohibit the sale of or to destroy these spurious things. What he would like to know was whether if he brought forward a series of cases of the kind he had described, properly authenticated, the Council would be inclined to join with the wholesale trade in making a representation to the Government on the subject, and so proving that it took interest in the welfare of the general public. There might be a good deal to be said on the other side of the question with regard to the restrictions on trade, and so on, but he hoped the Society would encourage the wholesale druggists by promising to support and assist them in obtaining a healthier state of things.

Mr. HAMPSON said the Council was indebted to Mr. Williams for bringing the question forward, but he thought it would be well if a committee were appointed to consider it before any steps were taken. It was a delicate question and would require very careful management or they might find more Government interference than they liked. The aim should be to remedy the grievance without establishing another.

Mr. SYMES suggested that one of the existing committees might deal with the question.

The PRESIDENT thought perhaps the best plan would be to let the Library, Museum and Laboratory Committee appoint a sub-committee at its next meeting. He thought it would have a good moral effect if a paper dealing with several of these cases, properly authenticated, were read at an Evening Meeting to call attention to the subject.

Mr. WILLIAMS said there was an Adulteration Act which affected the retail trade, but it would not in any way affect these wholesale dealings, so the most worthless articles could be sold openly and publicly without any possibility of touching the sellers under the Adulteration Act. At the same time it would be very unfortunate for any interference to take place with the legitimate wholesale trade; what was wanted was to find some happy medium by which the public could be protected from the fraud which now occurred without restricting the liberty of trade. He thought that any committee which was appointed would be glad of the advice and opinion of the Council.

Mr. WOOLLEY suggested that some good might be done by the publication of Mr. Williams's remarks.

Mr. SAVAGE said this was an interesting subject to the whole of the chemists in England, and it was very important that they should be made acquainted with the facts. If it were generally known it would show the public the importance of going to respectable shops for their drugs.

Mr. WILLIAMS said he would move that the question be referred to the Law and Parliamentary Committee with power to confer with certain members of the wholesale trade as to what steps should be taken, if any, with regard to the sale of spurious drugs.

Mr. RICHARDSON thought it would be better to have a special committee. He was not on the Parliamentary Committee and should be very glad to take part in this inquiry.

Mr. SYMES said the Law and Parliamentary Committee would have power to call in the aid of the wholesale trade.

Mr. WILLIAMS said it would be easy to add Mr. Richardson's name to the Law and Parliamentary Committee.

Mr. GREENISH remarked that scarcely an Evening Meeting took place at that house, at which instances of adulterated drugs were not brought forward. He did not think Mr. Holmes ever explained the specimens he had on the table without one or two being shown as adulterated specimens. The subject was not new, but it might perhaps be brought forward with more force than had hitherto been the case.

The VICE-PRESIDENT said it would have more effect if a paper were prepared on the subject. He should be very glad if Mr. Williams would prepare one. He thought it would be well to appoint a special committee with power to add to its number so that it might bring in two or three wholesale druggists from outside.

Mr. RICHARDSON agreed with Mr. Greenish that these matters were not new; they had been spoken of over and over again for years, but he was afraid that the sinners in the city took not the slightest notice of these exposures. The better plan would be to have a committee from the Council to co-operate with some of the wholesale people, and see if anything could be done. It was known to all wholesale dealers that this had been going on for years, and it was impossible to stop it unless Government aid were invoked. As a wholesale druggist he was rejoiced to think something was going to be done to put a stop to this pernicious practice, for it was very hard on those who wished to be honest that so many facilities were given to malpractice.

Mr. Robbins said, some years ago it was the practice of the Editor of the Journal to bring before the notice of his readers any adulterated article which came on the market, but he did not think those in the trade had any idea of what was going on until their attention was directed to it in this way. It was only necessary for the chemist to know that adulteration was being practised on any article and then he would take proper precautions, and that article would soon be expelled from the market. He recollected several instances of that kind. On one occasion a quantity of spurious senna leaves were offered for sale, but the fact was noticed, the mode of detection pointed out and the thing soon came to an end. Thus the evil cured itself when it was properly brought before the members, and he believed if the same thing were done now, a full description being given of the adulteration and mode of detection, it would put a stop to it.

Mr. Schacht said he was not certain that he saw the practical outcome of this proposed action. It occurred to him that as a body of pharmacists it was undoubtedly within their province to ascertain the facts connected with the adulteration of drugs, and to make those facts as widely known as possible, but he was not quite sure that in the action which seemed to be proposed the Council would not be going a little outside its legitimate work. Supposing this evil to exist to a very large extent, what was to be the process by which it was to be eradicated? How could the root of the evil be reached. First of all by a process which would go to the examination of all drugs, certifying what was good and what was imperfect, and, secondly, by punishing those offenders who were detected; but the task in each case would be an exceedingly difficult one. Supposing either of these things were accomplished, there would be the risk of absolving the wholesale dealers who purchased and distributed the drugs from their legitimate duty, viz., of satisfying themselves that the materials they had bought and sold were good. With regard to these articles he found by experience that he could place more trust in some men than he could in others; he knew that he had a personal duty to perform after them, but he felt it more incumbent on him when materials came from certain sources to perform that duty, than when they came from other sources. He was rather disposed to think that in order to remedy this evil, the Council must be content with exposing it, and he should be rather sorry if it were understood that the committee to be appointed should co-operate with gentlemen outside the body for a purpose which lay, in his opinion, a little beyond the proper province of the Society. He was very much inclined to think that the sole duty of the Council consisted in teaching the processes by which good things could be recognized from bad, and in exposing as much as possible attempts to palm off fraudulent articles. Those powers it already possessed, and he should be disposed to endorse all the recommendations of Mr. Williams. He hoped he would put his knowledge in the form of a communication to the Society, and let it be made public.

Mr. Williams said it was not a question of adulteration altogether. Every druggist in the market could tell that the specimen before the Council was bad jalap; it was an evident case of fraud.

Mr. Symes thoroughly approved of the suggestion that a committee should be appointed, because it would be only carrying out one of the very objects for which the Society was instituted, viz., the protection of those carrying on the business of chemists and druggists. Wherever the Society found a useful purpose could be served by exercising that power it should do so; complaints were often heard that it did not exercise that power and look after the interests of chemists and druggists, and this was one particular in which it might very well do so. A good deal had been said about discriminating between drugs, and there was no difficulty whatever in discriminating between this exhausted jalap and the rotten ipecacuanha as they were now shown, but when they came to be ground up and mixed with a little of the good article a great deal more difficulty would arise. These things were not like chemicals, which could be tested and determined at once whether they were good or bad, or merely of second quality. Mr. Schacht's argument would scarcely go the length of rejecting the motion, because the committee would not take any responsibility of action without reporting to the Council, even if it recommended any action at all. He took it, too, that there would still be a good deal of discretion left with the wholesale houses in declaring the various qualities of drugs; it was only suggested that, if the committee thought it desirable, someone should be appointed to destroy the really worthless articles, and that, it appeared to him, would be a step in the right direction. It would convince the Government and the public generally that the Society was exercising the powers it possessed for the public good.

Mr. Greenish agreed in the main with the observations of Mr. Schacht. He thought the publication of the facts at an Evening Meeting and in the Journal would be amply sufficient, and did not see what benefit could result from a committee. He might mention a case which occurred about twelve months ago, when a large quantity of rose leaves artificially coloured was put upon the market. Some came under his notice and he requested his son to examine them, which he did, and read a paper before one of the Evening Meetings, in which he showed that these leaves were coloured with magenta. The bubble burst at once, and he was told by the principal of one wholesale house that he had disposed of a large quantity of these leaves for sachets or something of that sort—they were taken out of the domain of medicine.

Mr. Andrews supported the proposal for a committee, because, notwithstanding there had been these exposures at Evening Meetings and in the Journal, the evil still went on, showing that the reading of papers alone was not sufficient. He thought with the careful limitations, which no doubt would be introduced, there would be no danger to the trade to be feared.

Mr. Savage said one thing occurred to him which he thought would meet the difficulty without going into that minute detail which would require the objectionable practice of having an inspector visiting chemists' shops and examining the drugs, which was once the case, and led to a great deal of abuse,—there might be an inspector to examine the imports and exports so as to avoid adulterated goods coming in. There was already an Act condemning those adulterated drugs found on the premises of any chemist, and if drugs which were manifestly impure could be kept out of the market it would meet the case.

Mr. Bottle agreed with the remarks of Mr. Savage. If there could be an inspector who should inspect and destroy all those drugs which were absolutely useless, in the same way as the inspector of meat or fish at Smithfield or Billingsgate, it would meet the case. Those inspectors did not destroy that which was of inferior quality, but only that which was absolutely deleterious. But he rather viewed this specimen of jalap from a different point of view, for it seemed to him that the Sale of Food and Drugs Act was quite sufficient to meet such a case. He believed that those individuals who sold such an article would be liable to the penalties of the Act.

Mr. Gostling said it was most important that chemists should be able to procure good drugs in a powdered state; at the same time he was very much afraid of Government interference. Not that he should object to an inspector coming to look at his stock, or that of any gentleman round the table; but it appeared to him that the remark of Mr. Greenish met the case entirely, especially if a person like the Curator were appointed to go into the drug market and ascertain the condition of things, which was presented and periodically reported to the Council.

The PRESIDENT said that was done at the present time.

Mr. GOSTLING said the result was not made public. If printed reports were presented from time to time people's eyes would be opened.

Mr. WOOLLEY said that through this subject coming forward so suddenly he had hardly made up his mind what was best to be done; but he understood from Mr. Williams that certain gentlemen connected with the wholesale drug trade wished the Society to take the matter up.

Mr. WILLIAMS said that was so.

Mr. WOOLLEY said with that view he should strongly support the appointment of a committee, if it were only to meet those gentlemen and show them that the Council was willing to see what grievance there was and help to remedy it if possible.

Mr. RICHARDSON said it was the duty of the Council to protect the chemist as far as it could, even against the malpractices of wholesale druggists.

The VICE-PRESIDENT said Mr. Richardson had expressed what he was about to say. He was as jealous as any man well could be of Government interference, but it struck him that the appointment of an inspector would only refer to the importation, not to go into provincial pharmacies. His duty would be to do as was done in the case of tea, to condemn on the spot that which was adulterated or exhausted. He did not know whether all wholesale houses kept their own analysts, but it would be an immense advantage to have the thing stopped before the article came into their possession.

Mr. SQUIRE thought that everyone who had passed the Minor examination could detect the absolutely worthless character of the two specimens of ipecacuanha and jalap which had been referred to.

Mr. GREENISH (handing up the sample of jalap) said it was absurd to suppose that any wholesale dealer required anything to protect him from the purchase of such an article as that.

Mr. HILLS thought very likely the committee would be able to collect useful information, but he was not satisfied at present that it would be able to do anything further. He did not think the cases of the fish and meat inspectors were altogether parallel, because in the case of drugs he presumed there were instances in which a sample would be quite useless for one purpose and yet might be useful for another. There might be certain drugs which were not entirely deprived of their active ingredients and yet not suitable to sell in the condition in which they were, but which might be useful for manufacturing purposes, and there would probably be a large number with regard to which it would be difficult to decide whether they had any value or not. After all it was a matter of price, and as a rule if the chemist would pay a fair price he would get very good powdered jalap or ipecacuanha, but if he chose the lowest priced articles he must expect to get something inferior.

Mr. CHURCHILL said that both from the wholesale and retail point of view it was a great hardship that the honest man should be undersold by one who was content to buy such stuff as that produced. He should not like to give an opinion offhand whether an inspector should be appointed or not, but he thought no harm could be done by appointing a committee which in the first place would endeavour to ascertain how much of this sort of thing actually took place.

Mr. SCHACHT said if the committee came to the conclusion that it was desirable to appoint an inspector, the question should also be considered whether the inspector's duties should take him into the wholesale druggist's warehouse as well as the open market.

Mr. WILLIAMS then moved formally:—

"That a committee be appointed to consider the question of the sale by auction of spurious and worthless drugs and to report to the Council what steps, if any, should be taken to check this practice. That the Committee consist of the President, Vice-President, Messrs. Greenish, Hampson, Richardson, Symes, Williams, Woolley and Young, with power to add to their number."

In reply to some of the remarks which had been made he should like to say that he trusted the committee would not go to work with any foregone conclusion that no action was to be taken. It would hardly be fair to call on their wholesale brethren to come and give time and attention to the Committee if such were the case. He had approached this question with great caution and did not wish to commit the Council in any way. He saw the difficulties, as clearly as Mr. Schacht did, of anything like legislative action or grandmotherly care; all he wished to urge was that when a case of exhausted or spurious or spoilt drugs or something not fit for human consumption was pointed out there should be power somewhere to prevent that thing being sold. Several gentlemen had observed that druggists both in town and country were generally quite able to distinguish a good article from a bad; but this ipecacuanha when scrubbed up, washed, dried and powdered would go out as *pulvis ipecac.*, and it would be more difficult for many persons to distinguish it. It was very well known who purchased these things; the buyers were as well known as the sellers, and it had lately led to a scandal in the market. Those who did not buy such things challenged those who did and asked, "How can you buy such rubbish?" But the answer had always been that they sent it abroad and that they did not sell it in England. There seemed to be a sale somewhere for all the rubbish that could be collected in the London market. Mr. Greenish seemed to think that exposure was sufficient and gave the illustration of rose-leaves coloured with magenta. He would be somewhat surprised to hear, perhaps, that these leaves were still in the market and were purchased in large quantities, so that exposure had done no good whatever in destroying these improper practices. Under these circumstances he thought he might fairly ask the Council to appoint a committee with the serious intention of supporting the action of the wholesale drug trade in applying to the Government to do something to check the importation and sale of absolutely spurious or rotten drugs; not in any way to prevent the importation of any quality of drugs if genuine, because the lower qualities were often very useful for manufacturing purposes.

Mr. SYMES seconded the motion.

The PRESIDENT said the gist of the whole matter was that the attention of the Council had been called, not for the first time, to the sale of those things by auction; and it was notorious that any person, whether a druggist or not, could go and see the attempt made to sell by public auction materials absolutely worthless. It was a cruel form of deception, and as that was the only Society representing the intelligence of the drug trade, it was only fair that it should be asked to consider if anything could be done to check such practices. The best pharmacists in the world, those in the United States, had come to the conclusion that it was necessary to have an inspector, though no one would suppose that the average pharmacist in the United States was not an educated man, and, as far as the analytical processes would allow, able to protect himself. The Committee would consider the matter with the greatest care before making its report to the Council.

The motion was then put and carried unanimously.

THE LATE MR. ALLCHIN.

The VICE-PRESIDENT said a telegram had been received that morning stating that Mr. Allchin had died at half-past nine o'clock, and he felt that no time ought to be lost in referring to this painful event. He could not claim such a long and intimate knowledge of Mr. Allchin as some of the members of the Council, but he had known him some years and very highly esteemed him. It was needless to dwell on his genial qualities as a man, but he had also occupied a prominent position in connection with the Society, sufficient to justify the Council in taking marked notice of his decease. He was one of the earlier Major certificated men, he believed he was once demonstrator in the school and certainly had been for some years one of the examiners. Since he had had the honour of being Vice-President he had been brought into close contact with him and had learned to esteem him very highly. He therefore begged leave to move—

"That this Council learns, with much regret, the death of Mr. Allchin, and that the President be requested to write a letter of condolence to Mrs. Allchin expressing the sympathy of the Council with her and the members of her family."

Mr. BOTTLE seconded the motion. He said the Vice-President had left nothing to add other than this, that it was his privilege to have known Mr. Allchin for a great many years, he could scarcely say how long, but from a very early date in the formation of the Society he had know him as an active worker. Mr. Allchin was at all times a genial and pleasant companion, and he deplored his loss very much.

Mr. SAVAGE could not allow the opportunity to pass without expressing his deep sympathy with the family of Mr. Allchin. He had probably known him longer than any member of the Council, for he knew him when he was an apprentice at Brighton. He, therefore, did sincerely sympathize with the widow and family of Mr. Allchin, and regretted deeply the loss the Society had sustained.

Mr. WILLIAMS said Mr. Allchin was an old friend of his, he having known him when he was a student in the school. He saw him last at the Conference, at Southampton, when he felt doubtful whether he should see him again. He was deeply grieved to hear of the death of his old friend, who was one of the most able pharmacists he had known.

Mr. ANDREWS said it was hardly necessary to multiply testimonies of respect to Mr. Allchin, but he had known him a very long time and was very intimately acquainted with him. After the meeting at Southampton he had spent a few days with him in the neighbourhood of the New Forest, and was then painfully convinced that he was not long for this world. He could only say he had never known a more amiable or more lovable man.

Mr. GREENISH wished also to express his regret at the death of Mr. Allchin, and his sympathy with his family. He had known Mr. Allchin for very many years, he could scarcely say how long. He esteemed him as a friend, and had a high opinion of his abilities as a chemist and pharmacist. His death would be a great loss to the Board of Examiners.

The PRESIDENT, in putting the motion, said he fully endorsed every word which had been said of Mr. Allchin. He had known him for many years, and, having worked side by side with him as an examiner, could testify to the extreme value of his services on that Board.

The motion was carried unanimously.

EVENING MEETING.

Wednesday, November 1, 1882.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

An Evening Meeting of the Pharmaceutical Society was held on Wednesday evening last. The chair was taken at half-past eight by the President.

The minutes of the previous meeting were read and confirmed.

The PRESIDENT commenced the proceedings by reading a paper on—

THE ORCHARD ALUM SPRING.

BY DR. THRESH.

The paper is printed on p. 361, and gave rise to the following discussion:—

Mr. POSTANS said the meeting was greatly indebted to Dr. Thresh for presenting such an interesting and able paper, in which he had given a most excellent analysis of the water from this spring. He said he was informed, though he did not give any medical testimony, that it was an excellent vermifuge, and he need not say that anyone who would bring to light a British spring which possessed all the properties which Dr. Thresh ascribed to this had really conferred a great boon on the medical profession. All that was necessary to bring it into use was that medical testimony to its efficacy should be forthcoming. Germany had long maintained a high reputation for its waters; it might be that there were plenty of most useful springs in our own country if they were only known.

Mr. EKIN said that springs having a blood-red appearance were not uncommon in coal districts. He had himself examined an iron spring of some considerable volume, issuing from a coal mine, which contained about 60 grains per gallon of iron as ferrous sulphate. He was considerably startled at what seemed to him the enormous quantity, but on referring to one of the reports of the Rivers Pollution Commissioners he found that they had examined several springs of the same kind. One feature of this spring was the large amount of sulphate of alumina. No doubt there were many springs in England containing large amounts of iron and alumina. Bunsen's method of analysis, by which the table at the end of the paper was arrived at, had an immense superiority over the older methods, as the change of condition brought about by evaporation was avoided. At the same time he was a little struck at the boldness of Dr. Thresh in the matrimonial way; he thought a more timid man would have hesitated a little before he brought out his figures as he had done. For instance, to say that in the case of the chloride of ammonium, which was present in the water to the extent only of ·125 grain per gallon, to say that the ammonium was necessarily combined with the chlorine was taking a good deal for granted. And again, in the case of the ·170 grain of nitrate of potassium, it was of course just as likely that the nitric acid was in combination with the calcium as with the potassium. He must confess to having a preference for giving the bases and acids separately; all this fitting in was very nice, but anyone who had any experience of analysis of this sort must know that there must be a certain amount of straining to make things fit so completely. He thought that the plan of giving the bases and acids separately was the more scientific and proper way.

Mr. WILLIAMS said he noticed in the table at the end $BaSO_4$ were said to be found in enormous quantities, but he apprehended this must be a printer's error, as there was nothing in the former table to show this quantity of barium.

The PRESIDENT said Dr. Thresh gave this table to show the correctness of his original analysis, and in it he gave, according to Bunsen's method, the results of the various constituents he got in the portion of the residue soluble in water, the portion insoluble in water, and the total. So in determining the sulphuric acid, he had so much barium sulphate, etc. In a footnote Dr. Thresh referred to the *Journal of the Chemical Society*, which contained a paper he had read, probably the best paper published for many years on the analysis of mineral waters. He believed it was due to Dr. Thresh's modesty that he had not lengthened this paper and given fuller details. In that paper he showed conclusively the advantages of Bunsen's method, which consisted in determining the constituents of the soluble portion, the insoluble, and the total, giving the results, and leaving those who had to judge to draw their own conclusions. There was in the present paper a supplemental table to enable those interested in the subject to check his results. He had had some opportunities of seeing springs in the Lancashire and Yorkshire coal districts, and had there seen water which would probably give something like these results. He had seen some of a deep blue-red colour indicating a large quantity of ferric sulphate, but these waters had not been analysed in any large number, except those referred to by Mr. Ekin, which had been dealt with by the Rivers Pollution Commission. It was well known that these iron springs had some effect on organic matter, and if anyone present had any experience in rural districts and could speak as to the effects which salts of iron were supposed to have in purifying water from organic matter he should be glad to hear the result. Very extraordinary results were said to have been obtained not only by adding ferrous sulphate to water, but also by passing water through a spongy iron filter, and so on.

Mr. SCHACHT said if Dr. Thresh had been present he should have liked to have asked him if he had any further grounds for the assumption contained in one paragraph, where he said it was singular that when carefully evaporating, the basic salt redissolved, yielding a residue which could be diluted, and formed a nearly colourless solution. He should like to know if that was the only justification for the statement that the acidulous and basylous radicals in the latter case would scarcely be in the same state of combination as in the original water. If so, there might be some reason in his mind that did not appear for his exact distribution of the elements in their combinations to which Mr. Ekin had taken some exception.

Mr. EKIN said that in a case, not long ago, in which he was consulted, an action was brought against a local board in Staffordshire, which poured the whole of its sewage into a river, and it was proved that the water from a disused coal mine containing a large amount of iron as ferrous sulphate had mixed with this river, and in the course of a very short run the sewage was destroyed. The case for the prosecution, which was conducted by the riparian owners, was based largely on the fact that the stones and banks for some mile or two down the river were coloured with a nasty yellow deposit; but that was proved to be simply ochre, and the local board won their case completely. He believed that within the last two or three months Dr. Thresh had discovered another spring in the neighbourhood of Buxton, which he was utilizing for this purpose, having been consulted by the local board there in their sewage difficulty. He was still experimenting in that direction, and he believed the local board of Buxton would probably be indebted to him for getting them out of the difficulty with the least possible cost and trouble.

Mr. ALLEN said it might not be generally known, but travellers on the Great Western Railway into the Cornish district were not unfrequently astonished to see large streams of blood-red water running down through the valleys, and of course full of impurity. This blood-red colour was no doubt due to a considerable quantity of iron impurities washed out from the tin stones, and he had also noticed the yellow deposit which Mr. Ekin had spoken of on the border of the streams, which he had always thought to be an oxide of iron. If any gentleman in the Society wished to analyse any of this water he would undertake to procure a quantity of it, but whether it represented thousands of gallons of disinfectant running into the sea, he was not prepared to say.

The PRESIDENT said with regard to the first criticism, as to the bold way in which Dr. Thresh had tabulated his results, he was quite sure if he had been present he would have been only too happy to have given the results on the basis of the investigation which he published in April last in the *Journal of the Chemical Society*; but practically that would not have given to a large number of members the kind of information which they wished. He had given the results in the old-fashioned and popular way. Everyone knew that pairing was a difficult process in all affairs of life, and not the least so in analysis. It was very difficult indeed to give a table of this sort and put the acidulous and basylous radicals in a satisfactory way. His own impression was that Dr. Thresh had given the very best practical result he could on the total results as mentioned in the last table. He concluded by proposing a vote of thanks to Dr. Thresh, which was carried unanimously.

The PRESIDENT then read a—

NOTE UPON THE USE OF OXALIC ACID AS A TEST FOR ARSENIATES IN ALKALINE SALTS.

BY C. PATROUILLARD.

The paper is printed on p. 362, and gave rise to the following discussion:—

The PRESIDENT said this paper, by a distinguished pharmacien and chemist, was a rejoinder to the excellent paper read by Messrs. Naylor and Braithwaite at the Conference, in which they had repeated the experiments of M. Patrouillard, using arsenic oxide and water instead of alkaline arseniates, and had not obtained the results by him described. If either of those gentlemen had any remarks to make he was sure the meeting would be pleased to hear them.

Mr. NAYLOR said no one present could possibly feel greater satisfaction at receiving this paper from M. Patrouillard than Mr. Braithwaite and himself. He thought they might at least be congratulated on one important admission. He referred to the fact that oxalic acid did not act as a reducing agent on arsenic acid. But on referring to the original paper of M. Patrouillard it was perfectly evident that at the time the author wrote it he was of opinion that oxalic acid did exert a reducing action on arsenic acid, for he there stated, "Oxalic acid appears then to act on arsenic acid as well when it is combined as when it is in a free condition." He must say that it was quite unintentional on the part of himself and Mr. Braithwaite selecting arsenic acid mainly for experiments; although they had M. Patrouillard's instructions before them they certainly had no intention of deviating from them, and when they employed the acid instead of the salt they did it inadvertently. For his own part he was a little disappointed with this communication in one particular. It was a little unfortunate that M. Patrouillard should have confined himself to the use of a single reagent. When he had employed the oxalic acid or oxalate of ammonia he had not tested that solution to see if reduction had taken place or not, but had immediately employed a reagent which itself had a reducing action upon arsenical salts. With this sentence he could quite agree:—"When a *salt* contains at least 1 to 2 per cent. of an *arseniate*, if it be boiled with oxalic acid or oxalate of ammonia for a few minutes, sulphydrate of ammonia or sulphuretted hydrogen, after the addition of a few drops of pure sulphuric acid, will produce in it, at the end of an interval more or less long, a yellow precipitate of trisulphide of arsenic. This precipitate may be accompanied by a varying quantity of sulphur. If the proportion of arseniate contained in the salt amount to 5 or 10 per cent., and especially if the mixture be still sufficiently hot, the precipitate is produced *immediately*." He should not be at all surprised at this; in fact, if he were to take an alkaline arseniate and dissolve it in hot water and then acidify it with strong sulphuric acid and add a few drops of sulphydrate of ammonia he should expect to get down, not pure sulphur, but a precipitate consisting of tersulphide of arsenicum with a varying proportion of sulphur; how much he was not at present prepared to say, because the quantity would depend on certain conditions, notably temperature. M. Patrouillard said that he had noted in his laboratory register a large number of testings, and it was rather unfortunate he had not given in this paper the manner in which he obtained them. Although in the main he and Mr. Braithwaite had used arsenic acid in their experiments, they did not confine themselves entirely to it, and he found on looking back over his notes that in two or three cases disodic arseniate was employed. They did not, however, exactly follow Patrouillard's directions, for having dissolved the arseniate and boiled from a quarter to half an hour with oxalic acid, they did not then pass sulphuretted hydrogen through it, but tested the solution as it was, expecting if a reduction had taken place to find it. There was a question in his mind as to the part which the sulphuretted hydrogen played in this reaction, and, as text-books varied very much in their statements with reference to the action of sulphuretted hydrogen on arsenic compounds, they had paid some attention to it, and they thought it would be only paying due respect to M. Patrouillard if they were to repeat his experiments and present the results at the next Evening Meeting. Meanwhile he wished it to be understood they still considered that oxalic acid not only had no reducing action on arsenic acid, but that *per se* it had no reducing action on alkaline arseniates.

The PRESIDENT asked if Mr. Naylor wished it to be understood that his last statement was the result of experiment.

Mr. NAYLOR said it was not the result of recorded experiments, but only of note-book experiments.

The PRESIDENT said it was very important to study carefully the action of reducing agents on these oxidized compounds of arsenicum, and anyone who had experience in the matter would confer a benefit on all engaged in analytical work if they would state them. He thought now it might be assumed that with regard to arsenic acid, Mr. Naylor and his colleague had made good their case, but with regard to the unrecorded experiments, they must wait until they had further information before giving any opinion. They were indebted to M. Patrouillard for his courtesy in sending this paper in answer to that of two Englishmen, and he was sure the meeting would accord him a hearty vote of thanks.

Professor REDWOOD thought it was due to Mr. Naylor to state that he, from h s own experience, agreed with him as to the effect of using sulphuretted hydrogen or sulphydrate of ammonia as a precipitant where arsenic acid was concerned. All chemists were aware that sulphuretted hydrogen was not an accepted precipitant for arsenic acid, inasmuch as it did not in the first instance throw down arsenical sulphide, and an operator could not depend on the arsenic being precipitated from the solution by the mere use of sulphuretted hydrogen; but at the same time it was familiar to all who had any experience of the matter that if sulphuretted hydrogen were passed through solution of arsenic acid continuously for some time there would be ultimately a very appreciable precipitation. That appeared to be very much the view which Mr. Naylor was depending upon being able to justify by further experiments.

The PRESIDENT said the experience of Professor Redwood was no doubt that of those who had anything to do with this subject. Some years ago, when he had more to do with analytical chemistry than he had at present, he had many opportunities of proving the correctness of what had now been stated with reference to this reaction.

A vote of thanks to M. Patrouillard was passed unanimously.

The last paper read was a—

NOTE ON TINCTURA CAMPHORÆ COMPOSITA.

BY J. BLAND.

The paper is printed on p. 363, and gave rise to the following discussion:—

Mr. HOLMES said it gave him great pleasure to hear, at last, a paper on a pharmaceutical subject. With regard to star-anise, Mr. Bland had brought forward a very practical point in the fact that it is less soluble than ordinary oil of anise in proof spirit. In order to test this statement he had made two solutions, one of the oil *Pimpinella anisum*, and the other of the oil of *Illicium anisatum*, both of the strength of the tinct. camph. co. of the British Pharmacopœia, and it would be seen on comparing them that one was less soluble than the other, though the difference was not very great. In a former number of the Journal other features were pointed out by which the two oils could be distinguished; one was the congealing point, another the molecular rotation, another the fact that alcoholic hydrochloric acid would give with the true oil a reddish colour after a time, whereas the star-anise oil remained colourless. He should like to know if it were the fact that the oil of anise of commerce was almost entirely obtained from star-anise, as Mr. Bland supposed. The oil of anise became solid at a little above 50° F., whereas star-anise oil remained fluid down to nearly 35° F.; this difference could be easily observed in winter. With regard to the poisonous property of Japanese star-anise, a writer in the Journal had stated that the poisonous principle was soluble in water. He did not know whether it would in any way contaminate the oil, but if not, of course the oil would not be dangerous, even if Japanese star-anise fruits were mixed with ordinary star-anise. The Japanese star-anise fruit had lately come in large quantities into the market, but he had not been able to trace what became of it. He was somewhat surprised to find how rarely members of the Society made notes on points of interest which must inevitably crop up during their daily avocations. He thought, as a rule, such notes were of general interest, and would add much to the success of the Evening Meetings if brought forward more frequently.

Mr. GERRARD said he could corroborate what Mr. Bland had stated, but not as a rule; it had been rather an exception with him to find a separation of the oil of anise from tinct. camph. comp.

Professor REDWOOD congratulated the meeting upon having a truly pharmaceutical subject brought before it, and hoped they would more frequently have papers of this description. With reference to the subject itself, he should like to know a little more specifically than had been indicated the exact difference in solubility of the two oils, and whether the difference, looking at the quantity used in making the compound tincture of camphor, would be sufficient to account for the separation referred to by Mr. Bland. He believed it was generally admitted that a great part, if not the greater part, of the oil of aniseed which was commercial in this country was the oil of star-anise. Moreover, he had been for years accustomed to consider, having taken his opinion from such works as Dr. Pereira's, that the oil of star-anise was preferable to the other variety. Considering that those who had had experience in the use of these oils had given the preference to the oil of star-anise, and that on that account it was recognized in the B.P., considering that they had no evidence at the time, and he did not know what the evidence was now, of its having any poisonous effect, he should be rather disposed to think if any such effects had been observed they might be due to the fact of the oil being imported in copper vessels. At any rate he should like to know somewhat more definitely the grounds upon which such an accusation had been made against it. Considering, again, the preference given by high authorities to the oil of star-anise, and that it had a higher congealing point than the other oil, it was quite possible that a practice which had been detected in some instances was more common than they were aware of, namely, that of giving to the ordinary oil of anise a resemblance to the oil of star-anise by dissolving in it a small quantity of spermaceti. This substance had been detected in some specimens of oil of anise which had been sold as oil of star-anise; and seeing that spermaceti was not soluble in proof spirit, seeing, moreover, that some of those largely engaged in making this tincture had not experienced the difficulty Mr. Bland referred to, he thought it might be accounted for by a small amount of impurity in the oil employed.

Mr. ALLEN said there was one point to which Mr. Bland had not referred, viz., that a decrease of temperature, after the first solution had been made, would have the effect of throwing the anise out of solution. He had never found any difficulty in making the tinct. camph. comp., nor had he found the oil insoluble which he happened to use; but he did prepare an essence of aniseed containing more oil of anise than the tinct. camph. comp., with a much smaller amount of spirit, and with that his experience was that during the summer months it was perfectly soluble, and could be filtered bright into the stock bottles; but when the winter came there was not exactly a deposit, but an appearance through the liquid of a most remarkable series of apparently irridescent crystals. It was perfectly evident in a case of that proportion, that the fall of temperature threw the oil of anise out of solution, though in the first place it was thoroughly dissolved and passed through a filter.

Mr. HOLMES remarked that the vessels in which oil of anise was generally imported were, he believed, made of lead, and, therefore, it was not likely that the oil would be contaminated with copper. He was referring to that imported from China, and he was not sure whether the Japanese tree grew in that part of China where the *Illicium anisatum* grew; and, therefore, it was not at all likely that the imported oil would be poisonous, except that it had been shown by Mr. Eykman that the same poisonous principle was present in very small quantity in star anise itself. The fruit of the Japanese star-anise had been shown to contain a poisonous principle which was soluble in water, but he was not sure that there was any evidence of its being found in the oil. In the samples on the table there were 3 drops of oil to 2 ounces of proof spirit; he also made a third solution with 6 drops of *Pimpinella Anisum* to 2 ounces of proof spirit, and found that it left just as much insoluble matter, judging by the eye, as the 3 drops of oil of *Illicium anisatum* did, which would seem to indicate that the former was about twice as soluble.

Mr. BLAND, in reply, said he had recently obtained some oil of *Pimpinella Anisum* which he had reason to believe was genuine, and which was quite soluble. The oil used in his former experiments, in which he failed to get a bright solution, was obtained from five or six different sources; and until he got this last specimen, which he was informed was distilled from Russian fruit, he had not for some years seen a specimen which was entirely soluble in the proportion of ½ drachm to a pint of proof spirit. Even then success depended on a slight variation in the manipulation. It did not do, as was pointed out by Mr. Ince, to put the oil of anise directly into the proof spirit and shake them up. If he wished to prepare a pint of tinct. camph. co. according to the directions of the *London* Pharmacopœia he should proceed thus. The directions were to take 25 grains of camphor, 36 grains each of benzoic acid and powdered opium, ½ drachm of oil of anise, and 1 pint of proof spirit. He should take 7½ ounces of distilled water, and 12½ ounces of rectified spirit; in 4 oz. of the rectified spirit he should dissolve the oil of anise, the camphor and the benzoic acid; he should then mix the remainder of the spirit and the water together, shake them up briskly to facilitate the escape of air from the mixture, and allow it to cool down to the ordinary temperature; then pouring that gradually into the solution of oil and camphor, and shaking them up together, a bright solution was produced. Then to that solution he should, under the London Pharmacopœia, have added 1 oz. of tinct. opii, because in that formulary the quantity of opium in the tinct. opii bore a simple relation to that in the tinct. camph. co., being exactly twenty times as much; and besides that the 1 ounce of tinct. opii, added to the previous mixture, almost exactly compensated for the condensation which took place on the mixture of the water and the rectified spirit. In that way he got a tincture which scarcely required filtering at all, and then only from some slight mechanical impurities in the benzoic acid. With regard to the temperature at which these two oils solidified, he found so much divergence amongst the authorities he had consulted that he feared little dependence could be placed upon them. With the oil of *Pimpinella Anisum* one could get a perfect solution of ½ drachm in a pint of proof spirit, but he had not succeeded in so doing with the oil he had been getting for some years past, even varying the manipulation in every possible way. Another thing he had observed with regard to the star-anise was that it was not so attractive to rats and mice as the oil of *Pimpinella Anisum.* Another preparation was spirit of aniseed, which was a very weak spirit, sweetened with sugar; its only use, he believed, being as a cordial for infants. He had never found spermaceti as an adulterant in any specimen of the oil he had examined. There were two very simple tests for this oil, viz., if it were entirely volatilized by heat, and if it were perfectly soluble in rectified spirit; if it answered these two tests there was not much to find fault with. There had been a material alteration in the formula for the tinct. camph. co. in the British Pharmacopœia. The tinct. opii in the British Pharmacopœia was about 9 per cent. weaker, and the tinct. camph. co. about 11 per cent. stronger in opium than those of the London Pharmacopœia, and therefore his practice of using an ounce of tinct. opii to make the tinct. camph. co. of the London Pharmacopœia would not answer for the British Pharmacopœia. It required a rather more complicated calculation to arrive at the exact proportion.

The PRESIDENT proposed a vote of thanks to Mr. Bland for his paper, which was carried unanimously, and the meeting adjourned to December 6.

Parliamentary and Law Proceedings.

PROSECUTION UNDER THE 17TH SECTION OF THE PHARMACY ACT.

On Wednesday last, at the Lambeth Police Court, Sidney Joshua Marsh, oilman, of Lambeth Walk, was summoned by Mr. Templeman, acting on behalf of the Chemists and Druggists' Trade Association, for unlawfully selling oxalic acid, the same not being labelled with the name of the article or the word "poison," together with the name and address of the seller.

Mr. Glaisyer prosecuted for the Association, and Mr. Mayo defended.

Evidence was given to the effect that Mr. Templeman went into the shop and asked for some oxalic acid, and was served with some in a bottle on which there was no label.

In cross-examination by Mr. Mayo, the complainant said he was asked by the defendant what he wanted the oxalic acid for, and he told him to clean some brass-work. He (complainant) was obliged to tell an untruth in order to detect the defendant. The defendant at first declined to serve him at all.

Mr. Mayo, in defence, said there was a deal of epsom salts in the stuff sold by the defendant, and what he had done was in ignorance of the law. He urged also that if there were to be a conviction his worship should make the penalty as low as possible.

Mr. Saunders said it was a clear case, and if ignorance of the law was put forward, he had only to say that parties in whatever business they entered upon were bound to know what was the law appertaining to such business.

Mr. Glaisyer referred his worship to the section of the Act of Parliament showing that the defendant really had no right to sell the poison at all.

Mr. Saunders ordered the defendant to pay a fine of 40*s*., together with 23*s*. costs.—*Standard.*

POISONING BY LAUDANUM.

An inquest was held on Monday, October 30, at Mexborough, on an infant named Henry Harrys, son of a miner. The mother of the deceased left the child in charge of her daughter, aged eleven, and, as it was cross, professedly to quiet it a neighbour gave it five drops of laudanum in some sugar and water. The child lingered in an unconscious state until the next morning, when it died. The medical evidence went to prove that deceased died from the effects of narcotic poisoning.

Mrs. Tomlinson admitted giving the laudanum to the child, but protested that she had no evil intention.

Evidence was also given to the effect that the prisoner was under the influence of drink when she administered the laudanum.

The Jury, after a brief consultation, returned a verdict of manslaughter against the prisoner, who was committed to take her trial at the assizes.—*Leeds Express.*

Obituary.

ALFRED ALLCHIN.

It is with very great regret that we record the death, on Wednesday morning last, of Mr. Alfred Allchin, of England House, Primrose Hill Road, since British pharmacy loses in him one who has served it well and faithfully during a long series of years, and many pharmacists lose a kind-hearted and genial friend. Mr. Allchin was born at East Malling, Kent, on February 28, 1824, and was the youngest son of Mr. W. H. Allchin, surgeon, of that place. He was apprenticed to Mr. Stedman, of West Malling, and subsequently lived with Mr. Poole, of Queen Square, Brighton, and Messrs. Keating, of St. Paul's Churchyard. In the session for 1845–6 he entered the School of Pharmacy, in Bloomsbury Square, where he took the first certificate in pharmacy, and in the ensuing session received the appointment of demonstrator in practical chemistry. In 1848 Mr. Allchin went into business on his own account in the Richmond Road, Barnsbury, where he remained until 1872, when he removed to Primrose Hill Road.

In June, 1870, Mr. Allchin was appointed a member of the Board of Examiners, and he fulfilled the duties of the office up to within a short interval of his death. In the earlier part of his career he occasionally read a paper at an Evening Meeting of the Society, and some of these papers,—as, for instance, one on "Aquaria for the Preservation of Leeches," and another on the "Preparation of Smelling Salts,"—were of considerable practical value. He also communicated a paper on "Infusions" to the present series of this Journal.

Mr. Allchin had been suffering more or less for some time past from the disease to which eventually he succumbed. At the time of the recent meeting of the British Pharmaceutical Conference he was staying for his health in the neighbourhood of the New Forest, and he availed himself of the opportunity to be present. But many of his old friends who saw him there were grieved to mark the change that had already become evident in him, and which was so soon to result in death.

Notice has also been received of the death of the following:—

On the 23rd of September, Mr. Thomas Gardner, Chemist and Druggist, Queen Street, Morecambe. Aged 37 years. Mr. Gardner had been a Member of the Pharmaceutical Society since 1876.

On the 10th of October, Mr. Herbert Inglis, Chemist and Druggist, Every Street, Manchester. Aged 42 years.

On the 20th of October, Mr. John Sweet Cape, Chemist and Druggist, High Street, Exeter. Aged 41 years. Mr. Cape had been an Associate in Business of the Pharmaceutical Society since 1869.

On the 20th of October, Mr. Robert Richmond, Pharmaceutical Chemist, Leighton Buzzard. Aged 67 years. Mr. Richmond had been a Member of the Pharmaceutical Society since 1842.

On the 23rd of October, Mr. Morgan Thomas, Chemist and Druggist, Taff's Well, near Cardiff. Aged 42 years.

Correspondence.

Commercial Nitrate of Silver.

Sir,—With reference to Mr. Woodland's note on nitrate of silver, published in the last number of the *Pharmaceutical Journal*, I may say that I received a small sample of nitrate of silver from my friend Mr. Greenwood of Liverpool, but understanding it had been purchased from an itinerant photographer—whatever that may mean—I took no further notice of the matter.

Had Mr. Woodland stated in his paper, read at the meeting of the British Pharmaceutical Conference at Southampton, that he had purchased pure samples of nitrate of silver from respectable houses (both wholesale and retail), but samples he had purchased from "itinerant photographers" were impure and adulterated with nitrate of potash, I do not think any of the members present would have expressed much surprise; but the tenor of the paper was rather to throw discredit upon a large and respectable body of men who make it their business to supply photographic and other chemicals. This led me and others to protest against such an inference.

I must say I was not previously aware that nitrate of silver was sold by itinerant photographers, and think the propriety of purchasing the article from such a source, even if obtained in a pure and unadulterated state, very questionable.

London. John Williams.

A Correction.

Sir,—I am much obliged to Mr. Woodland for his courtesy in furnishing his data and elucidating his method of calculation in taking the percentage of morphia in extractum opii liquidum, B.P. I am, however, compelled to take exception to one of his fundamental statements. He says that "one fluid ounce of the liquid extract, specific gravity ·972, will weigh 450 grains." According to this statement it would appear that the weight of a fluid ounce of distilled water is 462·96 grains, but I regret to be under the necessity of informing Mr. Woodland that it is 437·5 grains. I had really hoped that in these days this elementary fact was known to every tyro in pharmacy.

With regard to nitrate of silver, I leave your readers to judge of the wisdom of making general assertions as to its purity or otherwise, from analyses of samples obtained from peripatetic photographers.

St. Thomas's Hospital. Sidney Plowman.

Sir,—Mr. Woodland will, I trust, forgive me if I point out a slight inaccuracy which has crept into his calculations published in the Journal last week.

One fluid ounce of liquid extract of opium having the sp. gr. ·972, would weight $437·5 \times ·972 = 425·25$ grains, not 450 as stated. From this it follows that the standard morphia percentage, calculated from the data given, is ·61 (instead of ·58) by weight.

W. Pickard.

⁂ [A communication to the same effect has also been received, bearing the signature "Specific Gravity."]

J. G. K.—(1) Taylor in his work 'On Poisons' quotes a case, reported by Löbel, of Jena, of a lunatic who died from a dose of one-eighth of a grain of phosphorus. (2) The amount of resin present in a sample would be a good indication of its quality.

Inquirer.—Dr. Symes has pointed out that lemon juice may be preserved unaltered for a long time by heating it to a temperature of 150° F., and excluding it from air at that temperature, provided that the operation be performed in the winter.

J. H.—Apply to the Secretaries of the Societies.

"*Vivisection.*"—(1) The certificate would have to be laid before the Board and accepted, and your name placed upon the Register of Apprentices, before you could enter for the Minor examination. (2) We do not know the address.

C. Jones.—Your letter could not be published without casting an unjust reflection upon those pharmacists in the district who have complied with the law.

Communications, Letters, etc., have been received from Messrs. Keyworth, Knight, Crook, Rimmington, Williams, Pickard, Henry, Maitland, Drew, Hollingworth, White, Parrott, Medicus, J. H.

THE JAPANESE PEPPERMINT PLANT.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society of Great Britain.

When examining some leaves of this plant, presented, together with a series of Japanese drugs, to the Museum of the Pharmaceutical Society, by Messrs. Christy and Co., in 1879, I thought it desirable to compare them with those of the plant which is stated to yield the Chinese oil of peppermint. Through the courtesy of the keeper of the Kew Herbarium, I was permitted to taste a fragment of a leaf of the Chinese plant and of one of Blume's specimen of *M. arvensis*, L., var. *Javanica*, the plant to which this peppermint is referred in 'Pharmacographia.' To my surprise I found that neither Blume's specimen nor any others of the same plant from various localities had the taste of peppermint, but possessed a flavour similar to that of the garden mint (*M. viridis*). Judging that the Japanese plant could not belong to *M. arvensis*, var. *Javanica*, I referred to the Japanese work 'Zo Mokou Zoussetz,' in which the Japanese peppermint plant is stated to be *Mentha arvensis*, var. *vulgaris*, Benth. On tasting the type specimen of this plant at Kew, I found that this also did not possess the taste of peppermint, but only that peculiar to European specimens of *M. arvensis.* I therefore wrote to China and Japan for specimens of the peppermint plants of those countries. After the lapse of more than a year, Mr. C. Ford, the director of the Botanical Gardens at Hong Kong, was able to procure a flowering specimen of the Chinese plant for me, but no specimens of the Japanese plant could be procured by my correspondents. Mr. T. Christy, however, after having first obtained seeds of the plant, attempted to grow them, without success, but was ultimately, and after considerable difficulty, able to procure from Japan living plants which flowered this year in his garden at Sydenham, and a specimen of the plant was exhibited for the first time, I believe, in this country, at the meeting of the Pharmaceutical Conference, at Southampton. On careful examination, both the Chinese and Japanese plants thus obtained were found to possess the botanical characters of *Mentha arvensis*, as defined in De Candolle's 'Prodromus;' the leaves being stalked, ovate lanceolate, and the hairs on the stems and pedicels reflexed, those of the calyx being erecto-patent, and those of the upper surface of the leaf appressed, the calyx being bell-shaped with acute lanceolate or narrowly-triangular teeth. The Chinese plant differs from the Japanese one in the leaves being narrower in proportion to their length and in the calyx teeth being shorter and more broadly triangular. In outline, the leaves of both plants taper more to the base and have a longer petiole than the English forms of *M. arvensis*, coming very near to *M. canadensis* in this feature. The latter plant, however, has spreading hairs on the stem. The Chinese plant appeared to so nearly resemble *M. canadensis*, var. *glabrata*, that I applied to Professor Asa Gray for specimens of that species for comparison. The specimens of *M. canadensis* which he kindly forwarded to me were derived from different localities in the United States, and varied considerably in taste and appearance, some having the flavour of pennyroyal, others that of *M. viridis*, and others again that of peppermint, in a feeble degree. The specimen having a peppermint flavour is labelled *M. canadensis*, var. *glabrata*; it has reflexed hairs on the stem and differs from the typical plant in having more triangular and shorter calyx teeth, which, as well as the petioles, have erect hairs; in fact, it appears in every respect to be the same plant as that grown at Canton. It is not surprising, however, to find Japanese or Chinese plants extending to North America.

It appears, then, that there are two plants possessing a widely different taste and both referred to *M. arvensis*, var. *Javanica*, by botanists. This might lead to confusion if the Chinese or Japanese peppermint plants ever came into demand for purposes of cultivation, unless a special name be given to the form which possesses the peppermint flavour, even although it does not possess characters sufficiently definite to separate it from *M. arvensis*. The mints are well known to form an uninterrupted series of plants which it is difficult to separate into species. Deeming it advisable, therefore, before giving it a name, to consult those botanists who have critically studied the mints, specimens of the Japanese peppermint plant were forwarded to several authorities on the genus, and the following opinions have been expressed:—Mr. J. G. Baker, of the Kew Herbarium, considers it to be a form of *Mentha sativa*, Sm. (It may be here remarked that this form, as recognized by Hooker and Babington in their 'British Floras,' is a species differing from *M. arvensis* in the smaller upper leaves and longer calyx teeth, while De Candolle includes it under *M. arvensis.*) Professor Baillon, of Paris, expresses the opinion that it must be referred to *M. arvensis*, var. *Javanica*, unless it be a hybrid between *M. arvensis* and *M. piperita*. Dr. Garcke, of Berlin, finds the plant to be nearly allied to *Mentha canadensis*, D.C., and also to *M. aquatica*, var. *subspicata*, D.C. Dr. Franchet, one of the authors of the most recent 'Flora' of Japan, believes the Japanese plant to be "a form of *M. arvensis*, characterized by the acuminate calycine segments, a feature which constantly occurs in specimens from Eastern Asia." He adds, "After carefully comparing your specimen and having vainly sought an analogous taste in the different forms of the *M. arvensis* of Europe, I have found in them only an insipid and herbaceous flavour; I can say the same of *M. arvensis* from the neighbourhoods of Pekin and Chefu, in the province of Shantung, and from the neighbourhood of the lake Sitau, in the province of Sche-kiuny; but I find the taste of peppermint developed in a very high degree in a specimen gathered at Voosung, near Shanghai. From Japan I possess specimens of *M. arvensis* gathered in very many localities and I have found the taste of peppermint in all my specimens, without exception. This taste is absolutely the same as that furnished by your plant. I remark, however, that the taste is more pronounced in proportion as the plants are more robust; puny specimens with small leaves from Kanasawa (in Nipphon) possess it only in a feeble degree." He thinks that the peppermint flavour is not the result of hybridity, since no other species has hitherto been observed in Japan, either in a cultivated or wild state, except *M. crispa* ('So Mokou Zoussetz,' xi., pl. 29) (which no botanist, that he is aware of, has ever brought back from that country), and *M. gentilis*, which is well delineated under the name of *M. arvensis* on the same page as *M. piperita*, after information probably furnished by the Dutch. M. Malinvaud remarks that the name *piperita* cannot be appropriated to the Japanese plant, as it is already applied to a form of *M. arvensis* with flower spikes. He therefore suggests the name *Mentha arvensis*, var. *piperascens*.

The weight of opinion is therefore on the side of considering the Japanese plant as a form of *Mentha arvensis*, D.C. If *M. sativa*, Lin., and *M. arvensis*, as defined by Babington, as well as *M. Javanica*, D.C., are to be considered as forms of one species, then the Japanese plant might, I think, also rank as a form under the name of *M. arvensis f. piperascens*, differing from *M. arvensis* as described by Babington in having the calyx teeth longer than broad, and in the upper leaves being gradually smaller; from *M. sativa*, in the leaves having longer stalks and tapering below; from *M. Javanica*, in the uppermost leaves being more than twice (usually six or eight times) as long as the verticillasters, and in the veins being hairy on the under surface of the leaf whilst those on the calyx are erecto-patent; and from *M. canadensis*, in the reflexed pubescence of the stems.

With respect to the Chinese peppermint plant, it so exactly agrees with the specimen of *Mentha canadensis*, var. *glabrata*, furnished to me by Dr. A. Gray, that if the latter be a typical specimen* I can only consider that it should be referred to *M. arvensis*, under the name of *M. arvensis*, var. *glabrata*.

Dr. Gray's specimen has the calyx teeth much shorter than those of the typical *M. canadensis* sent at the same time, and the hairs on the stem and pedicels are reflexed, while those of the calyx tube are erecto-patent.

There are some other points in connection with peppermint which are extremely suggestive, and to which I desire to call the attention of those who have greater ability and more time for investigation than myself.

A number of varieties and forms of so-called species possess the same odour and flavour, as shown in the following list:—

Mentha piperita, *Mentha arvensis*, var. *piperascens*, *M. canadensis*, var. *glabrata* (!), and *M. incana* (!), cultivated near Bombay for producing peppermint oil (Dymock).

Spearmint, *Mentha viridis*, L., *Mentha sylvestris* (!), *rotundifolia* (!), *sylvestris* (!), *canadensis* (!),† *M. arvensis*, var.

The questions then arise:—

1st. Do the oils of these species differ among themselves, as has been shown to be the case with those of *M. piperita* and *M. arvensis*, var. *piperascens*?‡

2nd. If so, is this difference dependent on degree of development, on climate, soil§ or sex?

3rd. Is the oil in each case a mixture, in which one ingredient is present in variable quantity in the different plants?

4th. Do the oils of spearmint and peppermint bear any chemical relation to each other?

5th. Which species, containing an oil of peppermint, yields the largest quantity and which the most valuable one for medicinal purposes?

To recapitulate: The writer would recommend that for convenience the name of *Mentha arvensis f. piperascens* should be retained for the Japanese peppermint plant and that of *Mentha arvensis f. glabrata* for the Chinese one.

* Dr. Franchet notes, in his 'Flore du Japon,' the reflexed leaves in some specimens of *M. canadensis*.

† Those marked (!) have been tasted by myself.—E. M. Holmes.

‡ *Pharm. Journ* (3), ii., p. 321.

§ Mr. J. Lloyd found a variety of *M. aquatica* possessing a lemon odour on *calcareous* soil near the sea, and M. Malinvaud a specimen of *M. arvensis* with a lemon odour in a ditch near Ivry, where other plants of the same species possessed only the usual odour of the plant.—*Bull. Soc. Bot.*, 1881, p. 370,

RESEARCHES UPON THE JALAPS.*

BY A. BOURIEZ.

In commercial specimens of any kind of true jalap (tuberous, fusiform, or Tampico) several varieties of tubercules can be distinguished by their external characters. Those which constitute the greater part of the jalap, and which I designate under the name of "typical tubercules," always present at one of their extremities (the upper) the remains of aerial organs. Sometimes they terminate in a point at both their extremities; sometimes one of the extremities only becomes slender, whilst the other presents a large surface of insertion. There are met with, besides, tubercules inserted on other tubercules, and very small fragments [*grabeaux*] showing tubercules inserted upon an organ which is most frequently slender and cylindrical, but sometimes fusiform and more or less swollen. The question presented itself to me, whether these tubercules of the different varieties answered to variations in appearance of one and the same organ, or whether they represented organs of a different morphological nature.

An examination with the naked eye, and aided by a glass, of transverse sections made at different points of these tubercules, yielded me some useful information, but not sufficient to answer the question with certainty. I then submitted the same sections to a microscopical examination.

As a basis for this micrographic study I selected a typical tubercule of the tuberous or official jalap.

A transverse section made at the lower extremity of the tubercule enabled me to conclude that the organ there presents the structure of a root. Towards the centre of the section there were observed four primary woody layers, symmetrical around the centre, and convergent in pairs. Each of these layers is formed of some spiral vessels, the most slender of which are nearest the exterior, the largest being nearest the centre. The differentiation has therefore proceeded in each of these primary ligneous layers from the centre of development (indicated by the most slender spiral vessels) towards the centre of the organ. It may thence be concluded that the centre of the organ is occupied by a single tetracentral primary bundle, the centre of which coincides with the centre of the organ, and it may be inferred from this conclusion that the organ, at this stage, is a root.

Among the histological details presented by this root, I will refer here only to the formation of the elements of the liber. Among the young cells with tangential divisions belonging to the cambial zone, the most external present very early longitudinal septa, which subdivide them into a number of narrow elongated cells, such as are seen in the Asclepiadaceæ, Apocynaceæ, Solanaceæ and Acanthaceæ. The transverse septum which separates two superposed cells is reabsorbed, following the meshes of the tissue, and in this way are originated the per-

* From the *Journal de Pharmacie*, [5], vi., 329.

-forated plates of cells characteristic of the liber. The elements of the cambial zone which do not present these septa make up the liber parenchyma, in the midst of which occur numerous resiniferous cells and glands containing crystals.

The resin-cells would appear to be parenchymatous elements, hypertrophied and gorged with resin. Generally they are superposed end to end, so as to form rather long vertical rows; but in no case have I observed the reabsorption of the wall common to two successive cells. There is therefore no formation of a canal, and I look upon these resin cells as unicellular glands distributed in the mass of the liber.

The crystal-bearing glands consist of parenchymatous cells, subdivided into as many compartments as they contain groups of crystals. These groups are sphæraphides of oxalate of lime. A radial section, treated with a mineral acid which dissolves the oxalate of lime, shows readily the subdivision of these glands.

I will now briefly sketch the structure of the part of the tubercule comprised between the lower extremity and the point which corresponds to the maximum volume of the organ, setting forth the mechanism of the formation of the tuber.

In sections which follow those which presented the structure of a well-characterized root, there is observed, in proportion as they rise towards the central part of the tuber, the interposition, among the hardened and characteristic elements of the root, of a parenchymatous tissue, supplied at first solely by the cambial zone. The interposition of this tissue, which I will call the "muriform parenchyma," results in separating the woody layers from each other, and quickly interfering with the primitive symmetry of the organ. The spiral layers, carried away and twisted in every direction by the secondary ligneous lobes, quickly disappears, so that at a very short distance from the lower extremity of the tubercule it is already impossible to recognize them.

Higher up the muriform parenchyma which surrounds the indurated ligneous masses splits up parallel to the surface of these masses, and thus originate true secondary generating zones, which produce, on the side of the wood, some rows of muriform parenchyma, and, on the other side, secondary liber, with numerous glands containing resinous and crystalline matter.

In the most swollen parts are seen important layers of muriform parenchyma, divided tangentially in every direction, and furnishing, at the same time, liber products on the one side and parenchymatous elements on the other. All the parenchymatous cells are gorged with starch, and the tubercule constitutes an important alimentary reserve for the plant.

In studying the upper portion of the tubercule I have followed the reverse order, and starting from the upper extremity descended towards the centre.

The transverse section made at the top extremity of the tubercule shows that the organ, at this point, has the structure of a stem. The primary ligneous mass forms, in fact, an annular zone around the centre of the organ, but at a certain distance from the centre. It is formed of radiating layers grouped in badly defined bundles. Each layer of primary wood comprises three or four contiguous spiral vessels disposed radially, the most slender being inside. The differentiation of the primary ligneous elements, therefore, has proceeded from the centre of the development (indicated by the most slender spiral vessel) in a direction which passes by the centre of the organ, but which leaves the centre of development between the centre of the organ and the ligneous layer. The centre of the organ presents, therefore, a central crown of bundles with centrifugal differentiation. From this it may be concluded that the organ at this level is a stem.

Moreover, at the top of the cicatrices, to which I have referred before, is observed the issue of four bundles, in two opposite appendages on each side. At the axil of each of these appendages a bud that is frequently developed is placed between the two bundles in relation with the bundles of the stem. In the interval comprised between the point of issue of the appendages and the swollen middle portion of the tubercule occurs the extinction of the primary ligneous layers of the stem. The organ becomes tuberized in this region by the same process as in the inferior portion.

The extinction of the primary ligneous layers of the stem shows that there is here a lower termination of the principal stem. Therefore, the stem which forms the upper portion of the typical tubercules of jalap is a principal stem, its inferior appendages are cotyledons, and their axillary buds correspond to creeping branches.

The secondary elements of the stem are in direct continuation with the secondary elements of the root; from this it follows that the root which forms the lower end of the tubercule below is the principal root. The part comprised between the points where the cotyledons issue and the point of insertion of the principal root corresponds therefore to the hypocotyledonous axis.

This investigation allows of the conclusion that the typical tubercules of jalap represent the stock of the convolvulaceous plants which produce them, and that the tuberized portion corresponds to hypertrophy: (*a*) of the base of the principal stem; (*b*) of the hypocotyledonous base; (*c*) of the region of insertion of the principal root upon the hypocotyledonous axis; and (*d*) of the upper part of the principal root.

I have studied in the same manner the various tubercules of jalap that never present the remains of aerial organs at one of their extremities, and I have in this way recognized that—

(1) Most of the varieties of tubercules represent tuberized roots of different orders;

(2) Some tubercules represent subterranean stems, which, having to play the same physiological *rôle* as the radical tubercules, are tuberized by the same process and present a nearly identical structure.

Finally, comparison of the three commercial kinds has shown me, that in respect of structure there is no difference, however slight, between the different kinds of true jalap.

From the materia medica point of view, the jalaps are therefore principally formed of tubercules which correspond to the stocks of the convolvulaceous plants that produce them; they include, besides, a certain number of tubercules which represent tuberized roots of different orders; lastly, tubercules are met with derived from tuberized subterraneous stems.

I will now add some pharmaceutical observations upon jalap and the resin extracted from it.

In none of the published analyses of jalap is mention made of oxalate of lime, but a microscopic examination and microchemic tests detect it in considerable proportion in the tubercules.

I am unable to accept the opinion of M. Andouard, according to which the small roots of jalap would be generally more rich in resin than the large tubercules from the same plant. This does not agree with what is revealed by the microscopic investigation, and, moreover, is not in accord with the amounts found by M. Guibourt. Would not M. Andouard consider as "small roots" the slightly tuberized fragments which are met with in the *débris*, which are derived from subterranean stems and which in fact contain much resin?

With the object of adding something new to the results already known, I have extracted the resin, by the Codex process, from nine specimens of jalap. In order to utilize the products of the aqueous macerations involved in this process, I prepared extracts evaporated in a water-bath to a pilular consistence, of which I have given the yield.

	Resin dried at 100°. Per cent.	Aqueous Extract. Per cent.
I. TYPE SPECIMENS OF JALAP. Supplied by the *Pharmacie Centrale.*		
Tuberous or Official Jalap	12·5	38
Light Jalap (small specimens)	2·0	35
Digitate Major Jalap	7·0	12
Digitate Minor Jalap	9·0	11·5
II. PICKED COMMERCIAL JALAP.		
No. 1	12·5	35
No. 2	10·5	33
No. 3	7·5	23
No. 4	8·0	17
III. DÉBRIS	8·5	27

It follows from the investigations of different authors that jalap owes its purgative properties to two homologous resinous glucosides, convolvulin and jalapin. I have, however, nowhere met with mention of clinical experiments made with the pure glucosides. Might there not be, if not an alkaloid, as alleged by Hume, at least a principle other than the resinous glucosides, and which has hitherto escaped analysis? If the opinion of Le Maout and Decaisne is to be accepted (*Traité général de Botanique*) the resin of the Convolvulaceæ owes its purgative properties only to the aroma which accompanies it, for the rhizomes lose them when powdered and exposed for a long time to the air, although they preserve the purely resinous principle. The odorous oleaginous substance which floats at the top towards the end of the distillation, when nearly all the alcohol is removed from the tincture of jalap from which it is desired to extract the resin, would deserve attention from this point of view.

When jalap resin is prepared by the Codex process, and, in following the mode of operation prescribed, the residue from the distillation of the alcoholic liquor is poured into boiling water, the resin precipitated agglomerates under the form of a thick turpentine, which adheres strongly to the sides of the vessel and can only be collected completely with great difficulty. I have found that if, on the contrary, the residue from the distillation be poured into well-cooled water, the precipitated resin will remain on the sides of the vessel in a very divided form; the resinous particles are separated one from another by drops of water, and it is very easy to collect the product with the aid of a flexible spatula. Upon placing all the resin together in a small capsule the water gradually floats to the top whilst the resinous particles agglutinate.

Finally, I have compared, in respect to yield, the Codex process, which gives an odorous greenish-brown resin, and M. Nativelle's process, which gives an inodorous resin, as white as starch. The following are the results I have obtained:—

	Codex process. Resin.	Codex process. Extract.	Nativelle's process. Resin.	Nativelle's process. Extract.
No. 1	7	11·5	3·0	9·0
No. 2	12·5	33·0	6·0	27·0
No. 3	7·5	23·0	3·3	17·0

This enormous difference in the yield of resin is due to the use of 65° alcohol, as recommended by M. Nativelle, which does not dissolve all the resin removed by 90° alcohol, as ordered in the Codex.

It is worthy of notice that more aqueous extract was obtained in evaporating the products of the macerations yielded by the Codex process than in evaporating the products of the decoctions necessitated in following the process of M. Nativelle.

REPORT UPON THE CREASOTE IMPURITIES OCCURRING IN THE AMERICAN MARKET.*

BY PROFESSOR P. W. BEDFORD.

The object of this query can be but one, namely: to inquire whether the wood creasote offered for sale is a pure article, or not; and if not, what is the impurity present?

The relative commercial value of the articles sold as coal tar creasote and wood creasote disposes of the question as to the latter being present in the former article, and we are quite certain that the cheap variety is nothing more or less than a phenol or carbolic acid. Wood creasote, it has been frequently stated, is adulterated with coal tar creasote, or phenol. The object of my experiments has been to prove the identity of wood creasote, and its freedom from phenol. The following tests are laid down in various works as conclusive evidence of its purity, and each has been fully tried with the several samples of wood creasote to prove their identity and purity, and also with phenol, sold as commercial creasote or coal tar creasote, and for comparison with mixtures of the two, that even small percentages of admixture might be identified should such exist in the wood creasote of the market.

The following tests were used:—

1. Equal volumes of anhydrous glycerine and wood creasote make a turbid mixture, separating on standing. *Phenol dissolves.* If three volumes of water be added, the separation of the wood creasote is immediate. *Phenol remains in permanent solution.*

2. One volume of wood creasote added to 2 volumes of glycerine: the former is not dissolved, but separates on standing. *Phenol dissolves.*

3. Three parts of a mixture containing 75 per cent. of glycerine and 25 of water to 1 part of wood creasote shows no increase of volume of glycerine, and wood creasote separates. *Phenol dissolves and forms a clear mixture.* Were any phenol present in the wood creasote, the increase in the volume of the glycerine solution, if in a graduated tube, would distinctly indicate the percentage of phenol present.

4. Solubility in benzine. Wood creasote entirely soluble. *Phenol is insoluble.*

5. A 1 per cent. solution of wood creasote. Take of this 10 cubic centimetres, add 1 drop of a test solution of ferric chloride; an evanescent blue colour is formed passing quickly into a red colour. *Phenol gives a permanent blue colour.*

6. Collodion or albumen with an equal bulk of wood

* Read at the meeting of the American Pharmaceutical Association held at Niagara Falls, 1882.

creasote makes a perfect mixture without coagulation. *Phenol at once coagulates into a more or less firm mass or clot.*

7. Bromine solution with wood creasote gives a reddish brown precipitate. *Phenol gives a white precipitate.*

All tests enumerated above were repeatedly tried with four samples of wood creasote sold as such; one a sample of Morson's, one of Merck's, one evidently of German origin, but bearing the label and capsule of an American manufacturer, and one of unknown origin, but sold as beechwood creasote, German, and each proved to be *pure wood creasote.*

Two samples of commercial creasote which, from the low cost were known to be of coal tar origin, gave the negative tests, showing that they were phenol.

Corroborative experiments were made by mixing 10 to 20 per cent. of phenol with samples of the beechwood creasote, but in every case, each of the tests named showed the presence of the phenol.

The writer on other occasions applied single tests (the collodion test) to samples of beechwood creasote that he had an opportunity of procuring small specimens of, and satisfied himself that they were pure. The conclusion is that the wood creasote of the market of the present time is in abundant supply, is of unexceptionable quality, and reasonable in price, so that there is no excuse for the substitution of the phenol commonly sold for it. When it is directed for use for internal administration (the medicinal effect being entirely dissimilar) wood creasote only should be dispensed.

The general sales of creasote by the pharmacist are in small quantities as a toothache remedy, and phenol has the power of coagulating albumen which effectually relieves the suffering. Wood creasote does not coagulate albumen, and is, therefore, not as serviceable. This is, perhaps, the reason that it has become, in a great measure, supplanted in general sale by the coal tar creasote, to say nothing of the argument of a lower cost.

FERRATED ALBUMEN.*

BY GEORGE BUCHNER, OF MUNICH.

From the author's investigations and observations on compounds of ferric chloride with albumen we make the following abstracts:—

The amount of chloride in egg albumen was determined by ignition with sodium carbonate and titration with nitrate of silver; 1·6 per cent. Cl was found. The chlorine of the compound was determined in the same manner, deducting the chlorine of the albumen. The iron was estimated by ignition, dissolving in hydrochloric acid, reduction to ferrous salt by zinc, and titration by potassium permanganate.

1. Solution of ferric chloride (1 : 20) was added to a filtered solution of albumen (1 : 10) until the voluminous yellowish-brown precipitate was just dissolved. In the clear red-brown liquid albumen as well as ferric chloride responded to the usual reagents. On evaporating this liquid at a temperature not exceeding 50° C. and drying the gelatinous mass at the same temperature, a dark-brown powder or transparent brown-red scales were obtained, only partly soluble in water, the insoluble portion becoming transparent and gelatinous. Analysis: Fe 2·193, Cl 7·980, albumen 89·827 = Fe_2Cl_6 6·354, excess of Cl 3·819.

2. The preceding product was thoroughly washed with water and the residue dried at 50° C. Analysis: Fe 1·488, Cl 2·700, albumen 95·812 = 4·119 Fe_2Cl_6, excess of iron as $Fe_2(OH)_6$ 0·131.

3. On slowly evaporating the original ferrated albumen solution the liquid becomes turbid, separating a thick jelly, which is soluble in warm water, yielding a clear solution which is not precipitated by boiling. The jelly well drained, pressed and thoroughly dried over sulphuric acid, yielded Fe 0·998, Cl 4·531, albumen 94·471 = Fe_2Cl_6 2·895, excess of Cl 2·634. The powder was completely soluble in water and the solution was not disturbed by boiling or by alkalies; acids caused a precipitate of albumen, while sodium chloride and potassium sulphocyanide precipitated ferrated albumen.

4. The original ferrated albumen solution was completely precipitated by a saturated solution of table salt; the precipitate was collected upon a filter, drained, pressed, the press cake rapidly washed by agitation with water and decantation, again pressed between bibulous paper and dried over sulphuric acid. The powder swells with water, and dissolves after some time to a solution which is not disturbed by silver nitrate, but is precipitated by potassium sulphocyanide; its composition is Fe 1·703, Cl 1·680, albumen 96·617 = Fe_2Cl_6 2·563, excess of iron as $Fe_2(OH)_6$ 1·566.

5. The original solution of ferrated albumen was mixed with excess of ferric chloride and precipitated by table salt; treated as before, the powder contained Fe 1·15, Cl 1·78, albumen 97·07 = Fe_2Cl_6 2·175, excess of iron as $Fe_2(OH)_6$ 0·41. It behaved to reagents like the preceding. Both, if left in prolonged contact with water while being washed, become transparent, gelatinous and then dissolve.

6. The original solution yields with excess of ferric chloride, on standing, a precipitate which, treated as before, gave a powder containing Fe 1·25, Cl 4·48, albumen 94·27 = Fe_2Cl_6 3·627, excess of Cl 2·103.

7. The original ferrated albumen solution was dialysed, the water being renewed until silver nitrate ceased to give a reaction. The contents of the dialyser had a neutral reaction and could be readily filtered. The liquid was not disturbed by boiling, by alcohol, caustic alkalies, carbonic acid gas, or silver nitrate. It was coloured violet-blue by tannin, and green, without precipitate, by ammonium sulphydrate. Nitric and hydrochloric acid caused a precipitate of albumen, the solution being yellow; lime-water a brownish-yellow precipitate; potassium ferrocyanide a bluish-green precipitate, turning dark-blue on the addition of hydrochloric acid; potassium ferridcyanide a green precipitate not altered by hydrochloric acid; potassium sulphocyanide a yellowish-brown precipitate, the solution becoming deep red on the addition of hydrochloric acid; sodium chloride a light yellowish-brown precipitate.

The liquid, evaporated at a moderate heat, yielded brown-red, nearly tasteless scales, which retained their solubility in water, the solution on being kept for a year becoming slightly mouldy, but not putrid. The scales contained Fe 1·1715, Cl 0·510, albumen 97·775 = Fe_2Cl_6 0·778, excess of iron as $Fe_2(OH)_6$ 2·765.

It is obvious from the foregoing that these products are readily altered and cannot be of uniform composition unless obtained under precisely identical conditions of temperature, dilution, action of water, etc. It is remarkable that with the entrance of $Fe_2(OH)_6$ into the compound these products become soluble in water and non-coagulable by heat, properties which, together with the peculiar behaviour to reagents, are best observed in the dialysed product, and result from a relatively small amount of iron. The difficulties of studying the nature of such products are increased by the uncertainty of determining the water without altering the composition, and of ascertaining whether definite compounds or mixtures of such are under investigation.

The formation of iron-albuminates may be used for proving the presence of albumen. A very diluted solution of albumen, which is scarcely rendered opalescent by boiling, if mixed with a saturated solution of table salt, yields on the addition of a little ferric chloride, near the point of contact a yellowish-white zone, and on agitation, at first a dense turbidity, changing after a while to a rather voluminous precipitate.

* From the *Archiv d. Pharmacie*, June, 1882, pp. 417—425. Reprinted from the *American Journal of Pharmacy*, October, 1882.

On digesting iron in solution of albumen for a few days a yellowish-brown liquid is obtained, which on evaporation at a moderate heat yields light brownish-red scales, similar in behaviour to the dialysed ferrated albumen; in two cases 1·2 and 2 per cent. of iron was obtained. Freshly precipitated ferric hydroxide dissolves in albumen; the dry product contained 0·65 $Fe = 1·24\ Fe_2(OH)_6$. Ferrous hydroxide is very slightly soluble in albumen.

INFLUENCE OF PEPTONES AND CERTAIN INORGANIC SALTS ON THE DIASTATIC ACTION OF SALIVA.*

BY R. H. CHITTENDEN AND J. S. ELY.

(*Continued from page* 368.)

The increased diastatic action of the saliva in the presence of the peptones is made more plainly apparent by the following table, in which are given the percentage amounts of starch converted into sugar; calling the sugar $C_6H_{12}O_6$ and the starch $C_6H_{10}O_5$.

	Without peptones.	With peptones.
1.	41·01 per cent.	44·03 per cent.
2.	41·69 "	44·58 "
3.	41·88 "	47·83 "
4.	41·38 "	44·72 "
5.	39·13 "	42·89 "
6.	38·22 "	43·43 "

It is thus seen that the presence of 1 per cent. of peptones causes an increased conversion of starch into sugar, amounting on an average to 4 per cent.

Similar experiments made with glycogen yielded like results. Two grams of pure dried glycogen, prepared from *Pecten Irradians*,† were employed in each experiment, and the digestions continued for thirty minutes. One gram of peptones was used as before.

	Without peptones.		With peptones.	
	Wt. Cu in one-tenth. Gram.	Total amount of sugar. Gram.	Wt. Cu in one-tenth. Gram.	Total amount of sugar. Gram.
1.	0·1405	0·7297	0·1477	0·7671
2.	0·1286	0·6581	0·1386	0·7144
3.	0·1300	0·6653	0·1328	0·6771
4.	0·1281	0·6556	0·1306	0·6684

A few experiments were then tried, both with glycogen and starch, using 2 grams of peptones. Following are the results:—

	Without peptones. Wt. Cu in one-tenth.	With 1 grm. peptones. Wt. Cu in one-tenth.	With 2 grms. peptones. Wt. Cu in one-tenth.
Starch .	0·0835 gm.	0·0949 gm.	0·0960 gm.
Glycogen	0·1405 "	0·1477 "	0·1472 "
"	0·1286 "	0·1386 "	0·1429 "
"	0·1300 "	0·1328 "	0·1362 "

Here it is to be noticed that the presence of 2 per cent. of peptones has but little additional influence on the diastatic action. That peptones themselves were entirely free from carbohydrate matter and that the saliva is wholly without action on the peptones was clearly shown by digesting 2 grams of peptones with 25 c.c. of saliva. This experiment was repeated twice, but in neither case was any reduction obtained on boiling the diluted fluid with Fehling's solution. Again, the possibility suggested itself that the peptones might exercise some influence on the precipitation of the copper, and that the increase of copper obtained when peptones were present was due not to any stimulating action they might exert on the ferment, but to a precipitation or reduction of the copper. In order to settle this point three digestions were made in the usual manner with 2 grams of glycogen. No. 1 contained, in addition, 2 grams of peptones. No. 2 had added to it after the destruction of the ferment by boiling, 2 grams of peptones, while No. 3 served as a control.

* From the *American Chemical Journal.*

† Chittenden, *American Journal of Science and Arts*, x., 26.

A determination of the amount of sugar in the aliquoted fluids gave the following results, clearly showing that the mere presence of the peptones has no influence on the precipitation of the copper:—

No. 1.	No. 2.	No. 3.
Wt. Cu in one-tenth.	Wt. Cu in one-tenth.	Wt. Cu in one-tenth.
0·1472 gram.	0·1403 gram.	0·1405 gram.

There still remained two possible chances of error, viz., the possibility of the peptones containing a trace of a diastatic ferment, or of their possessing a diastatic action, and secondly, that the slightly acid reaction of the peptone solution might exert some modifying influence. The former supposition was easily disproved by making a digestion of starch and peptones alone. This led, as would naturally be expected, to a negative result; the solution showing no reducing action whatever. An endeavour was then made to obtain the same result in a somewhat different manner: a series of digestions was made, in which one of the peptone solutions was vigorously boiled before being added to the starch solution, the digestions then being made in the usual manner.

	Without peptones.	With 1 grm. peptones.	Peptone sol. boiled.	Peptone sol. boiled and water replaced.
	Wt. Cu in one-tenth. Gram.	Wt. Cu in one tenth. Gram.	Wt. Cu in one-tenth. Gram.	Wt. Cu in one-tenth. Gram.
No. 1.	0·0856	0·0937	0·0950	0·0952
No. 2.	0·0904	0·0977	0·1035	—

That the peptones contain no ferment is plainly apparent, but the slight increase of sugar when the peptone solution is boiled is certainly somewhat singular. Three of the peptones employed in these experiments gave, when dissolved in water, very faintly acid solutions. The acidity of 1 gram of peptones, however, was never sufficient to neutralize the alkali of 25 c.c. of saliva.* The fourth sample, which was purified by dialysis, gave a neutral solution, and this sample did not differ in its action in the least from the other three. An attempt was made, however, to neutralize one of the peptone solutions, previous to the digestion, by the use of an exceedingly dilute alkali. The following results were obtained:—

Without peptones.	With 1 grm. peptones.	With 1 grm. neutralized peptones.
Wt. Cu in one-tenth.	Wt. Cu in one-tenth.	Wt. Cu in one-tenth.
0·0915 grm.	0·1045 grm.	0·0991 grm.

The slight decrease of copper in the neutralized peptone, as later experiments would seem to indicate, is due probably to the retarding influence of the alkali salt formed by neutralization, although it seems hardly possible that such a minute trace could exert any influence whatever on the action of the saliva.

O. Nasse,† in his work on unformed ferments, found that in 4 per cent. solutions of certain inorganic salts there was an increased ferment action. It therefore seemed desirable to ascertain in the present case whether the inorganic salts contained in the peptones could exert any influence on the salivary ferment. The four samples of peptones contained the following percentages of ash:—

No. 1.	No. 2.	No. 3.	No. 4.
1·71 per cent.	0·89 per cent.	1·25 per cent.	1·58 per cent.

With the exception of No. 4 the ash was composed of sodium chloride, sodium phosphate, and calcium phosphate.

No. 4, which was prepared from coagulated albumin and purified by dialysis, left an ash composed wholly of calcium phosphate. The following results show the individual influence of the three inorganic salts on the dias-

* Neutral saliva appears to have as great a diastatic action as saliva of normal alkalinity. Thus while a digestion made with freshly collected alkaline saliva gave 0·0905 gram Cu, a portion of the same saliva neutralized gave 0·0943 gram Cu under the same conditions.

† *Untersuchungen über die ungeformten Fermenten*, Pflüger's *Archiv*, xi., 138.

tatic action of saliva when present in the digestive fluid in approximately such percentages as the peptones give when added to the starch and saliva mixture:—

First Experiment.

	Wt. Cu in one-tenth. Gram.
Saliva and starch alone	0·0872
" " + 0·012 grm. NaCl = 0·012 p. c.	0·0862
" " + 0·024 " " = 0·024 "	0·0925
" " + 0·012 " Na_2HPO_4 = 0·012 "	0·0886
" " + 0·024 " " = 0·024 "	0·0834

Second Experiment.

	Wt. Cu in one-tenth. Gram.
Saliva and starch alone	0·0844
" " + 0·015 grm. $CaHPO_4$ = 0·015 p. c.	0·0839
" " + 0·030 " " = 0·030 "	0·0870

From these results it is apparent that no one of the inorganic salts in the peptones is present in sufficient quantity to have any stimulating action whatever in aqueous solution, for increased diastatic action is noticed only in the presence of 24 milligrams of sodium chloride, an amount much larger than the total ash of 1 gram of peptones. Again, peptone No. 4, which was freed from all trace of chloride by dialysis, had exactly the same stimulating effect as the other samples.

In order to ascertain exactly what the influence of the *mixture* of inorganic salts, as present in the peptones, would be, a series of digestions was made, in two of which the ash of 1 gram and of 2 grams of peptones respectively was employed; the ash, as in the experiments with the peptones themselves, being dissolved in 50 c.c. of water, and in this manner added to the starch solution previous to the addition of the 25 c.c. of saliva. The peptones employed were the ones which contained 1·71 per cent. of ash; thus the digestive mixtures contained respectively 0·017 and 0·034 per cent. of inorganic matter. The following results were obtained:—

Saliva and starch alone. Wt. Cu in one-tenth.	With ash from 1 gram peptones. Wt. Cu in one-tenth.	With ash from 2 grams peptones. Wt. Cu in one-tenth.
0·0862 gram.	0·0851 gram.	0·0715 gram.

It is thus very apparent that the stimulating action of the peptones is not due to the inorganic salts contained in them, for these latter, as the foregoing experiment shows, have, by themselves, in aqueous solution, a retarding influence. We therefore deem it proven that peptones under such conditions as have already been described have in aqueous solution a stimulating influence on salivary digestion. In other words, peptones when present to the extent of 1·2 per cent. cause, under the same conditions as saliva alone, an increased conversion of starch into sugar, amounting on a average to 4 per cent.

Influence of Peptones in Acid Solution.

Previous experiments* have plainly demonstrated the extreme sensitiveness of the saliva to the action of dilute acids. Thus the addition of 50 c.c. of 0·05 per cent. hydrochloric acid to a digestive mixture, thereby making the fluid contain but 0·025 per cent. of acid, very greatly diminishes the diastatic action. This result has been recently verified by J. N. Langley,† as also the results of Chittenden and Griswold in regard to the destruction of the salivary ferment by gastric juice and by 0·2 per cent. hydrochloric acid at 40° C.

An attempt was now made to ascertain the influence of peptones in an acid solution of the above strength, viz., 0·025 per cent. The experiments were conducted in the same manner as the preceding, with this exception: the peptones, instead of being dissolved in water, were in each case dissolved in 50 c.c. of 0·05 per cent. hydrochloric acid. One gram of peptones was used in each experiment, starch being the amylaceous material employed.

	Saliva alone.		Saliva and acid.		Saliva, acid, and peptones.	
	Wt. Cu in one-tenth. Gram	Total amount of sugar. Gram	Wt. Cu in one-tenth. Gram	Total amount of sugar. Gram	Wt. Cu in one-tenth. Gram	Total amount of sugar. Gram
1.	0·0896	0·4557	0·0076	0·0389	0·1068	0·5428
2.	0·0911	0·4633	0·0079	0·0405	0·1070	0·5439
3.	0·0915	0·4654	0·0098	0·0502	0·1060	0·5388
4.	0·0835	0·4247	—	—	0·0985	0·5010

The percentage amounts of starch converted into sugar under the three conditions are as follows:—

	Saliva alone	Saliva and acid.	Saliva, acid, and peptones.
1.	41·01 per cent.	3·50 per cent.	48·85 per cent.
2.	41·69 "	3·64 "	48·95 "
3.	41·88 "	4·51 "	48·48 "
4.	38·22 "	—	45·09 "

Similar experiments were tried with glycogen, 2 grams of this substance being dissolved in 25 c.c. of water and employed in the same manner as the starch; 1 gram of peptones was used as before. The following results were obtained.—

	Saliva alone. Wt. Cu in one-tenth.	Saliva and acid Wt. Cu in one-tenth.	Saliva, acid, and peptones. Wt. Cu in one-tenth.
1.	0·1300 gram	0·0049 gram	0·1408 gram
2.	0·1281 "	trace	0·1424 "

It is thus seen that the presence of 1 gram of peptones exercises a very remarkable influence on the diastatic action of saliva in an acid solution of the above strength. The peptones are present in the digestive mixture to the extent of only 1 per cent., while the acid is but 0·025 per cent., yet this quantity of peptones is sufficient not only to counteract the retarding influence of the acid, but increases the conversion of the starch to the extent of 7 per cent. above the action of the saliva alone. Increasing the amount of peptones to 2 per cent. does not appear to have any effect whatever, as the following results show:—

	1 gram peptones and 0·025 per cent. acid Wt. Cu in one-tenth.	2 grams peptones and 0·025 per cent. acid. Wt. Cu in one-tenth.
1.	0·1060 gram.	0·1084 gram.
2.	0·0985 "	0·0974 "

In acid solutions of increased strength the peptones appear to exercise but slight if any influence; thus when the solution contained 0·1 per cent. hydrochloric acid, no diastatic action at all was observed, even in the presence of the peptones. In 0·05 per cent. acid solution, however, one-tenth of the diluted and mixed digestive fluid yielded 0·013 gram Cu, showing a slightly increased action over and above what the acid fluid alone would give.

Control experiments with saliva, peptones, and acid without starch yielded negative results, thus showing that the saliva is entirely without action on the peptones in an acid solution of the above strength. Again, digestions of starch, peptones, and acid without saliva also gave negative results, proving that the peptones are wholly without diastatic action in the acid fluid. We deemed it advisable next to examine how far inorganic salts could influence the action of the ferment in an acid solution of the strength used. In aqueous solution it will be remembered the inorganic salts experimented with had but little or no action. In the acid solution the salts used were the same as before, viz., those present in the ash of the peptones. The experiments were conducted in the same manner as the preceding; 100 c.c. being the volume of the mixed fluid, of which 25 c.c. were filtered saliva, 25 c.c. water containing 1 gram of starch, and 50 c.c. 0·05 per cent. hydrochloric acid containing the salt.

(*To be continued.*)

* Chittenden and Griswold, *American Chemical Journal*, iii., 313.

† Foster's *Journal of Physiology*, iii., 246.

PHARMACY ACT, 1868.

RECTIFICATION OF THE REGISTERS OF PHARMACEUTICAL CHEMISTS AND CHEMISTS AND DRUGGISTS.

We are requested by the Registrar to publish the following list of persons whose names will be erased from the Registers unless they communicate with him on or before 30th December next.

Those marked (*) are Pharmaceutical Chemists.

Abbott, Joseph	1, Bellevue, Clevedon.
Abraham, William	16, Lawford Road, Rugby, Warwickshire.
Adams, Henry Gardiner	35, Burgate Street, Canterbury.
Alexander, William	Strichen, Aberdeenshire.
*Andrews, William Leatham	19, The Terrace, Peckham Road, London, S.E.
Armstrong, Brooksbank	71, King's Road, Chelsea, London, S.W.
Arnold, George James	17, Hardwick Place, Commercial Road, London, E.
Ashmore, George Johnson	Lindsworth, King's Heath, Birmingham.
Atkinson, Edward Fenton	42, Kirkstall Road, Leeds.
Attwater, Thomas Chipping	47, Kerr Street, Devonport.
Atwell, Benjamin Arthur	Wincanton.
*Bachelot, Pierre Eloy	Paris.
Baker, Arthur George	98, Hampstead Rd., London, N.W.
Ballinger, Arthur John	21, St. Alban's Street, Kennington Road, London, S.E.
Barnes, Benjamin	7, Cross Street, Hatton Garden, London, E.C.
Barry, Henry	79, High Street East, Sunderland.
Beesley, Thomas	10, High Street, Salisbury.
Bell, George	65, Hopwood Street, Spring Bank, Hull.
Bendelack, Charles	112, High Street, Southampton.
Berry, Robert Innes	65, St. Nicolas Street, Aberdeen.
Best, Robert	33, Strickland Street, Hessle Road, Hull.
Betts, John Howe	7, Bedford Row, Limerick.
Billsborough, Thomas	23, London Road, Preston, Lancs.
Bingham, Samuel	Eton.
Birchall, Samuel	39, Tennyson Place, Otley Road, Bradford.
Birrell, George	Post Office, Highgate, London, N.
Black, William Jones	21, High Street, Bangor.
Bluett, Reginald	Tetbury, Gloucestershire.
Boe, James	43, Blackett Street, Newcastle-on-Tyne.
Bond, Alfred	13, Pelham Road, High Road, Tottenham, London, N.
Boor, Jonathan	38, East Street, Brighton.
Booth, Jonathan	6, Cavendish Terrace, West Hill Park, Halifax, Yorks.
Boulton, Joseph Oakwell	Albert House, Claremont Street, Bristol.
Branch, George	26, St. Peter's Street, Mile End, London, E.
Branson, Alice	7, Back Lane, Bradford, Yorks.
Breton, Harvey Wolstenholme	29, Loseby Lane, Leicester.
Brierley, John	Barrow-in-Furness.
Bristow, Robert Anthony	47, Eastlake Road, Brixton, London, S.W.
Britten, John	272, Albany Road, Camberwell, London, S.E.
Brown, Benjamin	6, Russell Street, Hull.
*Brown, William Braithwaite	Kibworth-Beauchamp, Leicestershire.
Buchanan, Robert	5, Wellington Arcade, Glasgow.
Burt, James	Harrogate.
Burton, Shadrach	10A, High Cross Street, Leicester.
Burton, William	37, High Street, Redcar, Yorks.
*Buzzard, Thomas Hardy	Market Place, Leicester.
Campbell, James	127, Main Street, Anderston, Glasgow.
Campbell, John	4, Portland Street, Glasgow.
Cant, Hemington	8, Coborn Street, Bow Road, London, E.
Capner, William Morgan	Highgate, London. N.
Carter, Frederick Lewis	Canterbury.
Carter, William Robinson	13, Renfrew Road, Lower Kennington Lane, London, S.E.
Caswell, Edmund	Avenue Road, Leamington, Warwickshire.
Chalmers, William	12, Glassford Street, Glasgow.
Chantry, Elizabeth	Aire Street, Goole, Yorks.
Chirm, John	23, Guildford Terrace, Guildford Street, Birmingham.
Christian, George	Godalming, Surrey.
Churchman, James	123, Brixton Road, London, S.W.
Clarke, Thomas	36, Conway Street, Birkenhead, Cheshire.

Clayton, George Pearson	Rose Cottage, Hall Bower, Huddersfield.
*Clayton, Henry	5, Amersham Park Terrace, Amersham Road, New Cross, Kent.
Clode. Charles	5, Lordship Terrace, Tottenham, Middlesex.
Cocking Thomas	Holbeach.
*Coleman Alfred	13, St. Mary-at-Hill, London, E.C.
Conway, John William	23, Regent Street, Leamington.
Cook, Charles	120, Alston Street, Ladywood, Birmingham.
Coomber, Sarah	85, Hollydale Road, Queen's Road, Peckham, London, S.E.
Cooper, James Newberry	Woodville House, White Ladies Road, Bristol.
Cope, Charles Ball	96, Rock Street, Sheffield.
Corfe, Henry	4, Jewry Street, Winchester.
Cork, Charles Sawyer	Hadleigh, Suffolk.
Court, Alfred	35, Bull Street, Birmingham.
Cowper, David Burgess	127, Main Street, Anderston, Glasgow.
Crane, John	2, Louis Street, New Leeds, Yorks.
Crane, Walter	91, Lower Marsh, Lambeth, London, S.E.
Crawley, Henry	19, Phœnix Street, London, N.W.
Crook, Edward	41, Canterbury Road, Brixton, London, S.W.
Crooke, Charles Gibbins	82, Barkham Terrace, Lambeth, London, S.E.
Cross, John	12, Belle Vue Road, Upper Tooting, Surrey.
Cross, Thomas	448, Duke Street, Glasgow.
Cunningham, William	35, Elizabeth Street, Bradford, Yorks.
Currie, Alexander	24, Argyle Place, Edinburgh.
Dakeyne, Thomas Edward	Wincle, Cheshire.
Davies, Charles	Newton House, Newton Street, Pennywell Road, Bristol.
Davies, Thomas	5, Baker Street, Aberystwith, Cardiganshire.
Deane, Maurice Bumstead	High Street, Dawley, Salop.
Defriez, Richard	92, Packington Street, Islington, London, N.
Delamar, Edward Thomas	14, Albert Street, Leith Walk, Edinburgh.
Dickinson, Joshua Steel	1, Union Street, Jarrow-on-Tyne.
Dixon, William Bunting	2, Loxton Street, Bloomsbury, Birmingham.
Dodridge, Samuel Henry Stephens	180, Shoreditch, London, E.
Downes, Foster Donald	45, Ellerslie Road, Loftus Road, Shepherd's Bush, London, W.
Dowsett, Arthur	16, North Street, Brighton.
Duckers, Henry	Cheshire Street, Market Drayton, Salop.
Duncan, James	57, Castle Street, Aberdeen.
Dunn, Edward	16, Newgate Street, London, E.C.
Eastes, Benjamin Henley	Burleigh House, Stanstead, Essex
Edwards, Charles Richard	5, West Place, Fareham, Hants.
Ellison, John Clement	40, Brunswick Square, London, W.C.
Evans, David Powell	8, Battersea Park Road, London, S.W.
*Evans, William Henry	87, Westbourne Street, Eaton Square, London, S.W.
Evatt, Henry Royle	32, Sweet Street, Holbeck, Leeds,
*Fairbairn, George	2, Fairy Lane, Bury New Road, Manchester.
Farr, Archer	10, Tillotson Place, Waterloo Road, London, S.E.
Field, Alfred William	39, South Clerk St., Edinburgh.
Field, Henry	133, Oxford Street, London, W.
Finch, Henry	1, Keynsham Street, Cheltenham.
Fitness, Henry Robert	Oughtibridge, Sheffield.
*Fleetwood, Thomas	Widnes, Lancs
Fleming, Ebenezer	104, North Street, Glasgow.
Fleming, John	27, Howard Street, Glasgow.
Forsyth, James	53, Regent Quay, Aberdeen.
Foster, George Edward	Newbury, Berks.
Foster, William	149, Kennington Cross, London, S.E.
Fox, John	1, Spring Street, Sussex Gardens, London, W.
Fox, William	51, Noble Street, Leicester.
Frank, John Mead	Dean Street, Newcastle-on-Tyne.
Freer, Thomas	30, Bonners Lane, Leicester.
French, Mary Ann	53, St. Peters Street, Islington, London, N.
Funnell, Edward	22, Devonshire Place, Brighton.
Funnell, William Henry	22, Devonshire Place, Brighton.
Gage, George	Luton, Beds.

Garside, Thomas	10, Cross Street. Southport.
Gell, George	6, Woodbine Place, Leeds.
George, Daniel	Hillside, Ebbw Vale, Monmouthshire.
Gethen, William	57, Linnell Road, Vestry Road, Camberwell, London, S.E.
*Gibbs, James	98, Elsey Road, Lavender Hill, Surrey.
Giddy, Anne	1, King Street, Twickenham, Middlesex.
Gilders, George Pollard	6, High Street, Maidstone.
Gilkerson, Watson	Market Place, Melton Mowbray.
Gill, Sutton Dudley	Maida Vale, London, W.
Gittings, Alfred	Birmingham Road, Oldbury.
Glasier. Samuel	21, Red Lion Street, Holborn, London, W.C.
Goddard, Benjamin	20, Sussex Road, Stockport, Cheshire.
Goodale, John Wallett	12, Cobden Street, Humberstone Road, Leicester.
Goodman, Godfrey	47, Jasmine Grove, Anerley, Surrey.
Goodwin, John	Muntz Street, Small Heath, Birmingham.
Goodyer, Frederick Richard	Sherwood Rise, Nottingham.
Grant, Robert	Aboyne, N.B.
Gray, Alexander	Bridge Place, Bonnington, Leith N.B.
Greenough, Isaac	1, Diamond Row, Stepney Green, London, E.
Griffin, George Henry	60, Deansgate, Bolton, Lancs.
Griffiths Joseph	8, Church Street, Wrexham.
Hambridge, Thomas	West Street, Reading.
Hancorne, Edward	9, East India Dock Road, Limehouse, London, E.
Hanson, Philip Freeman	Chagford, near Exeter, Devon.
Harding, George	High Street, Farningham, Kent.
Harries, Thomas	22, Page Street, Swansea.
Harris, Waddelow Chambers	170, Westgate, Bradford, Yorks.
Hawthorne, Charles Oliver	109, Chobham Road, Stratford, London, E.
Hayward, Charles William	54, Gartside Street, Manchester.
Healy, Patrick J.	25, Felstead Street, Victoria Park, London, E.
Heaps, William	16, Lime Street, Preston, Lancs.
Heaton, George	198, Manchester Road East, Little Hulton, near Bolton, Lancs.
Henderson, John	125, Gairbraid Street, Maryhill, Glasgow.
Heslop, John	South Shields.
Higgins, Joseph Slatterie	Clarence Cottage, St. John's, Fulham, London, S.W.
Hodsall, James	8, Lowfield Street, Dartford, Kent.
Hogg, Walter	3, Nesham Street, Westmoreland Road, Newcastle-on-Tyne.
Holland, Henry	97, Higate Lane, Sparkbrook, Birmingham.
Horner, James William	5A, Banyard Terrace, Banyard Road, Bermondsey, London, S.E.
Horsfall, Henry	31, Vicar Lane, Leeds.
Horsfall, Thomas	Burley Road, Leeds.
Howard, George	72, Rochdale Road, Manchester.
Howard, James Walker	39, Green Road, Leeds.
House, Henry William	28, Red Lion Square, London, W.C.
Huff, Evan	330, Ashton Old Road, Openshaw, Manchester.
Hunneman, Charles Julius	Hanover.
Hunter, William Bildad	42, Lansdowne Street, Hull.
Huntley, Henry Edwin	36, Heygate Street, Walworth, London, S.E.
Huskinson, John Lovett	Frodsham, Cheshire.
Huxtable, James	1 Wine Office Court, Fleet Street, London, E.C.
Ives, Robert Hanworth	Chapeltown Road, Leeds.
Jack, George	100, King Street, Dundee.
Jackson, Nathaniel	192, Rochdale Road, Manchester.
Jackson, Richard	High Street, Teddington.
Jackson, William Kilvington	Horton, near Belford, Northumberland.
James, Abel	69, Oxford Street, Mountain Ash, Glamorganshire.
James, John	Pontypridd, Glamorganshire.
Jenkins, John	Church Street, Tredegar, Mon.
Jessop, John Arthur	Market Place, Willenhall, Staffs.
Jessop, Josiah Benjamin	12, Darlington Street, Wolverhampton.
Johnson, Edward	22, Pimblett Street, Cheetham, Manchester.
Johnson, Edward	48, Stamford Street, Stalybridge.
Johnston, Robert	212, New City Road, Glasgow.
Jones, Henry William Burnell	64, High Street, Newport, Mon.
Joy, Josiah Rudduck	1, St. Joseph Street, Hunslet Road, Leeds.
Judd, Richard	110, Suffolk Street, Birmingham.
Keith, Alexander Reid	15, Princes Square, Kennington, London, S.E.
Kirby, John Henry	124, Wheeler Street, Birmingham.
Kirkman, Thomas Charles	20, Ellerby Lane, Bank, Leeds.
Knight, John	5, Chapel Street, Somers Town, London, N.W.
Lanchenick, Emma	High Street, Marlborough, Wilts.
Langford, William	119, London Road, Lynn, Norfolk.
Langridge, Thomas Benjamin	Maud Villa, Colworth Road, Leytonstone, Essex.
Lavender, Joseph	Frog Island, Leicester.
Lemmon, Charles	12, South Street, Worthing.
Leppard, James	Guildford Street, Chertsey, Surrey.
Levie, Alexander Mair	73, Wales Street, Aberdeen, N.B.
Lewis, Rebecca	Ebbw Vale, Mon.
Lickiss, Charles	55, Liddell Street, Hull.
Little, Henry	107, Broad Street, Reading.
Lodge, Arthur William	London Hospital, Whitechapel, London, E.
Lomas, Charles Benjamin	25, King Street, Leicester.
Longfield, Joshua	17, Whitehouse Road, Sunderland.
Lyddon, Richard	138, Mile End Road, London, E.
Lynch, Edwin Bould	25, Cheetham Street, Rochdale.
Lynch, Thomas Bold	9, London Road, Preston, Lancs.
McCheyne, James	45, High Street, Dumfries, N.B.
McConachy, John	Hagley Street, Halesowen, Birmingham.
McCulloch, Charles	6, Cross Lane, St. Mary-at-Hill, London, E.C.
MacFarlane, Peter	191, Fulham Road, London, S.W.
McGown, John Porter	11, Caledonia Street, Paisley, N.B.
McGruer, John	47, South Kinning Place, Paisley Road, Glasgow.
McKenzie, Hector	116, Castle Street, Montrose, N.B.
McKinnell, Thomas Maxwell	16, Brougham Place, Edinburgh.
Macneill, Archibald	324, Caledonian Road, London, N.
McOwan, John Townsend	1, Powlett Place, Harmood Street, Camden Town, London, N.W.
Mann, John	68, St. Ann's Road, Nottingham.
Marlow, Frederick William	11, High Street, Battersea Square, Battersea, London, S.W.
Marrion, William	Oxford Street, Oaken Gates, Salop.
Marsden, John	17, Barony Street, Edinburgh.
Marsh, Thomas	Elm Cottage, Slindon, near Arundel, Sussex.
Martin, Michael	142, Mill Street, Liverpool.
Melton, Frederick	22, Worship Street, London, E.C.
Merrett, Joseph Hughes	48, East Street, Brighton.
Miller, William Henry	62, Bean Street, Hull.
Millington, Edward	162, Bermondsey Street, London, S.E.
Mills, John Perry	The Cross, Exmouth, Devon.
Mills, Thomas William	8, Lowfield Street, Dartford, Kent.
Milne, James	Forrest Road, Edinburgh.
Morgan, John	13, Methley Street, Kennington, London, S.E.
Morgan, Richard Thomas	Brook House Dispensary, Cricklade, Wilts.
Morris, Alfred	32, Torriano Avenue, Camden Town, London, N.W.
Morris, Edwin	1, Spring Street, Hyde Park, London, W.
Morris, John	Duke Street, Wellington, Salop.
*Morris, Thomas Edmunds	15, Longfellow Street, Lodge Lane, Liverpool.
Morrison, William Hay	65, St. Nicholas Street, Aberdeen.
Motherwell, Mary	20, Orchard Street, Paisley, N.B.
Murch, Edward	18, Broad Street, South Molton, Devon.
Muskett, Edwin Burrell	Holt.
Needham, Jane	60, Church Gate, Leicester.
*Newhill, John William	Kirkheaton, near Huddersfield.
Newman, Samuel Charles	8, East Street, Bedminster, Bristol.
Nicholson, Edward	Lindley, near Huddersfield
Nisbet, William Johnstone	Curries Cottage, Spring Gardens, Edinburgh.
Noakes, Richard	64, Geneva Road, Brixton, London, S.W.
Noble, Alexander	62, Elderslie Street, Glasgow.
*Noel, Ferdinand	Paris.
Oldham, Gervase	17, Chestergate, Macclesfield.
*Oliver, William Hurdon	113, Holborn, London, E.C.
Osborn, William Henry	124, High Street. Tewkesbury.

Osbourne, Nicholas Twigg	25, Trinity Street, Spring Bank, Hull.
Owen, Charles	Portland Place, Derby Road, Bootle, near Liverpool.
Owen, Richard Lewis	Turf Square, Carnarvon.
Padley, William	5, Norfolk Street, Lynn.
Parker, Frederick Carr	Lady Bank Works, Dundee.
Parr, Frederick Richard	Silverdale, Staffs.
Patman, George	White Lion Street, Norwich.
Pattison, Frederick	38, St. Paul's Road, South Tranmere, Cheshire.
Peat, William Henry	The Crescent, Birmingham.
Pemberton, William	51, Tithebarn Street, Preston, Lancs.
Penketh, John	197, Westminster Road, Kirkdale, Liverpool.
Phillips, Charles	34, Montgomery Street, Sparkbrook, Birmingham.
Pickering, Samuel Whaley	The Lache, near Chester.
Pidgeon, Joshua David	Hatherleigh, Devon.
*Pisani, Orestes Victoriano	23, Ravensdon Street, Kennington, London, S.E.
*Place, William Thomas	17, Brunswick Terrace, Aire Street, Leeds.
Poate, Stephen	1, Charles Street, Landport, Hants.
Pollard, Jeremiah	43, Winchester Street, London, S.W.
Pollard, John Frederick	North Street, Milverton, Somerset.
Poole, John	20, Garratt Street, Manchester.
Powell, Thomas Quarton	32, Cordingley Street, Otley Road, Bradford, Yorks.
Pye, John	Duke Street, Dartmouth, Devon.
Raynes, Sydney Herbert	10, Woodsome Road, Highgate, London, N.
Reed, Johnson	47, Diana Street, Newcastle-on-Tyne.
Reed, Willliam	47, Diana Street, Newcastle-on-Tyne.
Reekie, Arthur	Loanhead, Midlothian.
Reeve, James	Bell Hotel, Ely, Cambs.
Rennison, James	119, High Street, Sunderland.
Revell, John	11, Clifton Road, Maida Vale, London, W.
Richards, Frederick Johnson	60, Albion Road, Dalston, London, E.
Richards, Thomas	18, Saville Place, Lambeth Road, London, S.E.
Richardson, Joseph Hancock	3, Arundel Terrace, Cork.
Ring, Edward James	324, Caledonian Road, London, N
Roberts, Thomas	29, Rectory Road, Stoke Newington, London, N.
Roberts, Thomas Edwards	69, Beacon's Hill, Denbigh.
Robinson, George	27, Arlington Street, Salford, Manchester.
Robinson, Herbert	52, Royal York Crescent, Clifton, Bristol.
Robinson, John	15, Wellington Terrace, Norwood, Beverley.
Robinson, Thomas	Easington, Yorks.
Roper, George Arthur	4, Summerfield Terrace, Newnham, Cambs.
Routlidge, George	362, Rochdale Road, Manchester.
Salter, Sophia	Eltham, Kent.
Sargeant, Samuel	61, Roden Street, Holloway, London, N.
Shannon, John	168, Gallowgate, Glasgow.
Shearer, David Brown	156, New City Road, Glasgow.
Sheriff, Thomas Jackson	149, Chapel Street, Salford, Manchester.
Sibbering, George	Middlesex Hospital, Charles Street, London, W.
Sim, Robert	58, Aughton Street, Everton, Liverpool.
Simnett, Thomas	52, Royal York Crescent, Clifton, Bristol.
Simpson, Alexander	31, Ronald Street, Glasgow.
Simpson, John	80, Patrick Street, Cork.
Simpson, William	Market Place, Bedale, Yorks.
Slater, Samuel	Headingley, Yorks.
Smith, Anthony	11, Upper Well Street, Hill Cross, Coventry.
Smith, Charles Albert	42, Canal Street, Derby.
Smith, Charles Henry	4, Newby Terrace, Bootham Stray, York.
Smith, Percival Henry	80, Argyle Street, Birkenhead, Cheshire.
Smith, William Lyall	Great Hautbois, Coltishall, Norfolk.
Snape, John	Swinton, Lancs.
Soppet, Robert	5, Allerton Terrace, East Cotham, near Redcar, Yorks.
Sotaan, Paul Hellesen	2, Garford Street, Limehouse, London, E.
Spalding, William Richard	Lea Bridge Road, Leyton, Essex.
Spicer, Charles	Ferndale Lodge, Ennersdale Road, Lewisham, Kent.
Spicer, Thomas	Finedon, Northamptonshire.
Spreekley, George	58, Long Row, Nottingham.
Spurgin, Frederick William	Hounslow, Middlesex.
Stanley, Henry	Fore St., Edmonton, Middlesex.
Stead, Samuel	Hanover Place, Leeds.
Stenhouse, Robert	1, Malta Terrace, Edinburgh.
Stevens, Stephen Nobbs	Bridge Street, Downham Market.
Stevenson, Robert Albert William	44, Taylor Street, Liverpool.
Stewart, William Henry	11, Appleford Road, Upper Westbourne Park, London, W.
Stocks, Alfred	Halifax, Yorks.
Stonehouse, William	2, Bridge Street, South Stockton.
Story, William	Worksop, Notts.
Sutcliffe, Radcliffe	113, Crown Buildings, Boothtown, Halifax, Yorks.
Swallow, James Edward	Albert Cottage, Kensal New Town, London, W.
Tamplin, George William Dunlop Haddington	University College, Gower Street, London, W.C.
Tanner, Benjamin	2, Hargreave Buildings, Chapel Street, Liverpool.
*Tanner, Herbert	133, Oxford Street, London, W.
*Taplin, Frederick	Bristol.
Taylor, Hannah	17, Saville Street, Manchester.
Taylor, Sydney	Old Charlton, Kent.
Templar, Alfred	3, Denmark Street, Bristol.
Thomas, Richard	Crosswall, Dover.
Thomson, Frederick Charles	Victoria Place, Eastbourne.
Thorp, John	790, Rochdale Road, Harpurhey, Manchester.
Tomlinson, William Frederick	8, Blenheim Square, Leeds.
Toy, George Bentley	153, Summer Lane, Birmingham.
Traverse, Thomas	53, St. Peter's Street, Islington, N.
Turner, Robert John	185, Church Road, Essex Road, London, N.
Twizell, Robert	South Hylton, Durham.
Vincer, Frank	71, East Street, Brighton.
Vine, Richard	112, Westbourne Park Road, London, W.
Ward, Thomas Rowland	3, Ashley Lane, Long Milgate, Manchester.
Warner, Richard	20, Charterhouse Square, London, E.C.
Warren, Frederick	52, Preston Street, Brighton.
Waterfield, David	132, Ladbroke Grove Road, Notting Hill, London, W.
Waterworth, William	77, Cambridge Street, Sheffield.
Watson, Thomas Harrison	30, Osborne Road, Tue Brook, Liverpool.
Watts, John Taylor	69, Hall St., Stockport, Cheshire.
Watts, Walter	15, High Street, Kington, Herefordshire.
Wedge, Theophilus Aston	80, Victoria St., Wolverhampton.
Weller, James William	Nice.
Wells, Joshua Holroyd	6, Church Row, Kirkgate, Leeds.
Wheeler, Frederick Ebenezer	8, Victoria Street, Ryde, Isle of Wight.
Whinfield, William Henry	14, Cantlowes Road, Camden Town, London, N.W.
White, George G.	130, Camden Rd., London, N.W.
*Whitfield, Henry	45, High Street, Worcester.
Whitfield, Henry Spencer	43, Bolling St., Bradford, Yorks.
Whitworth, Frank	7, Holloway Head, Birmingham.
Wightman, James	3, Weston Street, Preston.
Wilding, William	Liscard Park, Liscard, near Birkenhead.
Williams, David	Llanfair Talhaiarn, Denbighshire.
Williams, Evan David	19, Goodge Street, London, W.
Williams, Robert	Tonge, Middleton, Lancs.
Wilson, Alexander Robb	48, High Street, Leven, Fifeshire.
Wilson, Charles Tyler	14, Cambridge Terrace, Islington, London, N.
Wilson, James	212, Evelyn St., Deptford, Kent.
*Wilson, John Henry	Scarborough.
Wood, Alfred Charles	366, Bristol Road, Birmingham.
Wood, Edmund	35, Parkstone Road, Peckham Rye, London, S.E.
Wood, William Turton	7, Blayd's Court, Hunslet Lane, Leeds.
Woodhouse, William	Ambleside, Westmoreland.
Wright, Arthur	Walter Street, Nottingham.
Wright, Edward	21, Durham Street, Middlesborough-on-Tees.
Wright, James	246, Manchester Road, Cubitt Town, London, E.
Wright, Watkin Valentine	21, King Street, Wrexham.
Yewen, Caleb Henry James	1, Clubb's Terrace, Odessa Road, Forest Gate, Essex.
Young, James John	22, Litchfield Road, Old Ford, Bow London, E.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 11, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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INSPECTION OF DRUGS IN THE UNITED STATES.

THE reference made last week, in the course of the discussion on Mr. WILLIAMS'S motion, to the existence in the United States of a system of inspection of imported drugs, will perhaps have raised some curiosity as to the nature of the regulations under which it is carried on and whether they would be at all applicable to the conditions obtaining in this country. We therefore avail ourselves of the opportunity afforded by the appearance in a United States contemporary of an article on this particular subject to quote some details as to the legislation under the authority of which the inspection is made, as well as the extent to which the provisions of the law have been carried out.

The United States statute law upon the subject is in substance as follows. It provides that all drugs, medicines, and medicinal preparations (including medicinal essential oils) and chemical preparations, used wholly or in part as medicine, imported from abroad, shall, before passing the custom house, be examined as well in reference to their quality, purity, and fitness for medical purposes, as to their identity as specified in the invoice, and if on such examination any of them are found, in the opinion of the examiner, to be so far adulterated, or in any manner deteriorated, as to render them inferior in strength or purity to the standard established by the United States, Edinburgh, London, French and German Pharmacopœias, and thereby improper, unsafe or dangerous to be used for medical purposes, they are not to be allowed to pass. When a consignment of drugs is condemned the consignee is allowed to re-export it at any period within six months from the date of the condemnation, upon executing a bond to land them outside the United States. If not so re-exported before the expiration of six months the drugs are then destroyed by the custom house officers. At the port of New York, one of the assistant appraisers is appointed with special reference to his qualifications for carrying out such inspection. In the event of an inspector's decision being challenged, an appeal is allowed, and the goods are referred for examination to an analytical chemist of good repute with the medical colleges in the State in which the custom house is situated; but in the event of the referee giving an adverse decision the consignee has to pay all the costs incurred before he is allowed to re-export the goods.

According to an official list furnished by the Deputy-Collector of the New York Custom House, one hundred and seventy-eight bales or packages of drugs were condemned at that port in the course of the twelve months ending June 1 of the present year; no definition is, however, given as to the weight of a "bale" or "package." Of these fourteen were destroyed by fire, one hundred and two were re-exported under bonds, and the remainder were at the close of the year in store, the six months' limit which was to determine their treatment not having yet expired. Among the articles rejected were valerian root (36 bales), sarsaparilla (24 bales), gentian (19 bales), belladonna root and leaves, colchicum corms and seeds, aconite root and leaves, senna, wormwood, comfrey root, horehound, hellebore, Persian opium, rhubarb (30 lbs.), balsam of copaiba and orange peel. No chemicals, medicinal preparations or essential oils were condemned during the same period.

It will be obvious that the introduction of such a law into this country would, as pointed out by Mr. WILLIAMS, probably act injuriously upon the London market. If carried out in its integrity it would prevent the importation of many articles for which manufacturers and others find a legitimate use, although they may not come up to a pharmacopœia standard. For instance, the Persian opium condemned would probably have had its value in the market for alkaloid manufacture, although the sophistication in which the Persians are proving themselves such adepts may have brought its morphia strength down to a low standard. On the other hand, a drug naturally of low quality, which is neither deteriorated nor adulterated, would not appear to be covered by the language of the statute. But it might almost be assumed from the fact that no chemicals or essential oils had been condemned that the statute is only partially carried out, and this view is confirmed by the sensational statements made every now and then as to the quality of specimens of drugs,—imported as well as native,—that are to be met with in the United States markets.

THE INTERFERENCE OF PUBLIC SERVANTS IN TRADING OPERATIONS.

WE notice that among the questions set down on the House of Commons paper are three that bear upon a subject in which many of our readers are much interested, namely, the extent to which public servants should be allowed to take part in the management of trading corporations carrying on business in competition with tax-paying tradesmen. Mr. HUBBARD proposes to ask the First Lord of the Treasury whether officials in the public service are at liberty to engage as promoters, trustees or directors in financial, commercial or industrial adventures, failure in which might involve them in pecuniary embarrassment or personal discredit, and bring reproach upon the public service; also whether the public servants of the country are adequately remunerated for the services to which the State has an exclusive claim, or whether there exists any excuse or sanction for persons in the service of the State supplementing their official salaries by the proceeds of private engagements; and, lastly, whether in the event of there being no excuse or sanction for the practice he will take effectual means to announce and enforce his disapproval.

At the time of our going to press, these questions have not yet been put, but we shall look with some curiosity for the answer, since it will probably indicate the course the present Government is prepared to take in respect to a grievance from which, more or less, chemists and druggists, in common with all tradesmen are suffering.

THE RECTIFICATION OF THE REGISTER.

On pp. 388—90 will be found a list of persons whose names have become liable to be struck off the Register of Chemists and Druggists through their failure to communicate their whereabouts to the Registrar. It will be remembered that under the provision in the tenth section of the Pharmacy Act, 1868, to enable the Registrar to fulfil the duty imposed upon him of keeping the Register correct, he is empowered to send a registered letter to any registered person, addressed to him according to his address on the Register, to inquire whether he has ceased to carry on business or changed his residence. If no answer be returned to such letter within six months, a second of similar purport is to be sent, and if no answer be given to this within three months it becomes lawful to erase the name of that person from the Register. This is the course, so far as the sending of the letters is concerned, that has been taken with respect to each person whose name is in the list printed this week, and the Registrar now gives formal notice of his intention to proceed to the erasure of these names, unless the persons whom they represent communicate with him on or before the 30th of December next.

It will be observed with regret that the list, which includes about four hundred and twenty names, is an unusually long one, as compared with those that have been published previously at biennial intervals. This difference is hardly likely to be explainable by so large an increase in the number of unreported deaths. The fair inference is that it is mainly due to the failure on the part of a large number of registered persons to take sufficient trouble to inform the Registrar as to their changes of residence. It is a pity, however, that so much labour and expense should be put upon others before such defaulters can be stimulated into the performance of an act which is solely for their own benefit.

EXTRACT OF MEAT, AND THE LAW RELATING TO TRADE NAMES.

In July last, Mr. Justice Field, sitting in Chancery, was occupied for little short of a week in the trial of cases in which Liebig's Extract of Meat Company, Limited, pressed allegations that it was entitled to restrain the use by Mr. R. W. Anderson and others of the title "Baron Liebig's Extract of Meat," and of any portrait of the late Baron Justus Von Liebig. This position was assumed notwithstanding the result of the action against Messrs. Allen and Hanburys, in 1867, in which that firm sustained the public right to call "Liebig's Extract of Meat" by that its proper name, and notwithstanding that the Company had never called the article "Baron Liebig's Extract of Meat," or used any portrait in connection with sales of it. It was felt by us at the time that the case was of especial interest to our readers, but as at the close of the trial judgment was reserved, it did not appear to us desirable to trouble our readers then with the lengthy arguments of counsel or details of the evidence.

On Wednesday, judgment was delivered in favour of the defendants. It contains a *résumé* of the evidence and arguments, and as we intend to present it to our readers *in extenso* next week, we defer for the present any detailed comment upon it. We think that as a judgment carefully prepared after argument by very eminent members of the Bar, and as an embodiment in a concise readable form of the facts of the case and of the law applicable to cases of the kind, it will be found to amply repay attentive perusal.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

At the first meeting of the present Session, to be held on Thursday, November 16, at 8.30 p.m., an address on "The British Pharmacopœia as a Students' Manual" will be delivered by the President, Professor Attfield, F.R.S. The address will be followed by a discussion. At this meeting also the election of officers for the present session will take place.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association will be held at 32a, George Street, Hanover Square, on Wednesday evening next, 9 p.m., November 15, when a paper on "Wild Flowers and their Relation to Insects," will be read by Mr. Cracknell.

THE AUSTRIAN PHARMACEUTICAL ASSOCIATION.

According to a statement made in a report presented at the recent meeting of the Austrian Pharmaceutical Association, in Agram, that Society now consists of 508 ordinary members, 50 corresponding members and 70 honorary members.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, the 1st of November, at the College of Physicians, Kildare Street, Dublin, at three o'clock.

The chair was taken by Mr. Pring and subsequently by the President, Dr. Tichborne.

The other members of the Council present, were Messrs. Allen, Bennett, Brunker, Dr. Collins, Mr. Grindley, Dr. Montgomery, Messrs. McIlwaine, Minchin, Payne and Wells.

The minutes of the annual meeting of the Society and of the last meeting of the Council were read and confirmed.

On the motion of Mr. Allen, seconded by Mr. Grindley, the four examiners of the Society were re-elected.

The next business was the consideration of recommendation No. 3, from the Pharmacy Act Amendment Committee, as follows :—

"That all candidates for the licence shall be required to produce evidence of having passed three years in a *bonâ fide* apprenticeship to an apothecary or pharmaceutical chemist keeping open shop."

Mr. J. C. C. Payne moved, by way of amendment, that the following be substituted for recommendation No. 3:—

"Candidates, before presenting themselves for their final examination, are required to produce indentures of apprenticeship, duly signed by a pharmaceutical chemist or apothecary keeping open shop, stating that the candidate has served a *bonâ fide* engagement of four years in his establishment."

He had carefully thought over the matter and discussed it with members of the Council who were actively engaged in pharmacy, and they agreed with him that a two years' certificate of practical pharmacy was not sufficient, and that the only satisfactory way of preparing young men for functions which were very important for the public was by apprenticeship. Two years was a very short period to give a young man for acquiring all the knowledge of pharmaceutical work that was required from him. He maintained that even four years was a short period for the purpose. It had been said that apprenticeship had to a great extent ceased to exist, but he did not think that those who were practically engaged in pharmacy would agree with that. Young men could only be made practical pharmacists in a medical hall or pharmacy where they got constant practical everyday work. He did not say that it was necessary that they should be employed for the whole four years in compounding prescriptions. The making of tinctures, and the mixing of powders and pill masses were matters to be learned ; and during the first twelve months of his apprenticeship, a young man would have very little chance of being allowed to compound prescriptions. He should learn how to make the preparations first, and there were a number of other matters, apparently trifling in themselves, which it was also necessary for him to learn, so that he would have to spend the first two years in preparing himself for the task of learning how to compound the prescriptions. It had been urged that there were other subjects which he had to learn, such as materia medica and botany; but the fact was that he learnt these daily in his practice of pharmacy. Every time he made a tincture he came across something connected with them. Chemistry also he learned daily in the same way. Analytical chemistry no doubt, he would not get ; but provision had been made for that. Schools for the purpose of teaching it had been recognized by the Council, some of which, if not all, had evening classes. In Belfast they had a chemical school which had been recognized by the Council, and at the evening classes of which young men, who were engaged during the day with pharmacists, learned practical chemistry. From all these reasons he thought a four years' service was necessary, in order to produce pharmacists in whom the physicians and the public would have confidence. He did not propose that his resolution should apply to those who were at present taking out a two years' course ; it should not come into force until after it had received the sanction of the Privy Council.

Mr. Pring: Make it law from the 1st of January, 1884.

Mr. Payne: I consent to make that alteration.

Mr. McIlwaine seconded the amendment.

Mr. Brunker said that while he agreed with almost everything that Mr. Payne had said, he did not approve of requiring from every candidate an indentured apprenticeship. No doubt the four years' service was desirable; but they might extend it to assistants who had been employed during that period with pharmaceutical chemists keeping open shop. He would suggest that the regulation should be:—"Candidates are required to produce a certificate signed by a pharmaceutical chemist or apothecary keeping open shop, stating that they had served a *bonâ fide* engagement either as apprentice or assistant with the person giving the certificate for a term of four years." But if they had a hard and fast rule requiring apprenticeship, they would shut out a great many men who might be ornaments to the Society. Besides some of the best houses did not take apprentices, and such a hard and fast rule would prevent the rising generation from learning their business in those places.

Dr. Collins said he was an old member of the Apothecaries' Hall and had had a good deal of experience in the compounding of medicines for more than fifty years. Several years ago this question was considered at a general meeting of the apothecaries' profession, at which there was a large attendance, and it was then unanimously decided that an apprenticeship or pupilage of three years was long enough to fit a young man entering their branch of the profession for the important function of compounding medicines and for taking charge of an establishment during his employer or master's absence. His own opinion was that unless a young man was extremely dull three years was sufficient for the purpose. Of course that had no reference to the teaching of the other parts of the business. A great many pharmaceutical chemists might think it necessary to have other employments for their apprentices and pupils besides compounding medicines; but in that Society they had simply to consider what time it would take a man to become a good safe compounder of medicine. For his own part he thought three years abundantly sufficient for that. Apprenticeship had now been largely done away with and pupilage was generally taking its place.

Mr. Simpson observed that in country establishments where other business besides compounding had to be done it took the student a longer time than elsewhere to learn compounding. During the first two years the apprentice had to do a great many things besides compounding. Therefore he was not in favour of a shorter period than four years.

Mr. Pring said he had had a great deal of practical experience and would consequently be in favour of a period of five years, but as he could not get it he would accept four. Young men should be at the business for one or two years before they could commence compounding; in many establishments it was three years before they got into the compounding department. They had first to become acquainted with the poisonous and the non-poisonous medicines and to learn to make preparations.

Dr. Montgomery considered that the observations of Dr. Collins applied to apothecaries, who looked forward to practice rather than to the compounding of prescriptions. But those who sought the licence of that Society should have every iota connected with the compounding of prescriptions at their fingers' ends. He was a strong advocate for apprenticeship, otherwise there would be so many doors left open for imposition that they would have endless difficulties in investigating whether a man had put in his time or not. His opinion was that without apprenticeship they would not be able to get a young man to learn his business, or have any test by which they could ascertain whether he was applying himself to it or not. On the other hand apprenticeship gave the employer a legal authority over the young man. He (Dr. Montgomery) would have a period of three years at least. No employer in his senses, or who had any regard for the safety of his clients, would think of putting a young man of perhaps seventeen years of age, and only in his first year, to the work of compounding prescriptions. He served five years himself, and he spent the first in learning mere matters of routine. He thought they might go on from three to a period of five years.

The President said the proposal which was before them involved two matters. One was the length of the apprenticeship or pupilage. In the abstract he had not the slightest objection to a period of five years if it was found to be necessary; but on the other hand they should not throw an impediment in the way of men presenting themselves for the licence. He did not even think that they would be justified all at once in running the period up to four years. He would prefer three years. During the last twelve months only seventeen candidates had passed, and that did not show such a rush to the profession as required a drag to be put on the wheel. Only one passed at the last examination. They knew that a man would be all the better compounder for having served six or eight years; but the Council should have due regard to the practical bearings of any regulations that they made and to how they could be carried out. He was strongly of opinion—and there were a great many members of the Society who agreed with him—that their licentiates came short in general knowledge of the sciences outside compounding. Although they were supposed to have passed an examination in those subjects, their instruction in them was generally of the most superficial kind. There was one of those branches in which instruction was compulsory, and three more in which it was not. He did not agree with Mr. Payne that apprentices learned those things. On the contrary they knew perfectly well that they did not learn either botany or materia medica thoroughly. A great many of them would not know rhubarb or "hippo" in the lump states, because they generally saw them in the powdered form. He was alluding to those who depended for such knowledge solely on what they could acquire during their apprenticeship. However, it was a matter of opinion. Coming to the question of apprenticeship, previous speakers had lost sight of the fact that there was a very large contingent of men who might present themselves for the licence and had had large experience—much larger than those who had served apprenticeships of three or four years could get—although they had never served apprenticeships. Four of the principal establishments in that city would not take apprentices. They said that they preferred to be independent of them, and to engage assistants who were certified having undergone an examination. Of them there were a great number. Perhaps some members of the Council might not be aware of the fact that hardly a week elapsed in which some young man was not examined to see if he were qualified to be an assistant. The anxiety of some gentlemen to create apprentices was hardly consistent with the fact that they refused to allow a recommendation to go forward that the Council should have the power of examining assistants; in fact the course they took really looked as if they wanted to drive young men into becoming apprentices rather than take care that they learned their business. Mr. Payne was one of the gentlemen who objected to the recommendation going forward that there should be an examination for assistants. He thought that was hardly consistent with the position taken by him on the present occasion. He agreed that the Council should, if possible, do away with any certificate that should be a sham. It should be a proof that the four years had been *bonâ fide* spent in compounding; and if that were so the student would have got his knowledge, whether he were an indentured apprentice or not. As to the length of time, he thought it might be three years, and subsequently it could be increased to four.

Mr. Wells said he knew of a house which took a large number of apprentices. They were not bound at first, but indentures were given to them when they were leaving after having served for five years.

Dr. Collins: That was not apprenticeship at all.

The President said he alluded to large establishments in which there were from four to six assistants employed in compounding.

Mr. Payne, in the course of his reply, said he was thoroughly in favour of indentured apprenticeship. He was sure that anyone who had been such an apprentice for four years in a pharmacy where practical work was carried on would recognize rhubarb root or any other root in the Pharmacopœia. It was to be presumed that he would even have to powder the root himself.

The President: I do not think there is one pharmacist in twenty who even makes his own tinctures.

Mr. Pring: We make our own tinctures.

Mr. Allen: So do I.

Mr. Payne: I do not think there is a tincture that we sell that we do not make in our place and I presume it is the same with everyone round the table. All this has been brought about by sham certificates. Mr. Payne said in conclusion that in order to meet the views of the general body of the Council he would alter his amendment to the following:—

"That all candidates for the licence shall be required to produce a certificate, signed by a pharmaceutical chemist or apothecary keeping open shop, stating that he has served a *bonâ fide* engagement with him, either as apprentice or assistant, in his sole employment, for a term of four years; this resolution to come into force on January 1, 1884."

The President: That entirely meets my views in every respect, only that I wish you would make the period three years at first.

The President having to withdraw his objection to the time,

The amendment was then put and unanimously agreed to, and was subsequently adopted as a bye-law in place of No. 3 recommendation of the Pharmacy Act Amendment Committee.

Mr. Payne then moved the adoption of the following regulation:—

"To entitle a candidate to pass his final examination he must have a majority of the votes of the examiners, of which that of the examiner in pharmacy must be one."

At the final examination there were three examiners—one in chemistry, one in materia medica and botany, and one in pharmacy. As these regulations at present stood, provided the candidate could satisfy the examiners in materia medica, botany, and chemistry, he could pass his final examination, although he knew little or nothing of practical pharmacy. Now this was not in accordance with the requirements of the Pharmacy Act. It might be urged that it did not occur; but he had been told by an examiner that on one occasion a candidate who was very good in two or three subjects, but could not satisfy the examiner in pharmacy, obtained a certificate. He (Mr. Payne) maintained that in order to obtain a certificate a man should be a good practical pharmacist.

Mr. Wells seconded the motion.

Mr. Allen said he agreed in the main with Mr. Payne's resolution, but he objected *in toto* to the practice of the matter being decided by the examiners giving votes. It should be decided by a maximum or minimum number of marks. The latter had been the practice for years in the English Society. Mr. Bremridge, the Secretary of that Society, had written to him stating that many years ago they followed the practice of passing the candidates by a majority of votes of the examiners, but that it had been found inconvenient and had been abandoned. He (Mr. Allen) would move the following amendment:—

"To entitle a candidate to pass he must make with the examiner in pharmacy a minimum of 300 out of a maximum of 600; with the examiner in chemistry a minimum of 140 out of a maximum of 300; with the examiner in materia medica and botany a minimum of 140 out of a maximum of 300; and he must not have less than a total minimum of 650 out of a total maximum of 1200."

According to this regulation if the candidate had only a minimum in every subject he would not pass because he would only have a total minimum of 580, consequently he would have to pull up in all or some of the subjects in order to qualify. This was the plan adopted in the Pharmaceutical Society on the other side. He (Mr. Allen) knew that the present examiners were in favour of this mode of proceeding—at least Dr. Duffey and Dr. Davy were.

The President said he agreed in the main with what Mr. Allen proposed. When he was an examiner in the University the practice followed there was somewhat similar. A minimum of 40 per cent. passed the candidate in each subject. He (the President) was opposed to any candidate being allowed to pass who was deficient in any one subject, but he also objected strongly to the result of the examination being placed in the hands of any one examiner. So that he was in favour of Mr. Allen's system; at the same time he would suggest that before deciding on the subject they should get a report from their examiners as to their views on the matter.

Mr. Brunker seconded the amendment of Mr. Allen. His scheme had the merit of giving half the total of marks to the most important subject, namely, pharmacy, and of dividing the remainder of the marks judiciously between the other subjects.

Dr. Montgomery said it would be well to defer their decision on the matter until they should have referred it to their examiners and obtained a report from them.

Mr. Payne withdrew his motion, and moved in place of it that the amendment of Mr. Allen be referred to a committee, consisting of the President, Mr. Brunker, Mr. Allen and Dr. Montgomery, with a request that they would confer with the examiners on the subject.

This proposal was unanimously agreed to.

The Registrar read a letter from Mr. Daniel Joseph McGrath, of No. 2, Dublin Street, Carlow, asking whether hardware merchants, oilmen, etc., were at liberty to keep in stock and vend corrosive sublimate and arsenic, and, if not, what protection was afforded in the matter to pharmaceutical chemists?

The President: He should be referred to the clauses of the Act, and informed that we are not in a position to give a legal opinion on the matter.

Mr. Brunker: The police have power to act if there be any breach of the law.

The President: He should also be informed that if any infringement of the law occurs the police should be informed of the matter.

A letter was read from Mr. John Patrick Henry, of 97, Donegall Street, Belfast, in reference to certain observations lately made by the Coroner of Belfast, on the occasion of an inquest there.

The President said the letter, which had only arrived that day, was too important to be discussed then, and had better be postponed to the next meeting.

Agreed to.

In pursuance of a resolution passed at the Annual Meeting of the Society, the following committee was, on the motion of Mr. Brunker, seconded by Mr. Wells, appointed to confer with four members of the Society, not on the Council, as to the best means of making the Society more attractive to its members:—Dr. Collins, Dr. Montgomery, Mr. Hayes and Mr. Grindley.

Mr. John Evans, of Dawson Street, Dublin, apothecary and pharmaceutical chemist, was elected a member of the Society.

A report of the pharmaceutical examination, held on October 4, stated that one candidate had passed, and one had been rejected.

The Council then adjourned.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The second general meeting of the above Association was held at the Royal Institution, on Thursday, October 26, 1882.

The Secretary announced that he had received a letter from the President, in which that gentleman explained that he should not be able to attend. He, therefore, in the absence of the Vice-President, who was out of the town, proposed that Mr. Conroy should occupy that position. This motion was seconded by Dr. Symes and carried by acclamation.

The minutes of the last meeting were read and confirmed and the following donations announced:—The *Pharmaceutical Journal*, from the Society, and the *Canadian Pharmaceutical Journal*, from the Editor.

Mr. A. G. Haddock then read the following paper upon—

Fertilizers.

BY ARTHUR G. HADDOCK, A.I.C.

In a former paper (*Pharmaceutical Journal*, April 22, 1882) I dealt generally with the constitution of plants, and of the manner by which they obtained their nutrition and sustenance. I pointed out that they obtain all their mineral constituents and also their nitrogen from the soil in which they grow, and that in land which has been cropped for a length of time, it is necessary to replace those elements which have been abstracted by the removal of the produce.

We saw that the ash of plants varied very considerably in amount and character, and that different vegetables exhausted the soil of different ingredients, or at all events of the same ingredients in different proportions, and hence the wisdom of adopting a system of rotation of crops. But if this system could be carried to its most successful issue it is perfectly clear that it could not go on *ad infinitum*. There must come a time when this robbery would be impracticable, since every useful article had been abstracted and there was nothing left to afford the slightest nutriment to the plants, which we might vainly endeavour to cultivate.

Coming to the question of the repair of the deficiencies by means of fertilizing materials, I may say that there is no such thing as a specific manure, that is to say, one which would be suitable for any kind of crop, and might be applied to any soil under any circumstances. The nature of the requirements must be studied, and the plant must have food, the constituents of which are the same, and as nearly as possible in the same proportion, as its own. Plants meet with a difficulty which does not obtain with animals, since the appetites and natural instincts of the latter lead them in search of the particular kind of food they require, a convenience denied to vegetables, as they are endowed with a very limited power of locomotion. They have, however, considerable gastronomic taste (if I may be allowed to use the expression) and much prefer a substance which is easy of assimilation to one which they have a great deal of difficulty in digesting. For instance, if you placed in the proximity of a plant which required nitrogen, a little nitrate of soda, a little blood, and some torrefied leather, it would commence its attack on the nitrate of soda, to the neglect of the other two, but if its hunger were not satisfied when this was consumed, it would turn its attention to the blood, leaving the more difficult task of dissolving and absorbing the leather to the less fortunate plant which might succeed it.

It will, then, be seen, in a district which has been heavily cropped, that even if the whole of the nutritive matters have not been removed, those most assimilable must have been abstracted. When this is the case the land must either be allowed to lie fallow for some time, or fertilizers must be added. Except the plant can get at its food in a state of solution during the time of its growth, it is of no earthly use to it. By allowing the land to lie fallow, weathering influence and that of carbonic acid and of water are brought to bear upon the insoluble substances in the soil, so that in time these are rendered soluble and in a condition to be absorbed by the plant. But this would take some time, and the poor British farmer, paying say £4 per acre rent for his land, would likely, before nature had completed this operation, be compelled to "seek fresh woods and pastures new."

The second remedy is the application of fertilizing materials. To be able to say what kind of fertilizer the farmer should use, one ought to analyse the soil to which it is to be applied, and also to know what kind of crop is desired of it. But I am afraid it is expecting too much of the British farmer to think he will pay the necessary fee for obtaining an analysis which he does not appreciate, and which, I sadly fear, he does not believe in.

But although different crops exhaust the land of different substances, we may take it pretty generally that all of these, with the exception of calcium phosphate, alkaline salts, and nitrogen, have been present in such very considerable quantity originally that they will not want renewing, or only at considerable intervals. This statement must be taken in a general sense, and as only involving chemical restitution. Most of the artificial manures in the market are compounded with a view to providing for deficiency in the above-mentioned substances.

Guano is the name given to a large number of artificial and natural fertilizers. Originally this term signified the excreta of sea fowls, and I suppose, properly speaking, does so still, but in ordinary parlance it means pretty nearly anything. The Simon Pure (*i.e.*, Peruvian) guano was found to give such excellent results that it became a very popular article, and was imported in large quantities to this country. The demand for it was so great, and the price so high, that the usual result under such circumstances, adulteration and sophistication, followed, till now the meaning of the word guano has entirely changed, and in fact by itself has practically no signification whatever. We hear, for instance, of Megillones *guano*, which is a *mineral* phosphate of lime, and I have even come across the Alta Vela phosphate designated as guano. The phosphoric acid in the latter phosphate is entirely combined with the oxide of iron and alumina, and is almost worthless.

Then, again, the genuine Peruvian guano is only the ghost of its former self. It retains its distinctive odour, but the amount of nitrogen contained in it has wofully decreased. I do not exactly know what is the reason of this deterioration, but I have noticed that most samples contain a much larger proportion of stones than formerly, which may be attributable to a lower excavation of the deposit. However, it is still a very valuable manure, as it contains both soluble and insoluble phosphate, nitrogen and alkaline salts. The soluble phosphoric acid is combined with soda, potash and ammonia, and the insoluble with lime and magnesia. (The soluble phosphate cannot very well be determined by extracting it with water, as the samples frequently contain oxalate of ammonia, which dissolves some of the insoluble portion. The total P_2O_5 has therefore to be determined, and also the lime and magnesia. These latter are calculated into phosphate, and any P_2O_5 remaining is considered as soluble, and united with the alkalies. But this, by the way.)

The greater portion of Peruvian guano is soluble or readily susceptible to solution in the soil, and is highly stimulative, and must on this account be used sparingly. Another reason why it should be applied in small quantities at a time is that if dealt out with too liberal a hand a portion would get washed away into the drains, or soak into the subsoil, in either of which cases it would be lost. Peruvian guano is very effective on land which is very much exhausted, and should be applied, together with mineral phosphate, rather as a stimulant than a food, and to get the land into good heart, when further applications will be unnecessary. In leaving this, our old friend, I may say that for a soil suffering from ordinary famine, I consider it the premier of fertilizers, and affords us a capital model to imitate.

But as the deposits of natural guano could not yield a sufficient quantity it was necessary to turn attention to other substances which might supply its place, and it is generally considered that, as a rule, artificial fertilizers should contain phosphoric acid, lime, magnesia, alkaline salts and nitrogen. Some chemists, indeed, do not attribute much importance to magnesium salts, as, for instance, M. Ville, in his work on 'Agricultural Chemistry,' recently translated into English by Mr. Crookes, thinks the soil always contains a sufficient quantity, and he has a great opinion of the efficacy of lime, applied as such, or as gypsum. He is also of opinion that the nitrogen of the plant is derived to a large extent from the atmosphere, and that, therefore, the addition of nitrogenous substances to the soil is superfluous.

I was surprised to see this statement, as I thought that question had been quite threshed out, and if the results of the elaborate and careful experiments of Sir J. B. Lawes, Drs. Gilbert and Voelcker, Mr. T Jamieson, and others, in this direction, are not controverted, I think it has been pretty plainly shown that the addition of nitrogen to the soil is a very important factor in the success of the operation.

But all authorities are agreed that phosphoric acid in some form or other must be contained in a fertilizer, and the question then comes as to the mode of combination in which it is to be administered. Almost all natural phosphates yet found are insoluble in water, or very nearly so, and until they can be brought to dissolve in the saline solution and juices found in the soil they are useless, as the plant is unable to absorb them.

Insoluble phosphates of lime, both of mineral and of animal origin, are generally rendered soluble by treating them with sulphuric acid. A quantity of acid is used insufficient to convert the whole of the lime into sulphate, but only two-thirds of it, leaving one-third of it combined with the phosphoric acid, forming a salt freely soluble in water. This compound is called soluble phosphate, or sometimes monophosphate, or again, biphosphate of lime. Why the latter name, which is frequently employed, should be given to it, I am at a loss to see. Insoluble phosphates are thus rendered soluble on a very large scale in this country, and the mixture with the sulphate of lime formed in the reaction is sold under the name of superphosphate. The superphosphate made from bones has been generally regarded as being superior to that made from a mineral phosphate of lime, but unless the mineral contains a large quantity of oxide of iron and alumina, one would think that soluble phosphate was equally valuable, whether it had an organic or a mineral origin. The presence of oxide of iron and alumina in a phosphate is an objection, as the soluble phosphate made from it has a great tendency to revert, or go back into an insoluble form.

There is by no means unanimity of opinion as to whether this reverted or reduced phosphate is as valuable as the soluble variety, but at all events it will not fetch nearly the same price in the market. The processes which have been devised for estimating the amount of the retrograde phosphate are not, to my mind, altogether satisfactory. The method generally adopted is that of first removing the soluble phosphate by lixiviation with cold water, and then treating the insoluble portion with an alkaline solution of ammonium citrate, and reckoning the amount of phosphate dissolved by this reagent as reverted. I have found that a portion of the phosphoric acid of natural tribasic phosphates, such as coprolite, is removed by this process. The ground urged for placing reduced phosphate on the same scale as soluble, is that the latter is converted into an insoluble modification when applied to the soil. This, one would naturally say, is so, since any oxide or carbonate will reprecipitate soluble phosphate; and these are found in every soil.

This theory of reprecipitation before absorption by the plant must, I think, be freely admitted. The idea has of late years been carried further. Admitting the theory, it follows that the insoluble phosphate must meet with certain influences in the soil, which bring it into a state of solution, since it has to be absorbed in this condition by the plant. What causes this solution? In speaking of tribasic phosphate of lime as being insoluble in water, we are not making a statement which is absolutely correct. Certainly, if we placed a lump of mineral phosphate in pure water the amount dissolved, even after digestion for a very considerable period of time, would be quite inappreciable, and the experiment made in this way would appear to justify the usual definition. Again, glass in sheet, if treated with pure water, would remain practically intact, but if we ground the glass to an exceedingly fine powder, we should find that it yielded a weighable quantity to solution. So with phosphates. If they are ground sufficiently fine, it is found that they are to a certain extent soluble. In *pure* water they will dissolve, but the solvent action is much increased if the water contains salts of various kinds and carbonic acid. Such salts are contained in the soil, and so the tribasic phosphate is, to a certain extent, rendered soluble. It would seem, then, that fineness of division is all that is wanted, and all that is gained by making superphosphate. Of course when a soluble phosphate reverts the particles are in an infinitely finer state of division than could possibly be obtained by the most perfect mechanical means. The phosphate would be precipitated in molecules. It would consequently offer an enormously greater surface to the solvent action, and therefore, one would think, should be of greater efficacy.

If fineness of division is all that affects the value of phosphate of lime, one would expect that precipitated phosphate would be as valuable as soluble phosphate. By precipitated phosphate, I mean the article which is sold under that name or under the title of bone extract, and which is made by dissolving tribasic phosphate in acid, and adding lime until all the phosphoric acid is precipitated. In this country it is generally made from bone ash, but I should think that mineral phosphate would do equally well, and that the reason it is not used is on account of the popular prejudice against phosphates of a mineral origin. Sufficient lime is not added in the precipitation to convert it into tribasic phosphate, but generally only enough to form bibasic, and occasionally only a mixture of the latter and monobasic phosphate, so that it frequently happens that if the phosphoric acid found on analysis is calculated into tribasic phosphate (the usual way of stating it) the result shows more than 100 per cent. It is, therefore, necessary to give the amount of lime and of phosphoric acid separately.

As this form of manufactured phosphate is coming more into favour, I thought I would look up the different experiments which have been carried on with it comparatively with soluble phosphate, and I was surprised to find that there is a wonderful consensus of opinion with respect to its value. The reason of my surprise was that there is usually a very perplexing conflict of statements with regard to the relative efficacy of any particular kind of manure. Anyone need only refer to recent literature on agriculture to satisfy himself as to the truth of this statement. However, authorities seem generally agreed in giving high rank to precipitated phosphate, some chemists attaching a higher value to it than to soluble phosphate. Mr. T. Jamieson, of Aberdeen, gives a relative value to soluble phosphate of 12, and to precipitated phosphate of 13, bone ash being 10. This was after six years' careful experimenting. At the International Congress of the Directors of Agricultural Experimental Stations, held in Paris a short time ago, M. Maercker, a director, stated:—"In general, precipitated phosphate of lime employed in the same quantity as soluble phosphate in average soils in good condition has shown itself equal to the soluble phosphate." M. L. Grandeau, the Commissary-General of the Congress, rejoices to hear this expression of opinion from so eminent an authority, as he himself holds the same opinion. He says:—"The experiments of M. Petermann, at the station of Gembloux, and quite recently those also at Halle, published by M. Maercker, clearly confirm the results of my eight years' experience, viz.:—That the crops yielded by equal quantities of phosphoric acid given to plants in the form of superphosphate and in the form of precipitated phosphates are obviously equal." M. Grandeau has experimented on yellow turnips, swedes, oats, grass, potatoes, beet, rape, rye, wheat, barley, maize and oats.

I think that the manufacture of precipitated phosphate will greatly extend, and if so, we shall not be so much troubled with the question of reverted phosphate.

Mr. Thomas Jamieson, F.I.C., to whose researches I have once or twice referred, is the chemist to the Aberdeenshire Agricultural Association, under whose auspices he has conducted a series of experiments with fertilizers, extending over a period of six years, and the results are embodied in the sixth annual report of the Association, a copy of which I am indebted to his courtesy for. These experiments have apparently been very carefully conducted, and that he has not twisted the facts to suit any pet theory he might have formed is proved by his having arrived, at the end of each year, at certain conclusions which he regarded in a tentative manner, and some of which he has much modified. Mr. Jamieson now, however, considers that he has got sufficient weight of evidence to justify him in giving a definite relative value to the different forms of phosphate and nitrogen. As I could not in this paper touch the question of nitrogenous fertilizers, I will content myself with giving his table of the relative value of nitrogen in them, and notice more particularly only the experiments with phosphates.

They have been made by using the system of rotation —the particular one being turnips, oats, grass,—and also, as it was found that the application of phosphates to turnips produced the most marked effect, by cultivating turnips for six consecutive years on the same soil.

I have not space to enter into the minutiæ of the details, which I consider well worth disseminating in agricultural circles, but must confine myself to the general conclusions to which Mr. Jamieson has arrived. These are some of them:—

"1. Non-crystalline phosphate of lime, ground to a floury state, applied to soil deficient in phosphate, greatly increases the turnip crop, and also, though to a less extent, the cereal and grass crops, but always with equal effect, whether it be derived from animal or mineral matter.

"2. Soluble phosphate is not superior in effect to insoluble phosphate, if the latter be in finely disaggregated form, *e.g.*, disaggregation effected by precipitation from solution, or by grinding bones after being steamed at high pressure. In such finely divided conditions the difference is in favour of the insoluble form, in the proportion of about 12 for the soluble to 13 and 14 for the above insoluble forms respectively. In less finely divided form (such as mineral phosphate impalpable powder) insoluble phosphate is inferior to soluble phosphate in the relation of about 10 to 12.

"3. This conclusion has reference to nitrogenous materials.

"4. Fine division (or perfect disaggregation) of phosphates assists the braird nearly as much, and with more healthy results, than application of nitrogenous manure.

"The most economical manure is probably non-crystalline, floury, insoluble phosphate of lime; the cheapest form being mixed with an equal quantity of the form in which the highest degree of disaggregation is reached."

Experiments which have been carried on in Sussex, Kent, and Huntingdon confirm these conclusions very remarkably, so that it would appear that superphosphate is, as a rule, a very expensive form of fertilizer. Mr. Jamieson brings to light another great objection to it as regards root crops, or more particularly the turnip crop.

Turnips are frequently affected with a disease of a fungoid character known as club-root disease, a most distressing affliction to the farmer, as it is liable to spread very rapidly, and renders useless and kills a large portion of his crop. Now Mr. Jamieson has found as an invariable rule that the growth of this fungus is stimulated by the use of manures containing sulphuric acid, and thinks, therefore, on that account alone, they should be tabooed. This indeed seems a fatal objection to the use of vitriolized manures for turnips.

Phosphates maintain their relative values when applied to rotations in these experiments, though in these cases the effect of them is not so clearly seen as with the turnips, as their effect is obscured by the influence of nitrogenous materials which must be employed. The concordance of the figures leads Mr. Jamieson to the conclusion—"That the superiority of soluble phosphate over precipitated phosphate is practically *nil.* In a final summary of the results of the six years' experimenting he enunciates the follow opinions:—

"Dissolved phosphate is ready but rapid, and tends to unhealthy growth.

"Raw bone powder is steady, but slow and costly. Steamed bone flour is ready, steady, but more costly than insoluble mineral phosphate, which is slow but steady, and least expensive."

He recommends for general use a mixture of two extremes—the largest producer, such as steamed bone flour, or precipitated phosphate, together with the cheapest producer, finely ground mineral phosphates.

As a guide to farmers he gives the following relative values for different kinds of phosphates:—

"Phosphate of iron	0
Phosphate of alumina (Redonda)	3
Tribasic phosphate of lime in bone	10
Tribasic phosphate of lime in mineral	10
Monobasic phosphate of lime in soluble phosphate	12
Bibasic or tribasic phosphate of lime in precipitated form	13
Tribasic phosphate of lime in steamed bone flour	14"

Although I have not been able to go into the question of nitrogenous fertilizers, I think Mr. Jamieson's standards of value for some of them deserve quoting here.

"Nitrate of soda	10
Sulphate of ammonia	10
Guano	10
Nitrogen (only) in bones	8
Dried blood	8"

The latest report of the Aberdeenshire Agricultural Association is pregnant with information, and will well repay careful perusal.

The Chairman having made a few remarks upon the value and interest of the paper,

Mr. A. Smetham discussed the subject, pointing out the difficulties experienced owing to the variations of soil and climate, and concluded by moving a vote of thanks to Mr. Haddock.

This was seconded by Dr. Symes, and after a few remarks by the Secretary and Mr. A. H. Samuel, the proceedings terminated.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Tuesday evening, October 31, a lecture was delivered in connection with the above Association by Mr. W. B. Clark, on the "Halogens." The subject was handled in a very able manner, each element being brought before the audience in a very instructive light, much to the credit of the lecturer.

A vote of thanks was accorded to the lecturer at the close, on the proposition of the Chairman, Mr. Edwards, after having been seconded by Mr. Garrett.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

An open meeting of this Association was held in the Pharmaceutical Society's rooms, Edinburgh, on Wednesday evening, November 1, Mr. Peter Boa, President, in the chair.

The minutes of the previous meeting were read and confirmed.

The report of the Apprentices' Prize Examination Committee was then submitted. It showed that the competition had been eminently successful; eight candidates had competed, with the following result:—First prize (three months' practical chemistry, under Dr. Macadam), awarded to Mr. George Coull; second prize (value half a guinea), awarded to Mr. G. A. Grierson; special prize (Griffith's 'Materia Medica,' presented by Mr. William Aitken), awarded to Mr. Thomas Stephenson.

On the motion of Mr. J. D. Robertson, the report was unanimously adopted, and a vote of thanks was awarded to the Committee for their services, and to Mr. Aitken, for his donation of the special prize.

Mr. Boa, in presenting the prizes, congratulated the winners on the excellence of their papers. He regretted that the Committee had not power to award more prizes, as several of the competitors well deserved recognition.

An interval of fifteen minutes was then allowed for the inspection of an exhibition of microscopic objects and rare pharmaceutical specimens. Afterwards two lectures were delivered, on "How to Prepare for the Minor," by Mr. J. R. Hill, and on "Practical Pharmaceutical Chemistry," by Mr. Peter MacEwan.

After the members had expressed opinions on these subjects, votes of thanks were awarded to all who had contributed to the success of the meeting, special mention being made of the interesting contributions of Messrs. Hume, Maben and Purves.

The President having intimated that the next meeting would be on November 22, when a paper on "Alkali Manufacture: Old and New Processes" will be read, the meeting was closed.

ABERDEEN CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The first meeting of the Chemists' Assistants and Apprentices' Association was held in the Café Buildings, Ship Row, on Friday, November 3, the President in the chair, when Mr. Ritchie, Market Street, delivered the inaugural address, in the course of which he pointed out the advantages derived from and the best modes of conducting such associations.

The address was highly appreciated by all present.

Dr. Moir, Union Place, made some suitable remarks.

A large and successful meeting was brought to a close by hearty votes of thanks to the speakers.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

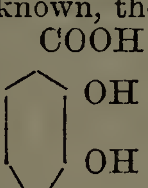
A meeting of this Society was held on Thursday, November 2, F. A. Abel, F.R.S., Vice-President, in the chair.

It was announced that a ballot for the election of Fellows would take place at the next meeting (November 16).

The following certificates were read for the first time:—F. W. Branson, J. S. Bishop, E. E. Berry, R. Blair, R. Coulthard, W. J. Chrystal, T. R. Cowie, R. Carruthers, E. G. Clayton, J. T. Dunn, H. L. Dampier, A. G. Earl, G. Gray, J. L. Howe, A. G. Howard, W. A. L. Hammersley, H. Hotblack, E. Jackson, A. E. Johnson, A. Keen, F. J. Kilner, J. D. McCarthy, H. E. Newton, R. H. Parker, T. E. Peppé, S. E. Phillips, S. Rideal, G. M. Taylor, T. E. Vasey.

Dr. A. K. Miller, then read a paper—

On Dihydroxybenzoic Acids and Iodosalicylic Acids.—Of the six possible dihydroxybenzoic acids five are already known, the sixth acid being represented by the formula



. Two methods were tried for preparing this body:—1. Catechol was heated with concentrated solution of ammonium carbonate in sealed tubes for several hours. The product of the reaction consisted of a mixture of two acids, one of which was protocatechuic acid, the other must be the acid sought for, as this and protocatechuic acid are the only two dihydroxybenzoic acids derivable from catechol. The above reaction gave a very poor yield, and a second method for preparing this catecholorthocarboxylic acid was tried. 2. Salicylic acid and iodine were heated together in alcoholic solution and the resulting iodosalicylic acids purified by crystallization from water. The results obtained differ from those published by Lautermann, Liechti, Demole, etc. It was found that two iodosalicylic acids had been formed, paraiodosalicylic acid melting at 197° and a new isomer melting at 198°. The two differed in crystalline appearance, solubility, etc., but most markedly in yielding two distinct dihydroxybenzoic acids when heated with potash. From the former quinolcarboxylic acid was obtained; from the latter an acid which split up on heating into carbonic anhydride and catechol. The fact of a dihydroxybenzoic acid, derived from salicylic acid, splitting up on heating into carbonic anhydride and catechol is of itself proof that it must have the constitution indicated above. This constitution is however the only one possible for the acid produced together with protocatechuic acid by introducing a carboxyl group into catechol, and since a comparison of the products of both reactions has shown the two to be identical, there can be no doubt that the constitution given is the correct one.

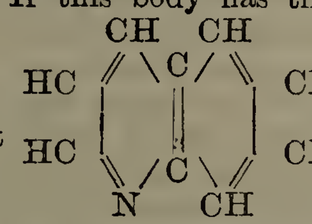
The Secretary then read a paper—

On Crystalline Molecular Compounds of Naphthalene and Benzene with Antimony Trichloride. By WATSON SMITH and G. W. DAVIS.—On melting 3 parts by weight of antimony trichloride, and 2 of naphthalene, minute but perfectly symmetrical clinorhombic tables formed in the liquid, after the source of heat had been removed; these crystals were separated with a warmed platinum spatula. They were very deliquescent and had the composition $3SbCl_3, 2C_{10}H_8$.

A similar compound is formed with benzene, having the composition $3SbCl_3, 2C_6H_6$.

A second communication was also read by the Secretary entitled—

Additional Evidence, by an Analysis of the Quinoline Molecule, that this Base belongs to the Aromatic Series of Organic Substances.—By WATSON SMITH and G. W. DAVIS. The authors have investigated the effect of an exhaustive perclorination, according to the method of V. Merz, on quinoline. If this body has the constitution usually assigned to it



the portion of the compound nucleus containing nitrogen might be expected to be least stable and to yield, when chlorinated, perchlorethane, perchlormethane and nitrogen, whilst the other portion would yield perchlorbenzene

$$C_9Cl_7N + 7\,Cl = C_6Cl_6 + C_3Cl_8 + N$$
$$C_3Cl_8 + Cl_2 = C_2Cl_6 + CCl_4.$$

Pure quinoline was therefore heated in a strong tube of hard glass with ten times its weight of antimony pentachloride to 170°, then to 280°, to 320°, and finally to 400°, each for a space of five hours. After each heating the hydrochloric acid gas and nitrogen were allowed to escape, an operation attended with some danger; a crystalline black mass was the result, which was washed out with hydrochloric acid, and the antimony separated. The residue was dried and sublimed; by resublimation, etc., perchlorethane melting at 182° and perchlorbenzene melting at 223° were separated. No perchlormethane could be detected, but owing to its volatility it was probably carried off in the violent rushes of gas which took place on opening the tube.

The Secretary then communicated a paper on—

Orcin and some of the other Dioxytoluols. By R. H. C. NEVILE and Dr. A. WINTHER.—Various considerations led the authors to the conclusion that orcin was a dioxytoluol of the constitution 1.3.5, a supposition which has since been shown to be true by Tiemann and Streng. The present research was undertaken to discover, if possible, some practicable method for the artificial production of orcin. The starting point was dinitrotoluol, 1.3.5, prepared from dinitroparatoluidine, the yield being 60 to 65 per cent. The dinitrotoluol was dissolved in an alcoholic solution of ammonium sulphide and water added, when an orange-red substance is precipitated. This was dissolved in dilute hydrochloric acid and reprecipitated by ammonia. The nitrotoluidine was purified, converted into nitrokresol, which was reduced with tin and hydrochloric acid. The chloride was dissolved in a hot mixture of equal parts of sulphuric acid and water, the solution diluted with water and a dilute solution of potassium nitrite added. The liquid was then warmed, filtered and extracted with ether. The red-brown oil so obtained was purified by distillation, and the product by crystallization furnished the dioxytoluol, identical in all respects with orcin. The authors have also prepared orcin from metabromotoluol metasulphonic acid and from metadibromotoluol. The authors have also prepared the dioxytoluol 1.2.4 and 1.2.5, and have investigated the preparation of the body 1.3.4. They have tabulated the reactions of the various dioxytoluols with ammonia, chloride of lime, ferric chloride, etc.

On the Varying Quantities of Malt Albumenoids extracted by Waters of different Types. By E. R. MORITZ and A. HARTLEY.—The authors give tables showing the specific gravity of the worts and the percentage of nitrogen extracted by distilled water and waters containing NaCl, $MgSO_4$, Na_2CO_3, Burton crystals, $Ca(NO_3)_2$, etc. The experiments show that distilled water extracts the smallest amount of albumenoids; salt does not much increase the extractive power, but calcium salts, especially the nitrate, have a strong extractive power. The authors, however, conclude that the influence of the extracted albumenoids has been very much overrated, as the differences in results are comparatively insignificant; they attribute the characteristics of the finished produce to the direct influence of the mineral matters on fermention, a subject which they are at present investigating.

Mr. Warington suggested that the authors might have carried their investigations further, and estimated the non-albumenoid as well as the albumenoid nitrogen, the extract might have been precipitated by phosphotungstic acid and the nitrogen determined in the filtrate.

On the Derivatives of Ethylene Chlorobromide. By J. W. James.—The author summarizes his principal results as follows:—When preparing ethylene chlorobromide by passing the gas into a solution of chloride of bromine (ClBr), it is necessary, to obtain a pure product and a good percentage, that the chlorine be passed into the bromide at 0° C., otherwise a substance is formed boiling 3° or 4° higher than pure C_2H_4ClBr, which is useless for the advantageous preparation of ethylene chlorothiocyanate. If an aqueous solution of neutral sodium sulphite and ethylene chlorothiocyanate be brought together in direct sunlight the sodium salt of a new acid, ethylene thiocyanosulphonic acid $C_2H_4{}^{SO_3H}_{SCN}$ is produced. By passing ammonia gas into an ethereal solution of chlorethylsulphonic chloride no amide is formed; with ethylsulphonic chloride, however, the corresponding amide is easily obtained. By the action of neutral sodium sulphite in aqueous solution upon ethylene dibromide or chlorobromide isethionate of sodium is produced with evolution of sulphurous anhydride, in addition to the well-known ethylene disulphonate of sodium obtained by Strecker.

After the thanks of the meeting had been given to the authors for their respective papers, the Society adjourned to November 16, when a ballot for the election of Fellows will be held, and the following papers are to be read:—"Contributions to the Chemistry of Tartaric and Citric Acids," by the late B. J. Grosjean; Contributions from the Jodrell Laboratory, Kew: (i.) "Constitution of Lignin and Bastose," by C. F. Cross and E. J. Bevan; (ii.) "Contributions to the Chemistry of Plant Fibre," by C. F. Cross, E. J. Bevan and S. S. Webster; (iii.) "Action of Nitric Acid on Cellulose," by C. F. Cross and E. J. Bevan; "On the Constitution of some Bromine Derivatives of Naphthalene," by R. Meldola.

CHEMISTS' ASSISTANTS' ASSOCIATION.

On Wednesday, a meeting was held at the rooms, 32a, George Street, Hanover Square, W. Mr. Wrenn, President, in the chair. There was a large attendance.

A paper by Mr. F. H. Alcock on "Subnitrate of Bismuth" was read, which will be published in a future number.

A good discussion followed, in which the President, Messrs. Thompson, Winfrey, Braithwaite, Woods, Millhouse and Palmer took part.

A vote of thanks, proposed by Mr. Phillips and seconded by Mr. Woods, was accorded to the author.

Parliamentary and Law Proceedings.

Pharmaceutical Society *v.* Bradford.

The case of the Pharmaceutical Society of Great Britain *versus* Bradford, instituted in the County Court of Yorkshire, holden at Bridlington, in which the plaintiffs sued the defendant for a penalty of £5, incurred by his having used the title of chemist, has been terminated by the defendant paying into court the amount of such penalty and costs.

Pharmaceutical Society *v.* Rickman.

The case of the Pharmaceutical Society of Great Britain *versus* Rickman, instituted in the County Court of Yorkshire, holden at Malton, in which the plaintiffs sued the defendant for a penalty of £5 incurred by him in having kept open shop for the retailing, dispensing or compounding of poison, has been terminated by the defendant paying into court the amount of such penalty and costs.

Pharmaceutical Society *v.* Fletcher.

The case of the Pharmaceutical Society of Great Britain *versus* Fletcher, instituted in the County Court of Lancashire, holden at Southport, in which the plaintiffs sued the defendant for a penalty of £5, incurred by his having used the title of chemist and druggist, has been terminated by the defendant paying into court the amount of such penalty and costs.

Correspondence.

Citrine Ointment.

Sir,—In the course of an interesting paper upon the "History of Citrine Ointment," published by Mr. Cripps in last Saturday's Journal, the author refers incidentally to the "well-known golden eye ointment" which, he intimates, is a preparation of precipitated mercuric oxide. This fact, if it be such, is quite new to me, my impression being that one of the sulphides of arsenic was the active constituent, and that the only doubt which was entertained upon the subject was the question whether orpiment (As_2S_3) or realgar (As_2S_2) was the specific ingredient, no salt of mercury being indicated. I am quite aware that ointments prepared with the yellow and red oxides are used, like the diluted citrine, as substitutes for the original preparation, but, of course, that does not affect the question of its composition.

Possibly Mr. Cripps may have some further information bearing upon the subject to communicate.

Eldon Grove, Rockferry. J. E. Saul.

Inferior Drugs.

Sir,—In corroboration of Mr. Williams's remarks at the last Council meeting and to give further weight to his views, allow me to state that some weeks ago I was offered a parcel of belladonna root a little below the market value. Upon examination it turned out to be the root of *Scopolia Japonica*, a plant closely allied, it is true, to *Atropa Belladonna*, but the substitution of which for belladonna could be no more justified than the use of hyoscyamus or stramonium.

I think it may be assumed this root was purchased at a cheaper rate than belladonna and if distributed might be used in making official preparations; the evil consequence of such a result needs no further comment.

University College Hospital. A. W. Gerrard.

Percentage of Morphia in Ext. Opii Liquid.

Sir,—Will you allow me to thank Mr. Pickard for kindly pointing out an error in my calculations, which is so obvious that I can only account for it by its being one of those slips to which we are liable when over worked?

Shepherd's Bush. John Woodland.

An Old Subscriber.—You do not say what colour you wish to use, but recipes for making suitable coloured liquids of all colours may be found by referring to the indexes.

W. S. Parrott.—We are unable to give you the formula with certainty. The correspondence respecting "Pil. Philip." will be found in vol. iv., pp. 419 and 440.

F. W. Hollingsworth.—(1) No. (2) The Secretaries are Messrs. Stewart and Chrisp; the Assistant Secretary is Mr. W. W. Reeves.

C. W. Price.—We have failed to obtain any information respecting the preparation, but are not quite certain that we have made out the name correctly.

Communications, Letters, etc., have been received from Messrs. Savage, Bedford, Haydon, Shenstone, Lee, A. T., Euretes, Pulvis.

THE SOLUBILITY OF MORPHIA SALTS.*

BY D. B. DOTT, F.R.S.E.

Before describing my experiments on the solubility of morphia salts, it seems desirable to say something on the general subject of solubility, having especially in view the remarks which were made after the reading of my note at the recent meeting of the British Pharmaceutical Conference.

At the outset we ought to have a distinct idea of what is implied by the expression *solubility*. It is too true, as Professor Attfield has said,† that there is a great deal of "haziness and indefiniteness" about this subject, and the sooner the matter is made clear the better. Of the real nature of solution and of what determines and limits solubility, we know very little. When we say that solution results from the attraction exerted between the molecules of different substances, by which a homogeneous liquid is produced, and that the solubility varies with the temperature and pressure, we are stating very nearly all that is known definitely in this department. However that may be, we are at present only concerned with the methods of ascertaining solubilities, the manner of stating the same, and the sources of error appertaining thereto. Generally speaking, such a determination consists of two stages:—

First. The preparation of the solution.

Second. The estimation of the amount of substance dissolved.

Before going further I should like to quote some sentences from Storer, which occur in the introduction to his 'Dictionary of Solubilities.'

"It may be well to remark here that the text-books do not generally lay sufficient stress upon *the preparation of the solution* of the substance under examination, and yet this is the single fundamental point of a correct determination, the other steps of the process being altogether subsidiary, and in general easy of execution as well as comparatively free from sources of error. It is commonly stated that an exactly saturated solution of a salt may be prepared either by exposing a large excess of the salt to the action of the solvent during several hours at the desired temperature (*method by digestion*), or by heating a mixture of the salt and solvent until a strong solution has been obtained at a temperature higher than that at which the determination is to be made, and then cooling the solution to the desired degree, and maintaining it at this point for some time in contact with crystals of the salt, the whole being frequently agitated (*method by cooling*). Now the latter method, though theoretically correct, is in practice peculiarly liable to error, and great care should consequently be exercised in employing it. It is no doubt true, that as regards most substances, the saturated solutions prepared by either method would finally coincide in composition, provided the cooled solution be allow to stand under proper conditions, for a sufficient length of time. Yet it is often exceedingly difficult thus to obtain normally saturated solutions, even of our most common and easily crystallized salts, within the limits of time which can conveniently be allotted to a single experiment. This depends upon the tendency of the solutions of many, if not of most, substances to an indeterminate supersaturation when cooled from a higher to a lower temperation. This supersaturation is not always to be easily detected unless comparative solutions are prepared by the method of digestion, and the length of time required by any given solution to assume the normal condition is a point not readily ascertained. . . . . Indeed it is my opinion, that next to the impurity of the material operated upon, by which many published statements have unqestionably been vitiated, there is no source of error so grave, none which has so seldom been fully guarded against, or so often altogether overlooked, as this tendency to supersaturation.

"On the other hand, in the preparation of solutions by the method of digestion, a difficulty is encountered in the tendency of many substances, like arsenious oxide for instance, to dissolve with extreme slowness; this can, however, be overcome by the exercise of patience, and in any event admits of being detected and controlled. It would, therefore, appear that when practicable the method by digestion should generally be preferred, at least for temperatures low enough to ensure the experiment against the influence of evaporation. The completion of the solution can always be ascertained by determining from time to time the amount of substance dissolved; the operation being considered finished when the results of two of these tests accord with each other."

My own experience thoroughly confirms the general truth of these remarks, although to one expression I must take exception. I do not think that the *method by cooling* is "theoretically correct" any more than it is practically so. It must be remembered that the solubility of a substance in a given liquid at a given temperature means primarily the proportion of the substance which is taken into solution by the solvent at that temperature; and *not* what proportion is retained at the same temperature after the solution has cooled from a higher temperature. If substances in solution did not undergo any chemical decomposition or physical alteration by heating, or even if they immediately returned to their normal condition on the solution cooling, the two methods would yield identical results. When, however, it is observed that many compounds undergo decomposition or suffer some permanent change when their solutions are heated, it is manifest that in their case the method by cooling is quite inadmissible. Solutions of sugar and of aloïn, for example, are so altered by boiling that however long they may be allowed to stand after cooling they will retain a greater amount of matter than if the solution had been prepared by digesting the substance with the solvent at the lower temperature. No doubt some salts undergo decomposition by contact with water at the ordinary temperature. This is the case with some of the alkaloidal salts and to a certain extent with some of the ammonium salts, as was recently well demonstrated by W. W. J. Nicol in a paper read before our Royal Society. The condition of salts in solution is a very interesting subject, but has only an indirect bearing on the question with which we are now engaged, except indeed in those cases where a precipitate is produced when the salt is dissolved. If citrate of caffeine, for instance, dissolves in water to a certain extent, I think it is quite right to take this as the measure of its solubility, whether or not it exists in solution as citrate of caffeine. As a matter of fact our knowledge of the condition of salts in solution is very limited. There is no proof, for instance, that the hydrates in all cases dissolve as such and do not part with their water; and, as was lately ably shown by spectroscopic observation,* changes take place which were formerly not suspected, on mixing solutions of different compounds. In any case, it is obvious that no more accurate method of preparing the solution is known, than causing the solvent to take up the

* Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, November 8, 1882.

† *Pharmaceutical Journal*, xiii., 253.

* *Journ. Chem. Soc.*, xlii., 1018.

maximum amount it is capable of dissolving at the temperature at which it is desired to make the determination. When, however, the "method by cooling" is adopted, the case is very different. As formerly observed, there are instances in which well-marked chemical decomposition takes place upon boiling a solution, and as the substance does not return to its original condition when the solution cools, any results obtained by this process are entirely vitiated. Besides the very common occurrence of the dissociation of hydrates by heating their solutions, physical changes may result, by which the determination is rendered fallacious. In some cases the cooled solution never attains the same composition as a cold saturated solution of the same temperature, and in other instances this result is reached only after a long time. In fine, we can never be sure that a determination made by the "method by cooling" is trustworthy, unless a check experiment is performed by the "method by digestion;" whence it is manifest that the latter method ought always to be employed.

Having prepared the solution, we have next to determine the proportion of substance dissolved. In most cases this can be easily done by evaporating a weighed portion to dryness and weighing the residue. All that is essential is that there should be no loss by volatilization, and that the residue has a known composition. The difficulty involved in a substance being volatile may in many instances be overcome by conducting the evaporation at a low temperature, or in other cases by adding a known weight of some body capable of forming a non-volatile compound. When a substance has to be dealt with, which is not amenable to these methods, perhaps the best plan is to add to a weighed portion of the same, little by little of the solvent from a burette, agitating after each addition, until complete solution is effected. It would be superfluous to discuss all the precautions which experience might suggest to meet special emergencies.

In regard to the sources of error in such determinations, it is important to consider the causes of the great discrepancies which occur in the published statements of solubilities. I have not the least hesitation in giving the first place to carelessness. After making all allowances, it must be admitted that some of the information supplied to us in this department is mere guess-work, or at the best the result of experiments so carelessly conducted as to make them of less than no value. When we see a solubility given as anything between "1 in 4," and "1 in 15," we cannot help feeling that "some one has blundered." Another fertile source of error is the presence of impurities in the materials employed, although I must say that I do not attach the importance to this matter which it has received from others. Generally speaking the amount of impurity at all likely to be present in a substance whose solubility was being ascertained would not seriously affect the accuracy of the result. It is, of course, well known that the solubility of a body is often greatly increased by the presence in solution of a second compound, but as a rule this result is only obtained when the impurity is present in considerable quantity, so that no experiment conducted with reasonable care would be falsified in this manner. I am quite aware that the existence in solution of certain foreign matters greatly influences the crystallization of organic compounds; but this fountain of error would only come into play when the determination is made by the "method by cooling," which we have already condemned. Supposing, then, that every ordinary precaution has been observed in making the experiment, through what sources are errors likely to creep in? I think they are principally two. In the first place there is the variation in physical condition. That is to say, that compounds having the same chemical composition may exhibit divergence in their solubilities on account of some difference in structure. I do not here refer to isomers, which one would expect to show such divergence. We have elsewhere discussed the influence of the amorphous state on solubility. It may be laid down as a general rule that a body is much more soluble in the non-crystalline condition than in the crystalline form, so that if a compound is capable of existing in both forms, it will dissolve far more readily when in the former condition than when in the latter, unless it very rapidly assumes the crystalline state. Thus, salts which have been partially fused are sometimes rendered more soluble than normally. In the next place we have to consider that the degree of solubility is very much affected by variations of temperature. Although this fact is well known, and therefore every care ought to be taken to maintain the solution at a constant temperature up to the time of the determination, in practice it is extremely difficult to do so. No doubt, many of the minor discrepancies in accounts of solubilities are due to the temperature having varied in the different determinations.

As regards the manner of stating the ratio of solubility, it is evident that there are two sides to the question. We may either take as our standard the solvent or the substance dissolved. In some cases the former method, in others, the latter, is the more convenient. We may give the number of parts of the substance dissolved by 100 parts of the solvent, or we may give the number of parts of the solvent required to dissolve unity of the substance. Contrary to the opinion of some authorities, I think the latter method is certainly the simpler and better adapted for the purposes of pharmacy, and it is the one I have adopted. It is true that a solubility is sometimes stated—say, as 1 in 10, the meaning being that 10 parts of the solution contain 1 part of the salt. Unless this method of expressing the facts is explained in each instance, it is only likely to lead to confusion. A much more objectionable—indeed, quite inaccurate system, consists in referring parts by weight to volumes of the same denomination, without stating what is intended. For instance, we may see it stated, that 1 part of salicin is soluble in 60 parts of alcohol; the meaning being, that 1 ounce of salicin is soluble in 60 *fluid ounces* of alcohol. The word "part" always refers to weight, unless it is otherwise stated. Perhaps the pharmacopœial dictum of "solids by weight, liquids by measure," has something to do with this form of erroneous expression.

It now only remains for me to give the results of the experiments which I have recently made on the solubility in water of the better-known morphia salts. The determinations were in all cases made by the "method by digestion," and the values given are believed to be nearly correct. The temperature in each experiment was 60° F., and it is, therefore, not mentioned in the following notes. M signifies $C_{17}H_{19}NO_3$:—

Morphia Hydrochloride.

(1). Solution = 92·06 grs. Residue = 3·18 grs.
3·18 grs. $MHCl$ = 3·71 grs. $MHCl.3H_2O$.

$$\frac{92{\cdot}06 - 3{\cdot}71}{3{\cdot}71} = 23{\cdot}81$$

(2). Solution = 78·94 grs. Residue = 2·71 grs.
2·71 grs. $MHCl$ = 3·16 grs. $MHCl.3H_2O$.

$$\frac{78{\cdot}94 - 3{\cdot}16}{3{\cdot}16} = 23{\cdot}98$$

(3). Solution = 128·54 grs. Residue = 4·44 grs.
4·44 grs. $MHCl$ = 5·18 grs. $MHCl.3H_2O$.

$$\frac{128{\cdot}54 - 5{\cdot}18}{5{\cdot}18} = 23{\cdot}81$$

(4). Solution = 164·92 grs. Residue = 5·65 grs.
5·65 grs. $MHCl$ = 6·59 grs. $MHCl.3H_2O$.

$$\frac{164{\cdot}92 - 6{\cdot}59}{6{\cdot}59} = 24{\cdot}02$$

Note.—These determinations were made with different samples. The mean result is:—1 part of the salt soluble in 23·9 parts water.

Morphia Sulphate.

(1). Solution = 118·44 grs. Residue = 4·62 grs.
4·62 grs. $M_2H_2SO_4.2H_2O$ = 4·95 grs. $M_2H_2SO_4.5H_2O$

$$\frac{118{\cdot}44 - 4{\cdot}95}{4{\cdot}95} = 22{\cdot}92$$

(2). Solution = 127·31 grs. Residue = 4·91 grs.
4·91 grs. $M_2H_2SO_4.2H_2O$ = 5·28 grs. $M_2H_2SO_4.5H_2O$

$$\frac{127{\cdot}31 - 5{\cdot}28}{5{\cdot}28} = 23{\cdot}11$$

(3). Solution = 119·98 grs. Residue = 4·64 grs.
4·64 grs. $M_2H_2SO_4.2H_2O$ = 4·99 grs. $M_2H_2SO_4.5H_2O$

$$\frac{119{\cdot}98 - 4{\cdot}99}{4{\cdot}99} = 23{\cdot}04$$

(4). Solution = 100·21 grs. Residue = 3·89 grs.
3·89 grs. $M_2H_2SO_4.2H_2O$ = 4·18 $M_2H_2SO_4.5H_2O$

$$\frac{100{\cdot}21 - 4{\cdot}18}{4{\cdot}18} = 22{\cdot}97$$

Note.—As with the muriate, these results were obtained from different samples. The mean of the four determinations is:—1 in 23·01.

Morphia Acetate.

(1). Solution = 70·01 grs. Residue = 15·20 grs.
15·20 grs. M. = 21·28 $M.C_2H_4O_2.3H_2O$

$$\frac{70{\cdot}01 - 21{\cdot}28}{21{\cdot}28} = 2{\cdot}28$$

(2). Solution = 55·50 grs. Residue = 12·085 grs.
12·085 grs. M = 16·91 grs. $M.C_2H_4O_2.3H_2O$

$$\frac{55{\cdot}50 - 16{\cdot}91}{16{\cdot}91} = 2{\cdot}28$$

(3). Solution = 94·26 grs. Residue = 18·59 grs.
18·59 grs. M = 26·02 grs. $M.C_2H_4O_2.3H_2O$

$$\frac{94{\cdot}26 - 26{\cdot}02}{26{\cdot}02} = 2{\cdot}62$$

(4). Solution = 86·07 grs. Residue = 16·88 grs.
16·88 grs. M = 23·63 grs. $M.C_2H_4O_2.3H_2O$

$$\frac{86{\cdot}07 - 23{\cdot}63}{23{\cdot}63} = 2{\cdot}64$$

(5). Solution = 106·67 grs. Residue = 22·03 grs.
22·03 grs. M = 30·84 grs. $M.C_2H_4O_2.3H_2O$

$$\frac{106{\cdot}67 - 30{\cdot}84}{30{\cdot}84} = 2{\cdot}45$$

(6). Solution = 86·13 grs. Residue = 17·86 grs.
17·86 grs. M = 25·00 grs. $M.C_2H_4O_2.3H_2O$

$$\frac{86{\cdot}13 - 25{\cdot}00}{25{\cdot}00} = 2{\cdot}44$$

Note.—The acetate is the most unsatisfactory salt to work with, on account of the difficulty in having it perfectly neutral. The determinations (1) and (2) were made with the ordinary salt, which contains an excess of morphia. (3) and (4) were performed with a specially prepared salt, which was as nearly neutral as possible. These results ought therefore to be the best. (5) and (6) are determinations made with solutions containing considerable excess of acid. The mean of the six experiment gives the solubility:—1 of acetate in 2·44 of water.

Morphia Tartrate.

(1). Solution = 105·04 grs. Residue = 9·15 grs.
9·15 grs. $M_2C_4H_6O_6$ = 9·83 grs. $M_2C_4H_6O_6.3H_2O$

$$\frac{105{\cdot}04 - 9{\cdot}83}{9{\cdot}83} = 9{\cdot}68$$

(2). Solution = 130·185 grs. Residue = 11·325 grs.
11·325 grs. $M_2C_4H_6O_6$ = 12·17 grs. $M_2C_4H_6O_6.3H_2O$

$$\frac{130{\cdot}185 - 12{\cdot}17}{12{\cdot}17} = 9{\cdot}69$$

Note.—The solubility may therefore be taken as 1 part of neutral tartrate in 9·7 parts of water.

Morphia Meconate.

(1). Solution = 189·36 grs. Residue = 4·86 grs.
4·86 grs. $M_2C_7H_4O_7$ = 5·42 grs. $M_2C_7H_4O_7.5H_2O$

$$\frac{189{\cdot}36 - 5{\cdot}42}{5{\cdot}42} = 33{\cdot}93$$

(2). Solution = 158·63 grs. Residue = 4·07 grs.
4·07 grs. $M_2C_7H_4O_7$ = 4·54 $M_2C_7H_4O_7.5H_2O$

$$\frac{158{\cdot}63 - 4{\cdot}54}{4{\cdot}54} = 33{\cdot}94$$

Note.—These determinations were made with the same sample. They are the only values which differ considerably from those I formerly gave. This result I attribute to the fact that the crystals used in these last experiments were dried by exposure to the air for a short time, while the salt employed in the older experiments was probably over-dried with the aid of heat. The mean of the determinations makes the solubility of the meconate 1 in 33·9 of water.

Since writing the foregoing I have noticed a paper,* by V. Coblentz, on the "Solubilty of Commercial Sulphates of Morphine," which calls for some attention. This pharmacist follows the process of Professor Power, which consists in estimating the sulphuric acid in the solution, and then calculating the equivalent amount of morphia sulphate. It is hardly necessary to say, that we have here a method which is only admissible when the sulphate is pure. If the salt were to contain free sulphuric acid, or a sulphate having a different proportion of acid from sulphate of morphia, the results would be to a greater or less extent erroneous. Mr. Coblentz falls into the same mistake as Professor Power, in so far as he finds the solubility of the sulphate in water by dividing the weight of the solution by the weight of the salt dissolved. This gives the ratio of salt to solution, not of salt to solvent. According to the results given, samples of sulphate from different makers require for solution from 18 to 24 parts of water. No doubt by the presence of certain impurities in small quantity, or from the salt having been over-dried, the solubility of the sulphate will be appreciably increased; but I can scarcely credit that any sample in the market would dissolve in 18 parts of water at 15° C. Regarding what has been remarked of the "variable nature of solubility," I just wish to say that I do not believe that in any true sense of the words there is the least variation about it. If I or others should use impure materials, or make bad observations, the results will doubtless vary; but, given a pure compound and properly performed experiments, the results will always be the same.

* *Pharm. Journ.*, [3], xiii., 330.

I conclude by giving a table showing the solubility of the morphia salts as above described.

The Solubility of Morphia Salts at 60° F.

Acetate . .	1 part is soluble in	$2\frac{1}{2}$	parts water.
Tartrate . .	" "	$9\frac{3}{4}$	"
Sulphate . .	" "	23	"
Hydrochloride	" "	24	"
Meconate .	" "	34	"

THE BEST FORM OF ADMINISTERING PUMPKIN SEED.*

BY L. WOLFF, M.D.

What is the best form of administering the seed of the pumpkin (*Cucurbita Pepo*)?

For the object of this query, to obtain in a pharmaceutical preparation of the seed of *Cucurbita pepo* the best possible results in the most palatable and effective manner for the expulsion of tape-worm, it is absolutely necessary that we should be well acquainted with the drug itself and its proximate constituents, in order to ascertain to which of these it owes its peculiar tænifuge power.

This property seems to be inherent not alone to the common pumpkin (*Cucurbita Pepo*), indigenous to our country, but also to other species of the cucurbitaceæ, such as *Cucurbita occidentalis* of the West Indies, and *Cucurbita maxima*, Duch., and others.

Pepo, though well known for ages as a domestic anthelmintic and tænifuge, was brought to the notice of the profession in 1845, by Brunet, who reported twenty-five or thirty successful cases of tænia treated with it.

Others have since then used this article largely for the same purpose, but only with varying success, as the action of any drug cannot be determined without a thorough knowledge of the principle or principles to which it owes its peculiar efficacy. These must be closely studied before a rule can be laid down for its use, with a view to its uniform action.

Pepo has been repeatedly examined and investigated by many able authorities, but the results have at all times been conflicting as to the nature of its active ingredients. Its general constituents have been uniformly established as fixed oil, starch, cellulose, pectin, and protein compounds. Free fatty acids, sugar, resin, and even a glucoside, have also been claimed to exist therein. To test this latter, I have made an extensive series of experiments, in order to be able to either verify or disprove them. As none of the former ingredients can be viewed as tænifuge in its nature, and this drug itself is such in a marked degree, the inference is that a peculiar principle exists in it to which it owes its remedial property.

Dorner and Wolkowtch (1870) claimed to have discovered in pumpkin seed an alkaloid, which they propose to call cucurbitin (cucurbita?) but which both as an alkaloid, as well as a glucoside, Kapylow (1876) has failed to establish. Slop attributes its action to the oil, of which he gives a description in the *Pharmaceutische Centralhalle*, but advises the use of an electuary of the seed as a tape-worm remedy.

Herard thinks its active principle resides in the kernel, and Lelievre in the gemmule.

Heikel maintains that it is contained in the menisperm, and, to prove it, has given this exclusively, with good effect. Of the resin extracted from it, he gave 75 centigrams in six pills, expelling the tape-worm. This amount would represent 17 grams of the green membrane or 250 grams of peeled seed. In further experiments, about 6 ounces of the perisperm, tegumentum, and testæ were given without result, while 1 ounce of the membrane surrounding the embryo expelled the parasite.

This membrane was found to consist of two layers, the outer of which contained a quantity of resin (one in seventeen).

As opinions of investigators on this subject are so much divided and with a view of presenting a definite answer to this query, I was led to experiment personally, going over the entire field in numerous experiments and observations.

While I found my results to correspond with the nature and quality of the general constituents, I am slightly at variance with Slop and Kapylow in regard to the oil. While I found it to be a glyceride of oleic, palmitic, and myristic acids, I could not detect at any time any free fatty acids in the recently dried seed; nor could I confirm the fractional solubility of the oil in alcohol, and must attribute their results to the spontaneous decomposition of the oil in old seed into fatty acids and glycerine.

While they assert that the expressed oil possessed tænifuge properties, I have not been able to verify this; nor have I observed it in the oil of pepo, which was extracted with petroleum benzine, but found it markedly so in oil extracted with ether or chloroform.

My experiments for the separation of an alkaloid or glucoside have also been unsuccessful, and I must side with Kapylow in claiming an absence of either of these. I arrived, therefore, by exclusion to entertain the views of Heikel as to a resin forming the active principle of the seed, and extended my experiments in that direction. I exhausted a quantity of recently dried and well-comminuted seed with petroleum benzine, previously proven not to extract the active ingredient, and the residue was repeatedly treated with ether, chloroform, and alcohol. The product on evaporation of the menstruum was a soft resin of a greenish brown colour and acrid bitter taste, reminding of the oleoresin of male fern in that respect. Oil which had been extracted with ether or chloroform yielded, on shaking with stronger alcohol, a similar substance. This resin administered in 15 grain doses, certainly possessed tænifuge properties, and I was thus led to regard it as the active principle of pepo. It would seem from this that stronger alcohol is the proper menstruum for preparations of this drug. As the resin, however, as well as the fluid extract, did not prove laxative in my observations, and the alcoholic strength of the latter besides would contra-indicate, in the doses required, its use for children, I examined the emulsion of the seed to determine if, and in what quantities, it contained the resin. I evaporated to this end an emulsion of the seed to dryness and treated it with stronger alcohol, which, after filtration, left on evaporation, a corresponding quantity of the resin, which had evidently been emulsified in the process.

I would, therefore, in answer to the above query, recommend as the most desirable and effective preparation for administering the seed of "*Cucurbita Pepo*" for adults:

First. Fifteen grains of the above-mentioned resin in pill form.

Secondly. One to 2 fluid ounces of the alcoholic fluid extract in broken doses and largely diluted; both of these taken fasting in the morning and to be followed two or three hours afterwards by a dose of castor oil; or better than either of these for children, an emulsion of 1 ounce of the recently dried and finely comminuted seed, and $\frac{1}{2}$ ounce of granular sugar, with 4 ounces of water, in which preparation the natural oil acts as a mild laxative; this to be also taken in broken doses, following closely on each other after a fast of six to eight hours.

The electuary, formed by pounding the decorticated seed into a pulp with sugar, has proved with me not alone unreliable, but presented in many cases serious obstacles to deglutition.

* From the 'Proceedings of the Pennsylvania Pharmaceutical Association,' 1882.

The Pharmaceutical Journal.

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Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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THE BOARD OF TRADE ON THE WEIGHTS AND MEASURES ACT.

AMONG the Parliamentary papers issued during the past week is a Report recently made to Parliament by the Board of Trade as to its proceedings and business under the Weights and Measures Act, 1878. It is satisfactory to learn from this Report that since the date of the previous one no question of importance has arisen with reference to the verification and stamping of the weights and measures used by chemists and druggists, and that in this respect the Act appears to be working satisfactorily. But the Report mentions that a "pharmaceutical chemist" in Edinburgh has been "fined for having unstamped weights used in dispensing poisons," and it further quotes a statement of the St. Pancras inspector that he recently visited thirty-six chemists' shops and in nearly every instance found weights that were unjust or incorrect. It does not, however, appear from the Report whether in these last-mentioned cases the weights alleged to be incorrect were also unstamped, although it must be obvious that the culpability or non-culpability of the persons in whose possession incorrect weights or measures may be found must depend very much upon whether they have complied with the law as far as can be reasonably expected, and secured the verification of an official inspector as to their correctness. This proper and safe course is, we regret to say, not so universally followed as might be expected, and only recently we received a semi-official notification, through a gentlemen who is himself a chemist and druggist, that a large number of chemists and druggists in a certain metropolitan district had up to that time failed to have their weights and measures stamped in accordance with the provisions of the Act passed four years ago, and seemed bent upon compelling the local authority to undertake the unpleasant task of commencing legal proceedings against them for their default. If this be a fact, and the result of sheer neglect, persons thus omitting to bring themselves within the conditions prescribed by law will have only themselves to blame for possible annoyance and ignominy such as are sure to be associated with any charge of being in possession of false weights or measures, since it cannot be said that, as a rule, undue harshness or haste has been shown in the enforcement of this Act. But it may be that some of the weights referred to are used solely in dispensing, and that the persons using them are of the same opinion as a correspondent, whose letter appears this week on another page, that the dispensing counter ought to be exempt from the inspector's visits. This contention will, no doubt, have the sympathy of many of our readers, and the question whether an attempt should be made to secure such an exemption authoritatively is one well worthy of consideration. Meanwhile the prudence of acting as if this exemption already existed appears to us to be very doubtful, for even if it were held that the dispensing and supply of medicines is not of the nature of a trading transaction, it would be difficult for a chemist and druggist to prove on every occasion that weights and measures, kept as a rule in the same shop where trade is carried on, are never used for any other purpose than dispensing.

Other points in this Report are also worthy of notice. It appears that serious complaints have been made to the Board by persons who have been required to have weights and measures, of which the accuracy was not questioned, restamped by the inspectors of the districts in which they were used. It seems strange that the plain provision of section 45 of the Act,—that a weight or measure "shall not be liable to be restamped because used in any place other than that in which it was originally stamped,"—should be thus ignored; but instances of this propensity of inspectors are known to be numerous, and it may be hoped that the official opinion now expressed may help to keep it in check. Questions have arisen as to the mode of stamping iron weights, which usually bear the verification stamp on the plug of lead or other metal by which they are adjusted, but which are sometimes meet with having more than one adjusting plug, each of which is stamped. This latter practice, it is pointed out, is bad, and hardly in accord with the words of the Act, which refer to "a plug." Inquiries have also been made as to the marking and stamping of earthenware measures, which is sometimes carried out by submitting them to the inspector while in the green state and again after firing, and the Board expresses approval of this practice, provided all that prove to be incorrect after firing are either destroyed entirely, or have the verification marks completely effaced. In addition, the subject of false statements of weight or measure placed on made-up parcels of goods exposed for sale has been under the consideration of the Board, and an opinion has been expressed that, except in respect to certain articles and localities which are the subject of special legislation, the proper remedy would lie at common law and that the Weights and Measures Act does not deal with offences of this kind.

As science advances and commerce extends fresh demands are made upon the Department for the creation of new standards, and its attention has been called during the past year to the expediency of adopting, among other things, photometric standards for gas and also to possible means of measuring electricity. It is not quite clear, however, under what section of the Weights and Measures Act authority will be found for undertaking work of this kind, or at any rate for enforcing generally the use of such standards if created, although similar power is to some extent vested in the Board of Trade in connection with various Gas Acts. But probably an extension of this power would be readily conferred by Parliament, as in the case of the petroleum-testing apparatus, under the Petroleum Act, and indeed a hope is expressed that an opportunity will shortly be afforded of laying before Parliament a Bill for consolidating and amending the enactments for regulating measures used in the sale of gas and of dealing with the mode of testing the illuminating power of gas. In connection with the Petroleum Act it is mentioned that an omission has been pointed out by Dr. Foerster, the Director of the Imperial Standards Commission of Germany, in the rules for testing petroleum, where no allowance is made for variations of atmospheric pressure at the time of determining the "flashing point" of an oil. The necessity for such an allowance is shown by the fact that some oils recently tested in London, when the barometric pressure was equal to 29·80 ins., showed flashing points of 89° and 74° F. respectively; but when tested at Buxton, with the barometer at 28·35 ins., the same oils flashed at 86° and 72° F., so that the oil that would have passed in London, as flashing at 74°, would have been condemned at Buxton, as flashing at 72° F., or one degree below the legal standard.

A brief but not very encouraging reference is made in the Report to the metric system. Beyond the verification of metric standards for scientific purposes and the issue of new cards of equivalents of imperial and metric weights and measures there have been no important proceedings or inquiries with reference to it. On the other hand, in Turkey the metric system of weights and measures came into operation, under a decree of the Sultan, on the 1st of March last.

In the appendix are given lists of the counties, boroughs, etc., that have adopted the uniform stamp of verification suggested by the Board of Trade, with the distinguishing number of each, as well as *fac-similes* of the special designs adopted by other local authorities.

THE EXTRACT OF MEAT CASE.

The full report of Mr. Justice Field's judgment in this suit proved to be so very lengthy that we have felt constrained to omit a few passages; but everything material has been preserved, and for all practical purposes the judgment may be considered to be given *in extenso*. It will be seen that the result of the judgment is in favour of the public, and opposed to the virtual monopoly which must have resulted from any decision which protected, in favour of a prosperous and wealthy company, exclusive use of the name of a commercial article.

In reading the judgment it is somewhat startling to find that the invention is attributed, by the Company, not to the late Baron Justus von Liebig, but to the French chemist, Proust, and dated as far back as the commencement of the century. The judgment does not disclose the authority for so attributing the invention, but the statement was made by Dr. Max von Pettenkofer, who gave evidence in the case, in the course of which he said that prepared extract of meat was first invented by Proust, an eminent French chemist, in the year 1801, and that, therefore, Liebig was not the real inventor of extract of meat. Dr. Pettenkofer added further, that the process of making what is now in England called Liebig's Extract, was, on the whole, the same as that known to Proust.

The curiosities of litigation are various, but it certainly is surprising to find that the eminent chemist, Baron Justus von Liebig, who undoubtedly did take credit for presenting to the world a very important discovery and desired that the extract of meat should be called by his name, should appear to have stipulated with the Fray Bentos Company for 2 per cent. of its profits during a period, and it is not less surprising that long after his decease his colleague and bosom friend should come to this country and in a witness box divert from him to a French chemist whatever honour may attach to the discovery.

MUNICIPAL HONOURS.

We notice that among the gentlemen who have recently been chosen to fill the office of Mayor there are several who are connected more or less with pharmacy. At Bolton, Mr. E. G. Harwood, who is still a member of the Pharmaceutical Society, although now out of business, has been chosen; at Brighton, Mr. A. H. Cox has been elected; at Denbigh, Mr. J. H. Jones; at Dorchester, Mr. H. Durden; at Hartlepool, Mr. John Horsley (re-elected); at Leominster, Mr. Michael J. Ellwood (re-elected); at Lymington, Mr. Henry Badcock; and at Peterborough, Mr. J. Whitwell. In addition, Mr. T. W. Atkinson has been appointed Sheriff of the Town and County of Poole, and in Scotland Mr. J. Harvie has been elected Senior Magistrate of Airdrie.

CHEMISTS' ASSISTANTS' ASSOCIATION.

We learn that on Wednesday evening next, the 22nd inst., the above Association will hold a Conversazione in the Banqueting Room, St. James's Hall, in connection with which there will be an exhibition of electrical apparatus, microscopes, etc., and rare chemicals.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

The first meeting of the twenty-ninth session was held in the Society's Rooms, 119A, George Street, Edinburgh, on Wednesday, November 8, at 8.30 p.m.

Mr. Alexander Napier, President of the Branch, in the chair.

The minutes of the last meeting of the previous session having been read and confirmed, Mr. Napier read the following—

Presidential Address.

Gentlemen,—I have, in the first place, to thank my brethren in Council for the honour they have done me in electing me their chairman for the present year. In taking the chair I must rely on your kindness and assistance as I humbly endeavour to discharge its duties, and I am encouraged by the assurance of support from Mr. Nesbit, who has kindly given his services for another year as Vice-President, and I rely on the help of the other members of Council. You know, gentlemen, it is no easy task to come after Mr. Stephenson, who has discharged the duties of this chair so admirably for these five years past. I cannot lay claim to either his qualifications or experience; but such abilities as I have are freely at your service. It shall be my endeavour to keep before me the interests of the North British Branch of the Society and to discharge the duties of this chair so that at the close of the year we may all have the satisfaction of finding that it has been a successful one.

In accordance with time-honoured custom I venture to offer a few opening remarks.

Perhaps the most noteworthy incident in the course of the year, in the world of pharmacy, outside the operations of our Society, was the meeting of the Pharmaceutical Conference, at Southampton, in August, under the able Presidency of Professor Attfield. His opening address was a masterly presentation of various aspects of pharmacy in this country, which were happily grouped under the departments of collection, preparation, and distribution. This address alone will stamp the recent Conference as probably the most memorable which has yet taken place. The scientific papers read and discussed are all valuable contributions to our scientific knowledge. The Conference gave another opportunity for the expression of mutual friendship and goodwill among the members of our common calling. Pharmaceutical gatherings have also been announced in Germany, Austria, and America; and invitations issued to members of other pharmaceutical associations to take part in them. The importance of these gatherings cannot well be over-estimated, whether we consider them in their scientific or social aspects.

I may refer to another set of scientific meetings, less pretentious, but well worthy of our regard—the Edinburgh Chemists' Assistants' Association, inaugurated for the fifth session in this place a month ago. The opening address delivered by their President and the programme of papers promised augur well for the success of the Association during the session. This Association has done good work in the past, and should be taken advantage of by all young men who are able to attend the meetings. In this and similar associations young men are not only educated, but are gradually drawn on to take part in the discussions of the subjects, and the habit is acquired of submitting to paper thoughts upon matters requiring investigation or upon which there are differences of opinion, and courage is gained to express these thoughts in public. These associations of junior pharmacists are nurseries from which the Pharmaceutical Society may confidently hope to draw valuable workers. They give substantial evidence that so far as the scientific meetings of the Society are concerned all the material required for their maintenance may be found within our borders. Among the members of this Association I see the names of some gentlemen whose qualifications are well known to all of us. I am sure I am right in saying it will gratify the Council to find these gentlemen taking part in the Evening Meetings of this Society as well. This remark need not be restricted to those who reside in Edinburgh, but should extend to all who have been associated with us, whether in Edinburgh or not. From time to time members are passing away from us. It is only by the younger men being alive to their duty and coming forward to take the vacant places that the prosperity of pharmacy and of this Society can be ensured.

As pharmaceutical education and examination are destined by a recent decision of the Council in London to receive greater prominence and to be more closely allied to each other than they have ever been in Great Britain, this subject may be said justly to occupy the foremost place in interest with the Society at this time. I am, therefore, induced to give it a place in my remarks this evening.

Pharmacy, to be seen aright, must be looked at as one of the departments of progressive medical science. It is only there the extent of its educational requirements can be estimated. Medical science now demands of those who pursue it enlightened and exact knowledge of the nature and causes of disease and of the methods of treatment. It is important for us to notice how the work of acquiring this knowledge is gone about. It is systematic, comprehensive, and thorough. It is carried on under the best training that can be procured and is tested periodically as it proceeds.

When medicine came to be prosecuted on thorough scientific principles it was found to be expedient to relieve students and practitioners of medicine from the more mechanical and routine duties of collecting, compounding, and dispensing drugs. The expediency and utility of this separation is witnessed to by the special position of pharmacy being now almost universally recognized. The ever-increasing demands upon practitioners of medicine for exact knowledge of the causes and nature of disease and for intelligent action in counteracting it, appeal for increased scientific knowledge in pharmacists.

Medical science, not satisfied with present attainments, is ransacking every repository of knowledge in quest of agents to combat the diseases common to men and animals. This science holds in Britain a distinguished place because of the thoroughness of instruction in our medical schools, the ability of its teachers, and the number of students who willingly devote their energies of mind and body to the mastery of the studies assigned to them.

Aware of the importance of thorough instruction, the State has declared for curriculum in elementary and general knowledge, by giving its awards according to results ascertained by attendances and examination.

The recent resolutions of our Council prescribing a compulsory curriculum to be imposed on all persons who are to have any legal standing in pharmacy is designed to ensure in the pharmacists of the future in this country such an amount of familiarity with the principles and facts relating to pharmacy as shall make them theoretically as well as practically masters of their art. The standard of knowledge for students of pharmacy in this country ought not to be behind the average standard in other countries. It should not be set at the point where acquaintance with the routine of pharmaceutical details and mechanical compliance with defined instructions is guaranteed. This is the more necessary from the growing objection to large doses of crude forms of medicines, and the corresponding tendency to eliminate all inert matter and administer medicines in the highest possible state of concentration. Errors in dispensing increase in proportion to the concentration of the drugs, and call for intelligent knowledge of their nature and properties in those who compound and dispense them.

There is also a wide field of labour, not more than fairly opened up, lying before the rising generation of pharmacists. There is a vast amount of work valuable to medical science and to pharmacy which can only be carried on to purpose by men who prepare themselves for it by liberal scientific instruction. This the compulsory examination under the Act of 1868 has hitherto failed to accomplish. The Council of the Society, after much observation and experience, came to the conclusion that the proposed curriculum is not only desirable but necessary. The Examiners found in very many cases that the general mode of preparation for examination in the special subjects of scientific study was imperfect and not founded upon any systematic or comprehensive plan.

Examination of itself revealed the fact that the knowledge hitherto acquired by many candidates was too superficial and too hastily imbibed to exercise a permanent influence on the reflecting powers; that it had been taken in in too crude a form for assimilation. The remedy which the Council have sought out and adopted for the purpose of rectifying this state of things begins with a compulsory examination in elementary knowledge before entering on apprenticeship. By adopting this measure the greatest hindrance to pharmaceutical study and progress will be taken out of the way.

Next to a compulsory Preliminary examination before apprenticeship, the Council has decided for compulsory and systematic instruction in theoretical chemistry, botany and materia medica, with practical instruction in chemistry. No one can doubt that this is the best means of insuring thoroughly intelligent agents for the general work of our profession, or that the highest interests of pharmacy and medicine can well be secured without it. Pharmacy in Britain, as shown by Mr. H. J. Möller, in his "Remarks on Modern Pharmaceutical Study," in the *Pharmaceutical Journal*, pp. 160, 258, and 379, vol. xii. (1881–82), and by Professor Attfield, in his able pamphlet on 'Education and Examination,' stands alone, in respect that it has as yet made no compulsory demand upon its students for systematic public instruction.

The average time devoted to general pharmaceutical education on the Continent may be said to be about three years, subsequent to three years of practical work in a pharmacy. The time must come when pharmaceutical students in Great Britain also will have to devote a certain time exclusively to scientific education. The present system, or no-system, of having an engagement in a pharmacy and attending lectures and studying privately in by-hours is unsatisfactory to the students and to their employers. It involves loss to both. The progress made in recent years in many branches of art is largely due to the application of chemistry and physics. Those who are to direct these require to take public instruction in chemistry and physics. Chemists and druggists may then fairly be expected to know something about chemistry, and may also be supposed to be able to turn such knowledge to practical account—be able to make it commercially valuable. It is only reasonable, too, that those who are to prepare and distribute poisonous drugs should understand materia medica, and botany so far as it relates to materia medica. In a word, what the rest of Europe and America has not only decided should be done, but is doing, Britain cannot but comply with; especially when the thing about which there is unity of action is education. In the words of Matthew Arnold, "Europe is to be regarded as now being, for intellectual and spiritual purposes, one great confederation bound to a joint action, and working to a common result.'

Only to those who have received years of public instruction is the work of pharmacy entrusted on the Continent; and to persons possessed of such qualification only is it intended to delegate the distribution of poisonous drugs in Britain. The course of public instruction required by the Council is stated to qualify for the "Minor," and differs little from that for "Graduates in Pharmacy" in Europe and America. In the meantime, no more extended and comprehensive course is announced as a "Major" standard for "Masters in Pharmacy" or "Pharmaceutical Chemists."

Pharmaceutical students have to remember, in view of the demands made upon them, that all other professions affecting culture can only be entered by the portal of a special training. Those who enter the drug business in future without complying with the compulsory requirements of the curriculum must be prepared to remain permanently in a subordinate position without the power of becoming principals.

It has been said that expediency dictates that curriculum should be introduced gradually, rather than all at once. The proposal of Professor Attfield was that a public system of pharmaceutical education should be arranged to meet the practical needs and requirements of a not too remunerative calling: a public system tentatively and gradually applied at first it may be to the Major only. Past experience points the other way. The Medical Act of 1858, the Education Act, the Act affecting Law Agents, the Dentists Act, and others, were introduced at once, with due regard to existing interests. The changes proposed by our Council may have to be introduced in the same way.

Experience fortunately proves that increased stringency of admission to the before-named professions has in no way diminished, but, on the contrary, has augmented the number of candidates, and the quality of brain-power offered. The necessity for advance in education is admitted on all hands. Its importance to pharmacy cannot be over-estimated.

This being a uniform experience, pharmacy should form no exception. By making the whole course of instruction at once compulsory, better provision may be made for imparting it; and students would have at once to devote a year or more to public training. If the course of instruction may be taken at intervals, to allow of students engaging in practical pharmacy, then it will be desirable to divide the examinations for the "Minor" into two sections, giving two chances to pass in all subjects, and in the case of failure, to impose a fresh course of study in the subjects in which they are deficient.

It is doubted by some whether a sudden withdrawal of entrants who aim at taking a first place in pharmacy may not result in the need for the introduction of unskilled labour in greater amount than heretofore into practical work. While they see the necessity for an advance in the amount of scientific knowledge which pharmacists should possess, up to, and even beyond what is to be required by the curriculum, they have a fear that while the qualification is being elevated at the one end it may be lowered at the other. It is to be hoped that the labour necessary for the work of pharmacy may suffer no depreciation in intelligence by a sudden introduction of curriculum.

The aim of all legislation relating to pharmacy, whether by the State or the Executive of the Pharmaceutical Society, is to render it more than ever a potent and reliable factor in public-health.

But, now that compulsory curriculum is to be a fact, the consideration is not so much as to the drawbacks attendant on its introduction, for in time these will adjust themselves. It is more important to consider by what agency the work of public instruction is to conducted. Where? By whom, and at what cost? and to be assured that when the results of the new system become visible it will be found that pharmacy is a better aid to medicine; that pharmacists better perform their duties to the public; that they are more respected and better remunerated for their services. There is no doubt the Committee entrusted with the maturing of the details of the compulsory measure will devise means to meet the occasion; as they may be presumed to be fully alive to the situation, and to the necessity for increased facilities for obtaining sound education. This work may have to be commenced at first in some of the leading centres. In Germany pharmaceutical education is conducted in twenty different Universities, viz., at every University in the State. Our model school in Bloomsbury Square is invaluable; but to very many young men engaged in pharmacies, even in London, it is inaccessible under present circumstances. When, however, practical work has to be abandoned for a season, for the right fulfilment of the course of public instruction, students will most consult their own good and that of pharmacy by repairing to the most thoroughly equipped school. Apart from the superior advantages of the school, there will be an opportunity, perhaps with many the only opportunity, of studying men and things in the greatest centre of human influence at the present day; an experience which would be of life-long value.

The wants of the provinces may be met by arranging for the necessary instruction being given in some of the principal centres of population: in Edinburgh, Glasgow and Aberdeen, for example, so far as Scotland is concerned. And the teachers, for the most part, will have to be the teachers in existing schools of medicine, or persons who have been trained in pharmacy schools at home or abroad.

The questions are put, "Will the Society institute such instruction?" and, "Can the funds of the Society subsidize public education in pharmacy?" In other professions students have to bear the cost of their public instruction, except in the cases of those who obtain bursaries. The Pharmaceutical Society may have to consider how far it can in this way aid higher education.

In the general absence of pharmacy schools in the past throughout the country, it is not to be wondered at that outsiders should, from a commercial point of view, have set themselves to meet the demands for preparation for examination; neither need it be wondered if only as much meat is put into the pie as will stave off present requirements and yield a good return for the undertaking.

It need not be surprising, either, that pharmaceutical students whose time is taken up with practical business, and who cannot well afford to throw themselves out of employment, should run to the shop where the ready-made article can be obtained, even if it is known to be unsatisfactory and ill adapted to the purpose of an education, which after-experience demonstrates to be a misfit. Pharmaceutical students have hitherto been placed in an unfair position in this respect, and are entitled to sympathy more than censure in seeking out the short cut to a pass in examination, injurious as it is in every respect.

Had time and circumstances permitted, I might have considered this subject as bearing on the questions of apprenticeship, remuneration, and the supply of drugs in thinly populated districts, when the people's medicine man,—the old chemist and druggist,—imperfect as he is, may give place to a yet more imperfect packet system of supply—imperfect because of the perishable nature of drugs. I might also have spoken of the pharmacist as the custodier of poisonous drugs, and of the right of the people to demand the intelligence of the seller in purchasing them. But I am satisfied that the most experienced and judicial minds have been, and still are, engaged in the consideration of these matters. I should not have thought of enlarging on the subject of curriculum, after the very full consideration it received when brought before you by my predecessor in his opening address last session, were it not to keep it before the minds of our younger brethren, whom it will certainly most affect. Last year it was a thing of contemplation; this year it has matured into fact in all but its details. The resolutions of the Council vitally concern the whole constituency. It is, therefore, desirable that they be kept before the notice of the Society and the public; and that they be heartily endorsed by us all. I, for one, will rejoice to know that those who comprise our apprentices and assistants throughout the trade at the present time approve, as Professor Attfield found most of the pharmaceutical students in the south with whom he conversed approved, of a compulsory course of scientific instruction such as the Council have adopted as the only way of entrance to pharmacy. With the hearty co-operation of the younger portion of the body, the educational difficulties which appear to beset pharmacy would be greatly modified, if not altogether removed.

Before closing, let me make a remark or two about the Evening Meetings. Happily under their influence the petty jealousies which prevailed before their institution are year by year disappearing, and a growing disposition is manifested by members for interchange of thoughts on pharmaceutical subjects. Of this we have had notable evidence in the papers read before this Branch of the Society in past years. One pleasing feature in connection with the discussions which have followed the reading of papers is, that they have often resulted in further investigations and more papers. The days have passed when men can live in a state of isolation in the prosecution of a common calling. There must be intercourse of men, and interchange of thought, and a spirit of common brotherhood—a desire to help one another. It is in this spirit that pharmacy can alone advance and keep pace with the other departments of medicine. It is this spirit that will furnish for our Evening Meetings profitable subjects for discussion, and temper criticism with a kindly moderation.

It has been grateful to observe the presence of this spirit in a marked degree in the remarks made by members upon the papers read at our Evening Meetings. If I would offer any observation now on this point, it would be that not unfrequently out of a modesty that is not wise, many who had opinions on the subjects under discussion have held back and refrained from speaking. This has arisen to some extent from the presence of those who from long usage had, from the foundation of the Branch, taken a conspicuous part in all its business being counted on to conduct the discussions. This—if not wise—was at least a high tribute to the worth of those to whom this duty and many more were intrusted. But the time has come when younger men must put their shoulder to the wheel, if the chariot of pharmacy is to make real progress and be in its place in the line of march with other branches of the arts and sciences which are to ameliorate the condition of mankind; especially if we desire to be helpful to that section which has set itself the task of preventing or mitigating human suffering.

Your Council desire that these Evening Meetings may prove highly instructive and agreeable to all, more especially to the younger members, so that if at a future time they come to be far removed from these rooms and this city, they may have cause to think gratefully of the evenings spent in this place. And, if they have begun to contribute pabulum for these meetings when on the spot, they may be encouraged to continue the good habit, and come up with, or send occasionally, notes on matters in pharmacy to be read and discussed. Such notes from brethren at a distance will, I am sure, be listened to with interest, and, in the discussions and results which follow, labourers will have their reward. They will thus feel that though separated from the centre they are yet present and potential.

In this I presume to express the mind of the Council; but, for the remarks I have made on the subject of education, I must be personally responsible.

Gentleman, suffer me to say a word for the Benevolent Fund, and then I have done. During the last year, as you are aware, a special effort has been made on behalf of our Benevolent Fund, which has been so successful that the Council were able at last meeting to make arrangements for electing six additional annuitants, bringing up the number of them to forty-two, each of whom receives, as you know, £30 or £35. I am glad to say that Edinburgh was not behind in this matter. My predecessor, as you will recollect, made an eloquent appeal in its behalf in his opening remarks last year; and this was followed up by energetic action on the part of himself and Mr. Young, and the result was even beyond expectation. My principal object in referring to the subject is to impress on you that the interest then awakened to be of any practical avail must continue from year to year. No one should withhold from subscribing because of the smallness of the amount it is convenient to give. A shilling or half-crown, from one, may be more than a guinea from another, when measured by the means of the givers. It is often the smallest things that accomplish most; the smallest things often repeated. And those who give a shilling when they can may be trusted to give more when convenient for them. Whether it be owing to Scotch thrift and independence, or to ignorance of the benefits at command, very few Scotch members have ever availed themselves of the Benevolent Fund. But, when a call has been made, it has always been freely responded to. Here as elsewhere "it is more blessed to give than to receive."

Mr. Young, in proposing a vote of thanks to the President for his address, remarked, that he was sure that the meeting had listened to it with much pleasure. Referring to the remarks on the Evening Meetings, he urged that the young men when qualified should identify themselves with the Branch, and give their fellow pharmacists the benefit of the experience which they had acquired in the course of their studies. He felt it unnecessary to comment in detail on the topics which the President had considered, but he might remark that a very able Committee was considering the whole question of compulsory pharmaceutical education, and this Committee, he had no doubt, would consider the opinions expressed in the provinces. In concluding, he emphasized the appeal for contributions to the Benevolent Fund, and hoped that all persons interested in pharmacy would contribute to it.

Mr. Stephenson supported the vote of thanks.

Mr. Dott then read a paper on "The Solubility of Morphia."

Dr. Inglis Clark said that the remarks which Mr. Dott had made on the solubility of morphia salts were very valuable. The whole question of solubility was wrapt in mystery, yet such observations as Mr. Dott's greatly favoured elucidation. He had drawn attention last session to the mechanical action of carbonic acid gas on the separation of caramel from a saccharine liquid; since that time he had observed that the pungent principle of ginger is thrown out of solution, or rather that it is brought to the surface of a tumbler of ginger ale, in the same circumstances. He remarked that Mr. Dott's experiments on the morphia salts were very valuable, and were a worthy contribution to the literature on the subject. The author deserved their thanks, and he had pleasure in moving that this should be accorded to him.

Messrs. Boa and McEwan supported the motion, and commented upon the introductory portion of the paper.

The Secretary to the Branch then announced the following donations:—

To the Library.

Year-Books of Pharmacy, for 1876 and 1879.
From the British Pharmaceutical Conference.

Six parts, *Journal of the Chemical Society*.
One part, *Journal of the Royal Society*, and
One part, *American Pharmaceutical Journal*, to complete volumes.
From the Pharmaceutical Society.

Twelve parts, *Journal of the Chemical Society*.
From Mr. G. D. Mackay, Edinburgh.

Eberle's 'Materia Medica,' vol. 2.
From Mr. Edwin Jones, London.

American Pharmaceutical Association, Proceedings, 1881. From the Association.

Smithsonian Institution, Report for 1880.
Smithsonian List of Foreign Correspondents.
From the Institution.

Massachusetts College of Pharmacy, Catalogue.
Philadelphia Alumni Association, Report.
Toronto School of Medicine, Report.
Victoria Pharmaceutical Society, Register for 1881.
Victoria Pharmaceutical Society, Pharmacy Act.
From the respective Publishing Committees.

Canadian Pharmaceutical Journal, January to October. From the Toronto College of Pharmacy.

To the Museum:—

Gadus morrhua, liver oil, specimens of British, Norwegian and Newfoundland products.
Gadus aeglefinus, liver oil, first and second extractions.
From Messrs. Carr and Sons, Berwick-on-Tweed.

Aspidium Filix-mas, large rhizome.
From Messrs. T. & H. Smith and Co., Edinburgh.

Thirty specimens of Indian Medicinal Plants from the collection of Dr. Trimen, Ceylon.
From the Pharmaceutical Society.

Herbarium Specimens of Indigenous Plants.
From Mr. Thomas Stephenson, Edinburgh.

Iodide of Bismuth, three samples.
From Mr. J. R. Hill, Edinburgh.

Sulphate of Magnesia.
From Mr. J. P. Coats, Leith.

Mr. MacEwan remarked that the herbarium specimens of Indian plants sent by Mr. Holmes were a valuable contribution to the Museum, and perhaps they were of more than usual interest from the fact that they were from the collection of Dr. Trimen, who was associated with Professor Bentley in the editing of 'Medicinal Plants.' The specimens with the fruit attached were very good, particularly *Canarium commune*, *Coffea Arabica*, *Coffea liberica* and *Toluifera Pereira*. Of the other specimens, six plants belonging to Zingiberaceæ were very interesting, and the specimens of *Cinchona succirubra*, *Croton Tiglium*, *Maranta arundinacea*, and a few others would prove very acceptable to many students. He hoped that more students would follow Mr. T. Stephenson's example in contributing their duplicate specimens of indigenous plants. The specimen of male fern rhizome was an exceptionally large one,—nearly 10 inches long and 8 inches in diameter. Attention was also drawn to the specimens of fish oils and the other contributions on the table.

Mr. Stephenson moved that the thanks of the Branch be accorded to the donors. This was agreed to with acclamation.

The meeting then adjourned.

Parliamentary and Law Proceedings.

Pharmaceutical Society of Great Britain *v.* James Kelsall.

This case was tried at the County Court at Stockport, on the 10th inst., before T. Hughes, Esq., Q.C., Judge.

Mr. Yates, instructed by Messrs. Flux, Son and Co., appeared for the plaintiffs, and Mr. Brown (Brown and Ainsworth) appeared for the defendant.

Mr. Yates said: May it please your honour, this is an action brought by the Pharmaceutical Society of Great Britain to recover from the defendant, James Kelsall, a penalty of £5 for an infringement of the Pharmacy Act passed in 1868. By a section of that Act it is enacted that from and after the 31st of December, 1868, any person who shall take, use or exhibit the name or title of "chemist and druggist," or "chemist" or "druggist," not being a duly registered "pharmaceutical chemist" or "chemist and druggist," shall, for every such offence, be liable to a penalty of £5 to be recovered in the way prescribed by the Pharmacy Act. The circumstances of the case are these:—The defendant had a shop in Sandy Lane, Stockport, and over the door he had a notice "Kelsall, Analytical Chemist." He also had numerous handbills published, in which there was the heading "James Kelsall, Analytical Chemist." Of course it is of the highest importance that people who are not duly qualified should not be allowed to act as chemists, and exhibit over their door the title of chemist. A chemist, duly registered, is allowed to sell poisons and other dangerous drugs, and, therefore, it is of the very greatest importance that people in this line, especially those who deal largely with the working classes, shall be duly qualified to dispense these dangerous drugs. This gentleman, having the words I have given you over his shop, is written to by the Society, and his answer is certainly a somewhat curious one. The answer is filed as part of his defence to-day. He said that when he used and exhibited the title of "analytical chemist," he was not infringing the Act of Parliament.

Mr. Brown: No.

Mr. Yates: I say that the defendant said "that when he used the words 'analytical chemist' that it was not his intention to act contrary to the provisions of the Pharmacy Act." The question is, did he use or exhibit the name? The Act says nothing at all about the intention—not a single word. In his letter which he writes in reply to the one received from the Registrar of the Pharmaceutical Society, the defendant sets up another extraordinary contention. He says, practically:—I know the Act well. I have not used any of the terms which are forbidden by the Act, because I have put before the word "chemist" the word "analytical." That is an extraordinary defence indeed.

Mr. Brown: I dispute your rendering of the defence to be set up.

Mr. Yates: It is plain from his letter, which distinctly implies this:—The title I do assume and use is that of "analytical chemist." And this he contends is not within the meaning of the Act. The whole question for your honour is, did he use the word "chemist." If the defendant had called himself an "analytical person" we should have said nothing at all to him, but having used the words "analytical chemist," he therefore infringed the Act, he made use of a title he was forbidden to use, and therefore incurred the penalty. The facts of the case are very short and simple.

Mr. Brown: I will admit the facts.

Subsequently it was decided to hear the evidence.

Thomas William Stroud, managing clerk to Messrs. Flux, Son and Co, 3, East India Avenue, London, E.C., was examined by Mr. Yates.

On the 14th of October last did you go to the shop of the defendant in Stockport?—Yes, I did.

Did you see exhibited over the doorway his name and title of business?—Yes.

Where was it particularly?—On the fanlight, a glass fanlight.

What was it?—"Kelsall, Analytical Chemist."

You say it was on the fanlight?—Yes.

Did you go into the shop?—Yes, I went into the shop and bought some glycerine.

Did you see anything on the counter, any bills, handbills of any sort?—Yes, I saw some bills, one of which I have got (handed to the Bench).

Do you know the person who sold you the glycerine,—did you speak to him?—Yes.

Did you ask him if he was Mr. Kelsall?—Yes.

And what did he say?—He said he was Mr. Kelsall, and in the course of our conversation he told me that he was an analytical chemist.

And you took the bill, which has been produced, from the counter?—Yes.

I believe there is the same notice to-day of the name and business on the fanlight?—Yes.

In fact, I believe you have been this morning?—Yes.

I believe that the Secretary of the Pharmaceutical Society is Mr. Elias Bremridge. I mean the Registrar to the Society?—Yes.

In August last he wrote to the defendant.

Mr. Brown: I object to the answer.

Mr. Yates: Do you produce as per notice?

Mr. Brown: I produce nothing.

His Honour: Then you can prove in the ordinary way.

Mr. Yates: The defendant was written to in August last by Mr. Bremridge, and in reply, on the 15th of August, the defendant wrote back:—"I have the honour to acknowledge the receipt of your communication of the 12th inst., wherein you state that representations have been made to you, as the Registrar of the Pharmaceutical Society of Great Britain. that I am acting in contravention of the provisions of the Pharmacy Act of 1868, by the use of the title 'chemist,' and calling on me to offer an explanation as to the representations which have been made to you. In reply I have to state that you have been wrongly informed. I have not assumed or used the title 'chemist,' or 'chemist and druggist,' or 'druggist or 'pharmacist,' or 'dispensing chemist or druggist,' or 'pharmaceutical chemist' within the meaning of the said Act. The title I do assume and use is that of 'analytical chemist,' a profession I have practised for sixteen years, and which I am advised is without the jurisdiction of the Pharmaceutical Society." In reply to that, Mr. Bremridge wrote:—"Referring to your communication, I have to inform you that the use of the title 'chemist' in any form whatever by you is illegal, and I must request that the infringement be at once discontinued." By this letter of the defendant's he forced an issue, and when he asked if the explanation was satisfactory, he was told that it was not. (To witness.) Do you know Mr. Bremridge?—Yes.

He is acting every day as the Registrar of this Society?—Yes.

Was he present at his office yesterday?—I saw him yesterday at the office of the Society.

Do you produce the Register of Pharmaceutical Chemists?—Yes.

Just look and see if the name of the defendant appears?—It does not.

And that Register by the provisions of the Act is evidence?—Yes, it is.

Mr. Yates: I have no other questions to ask.

By Mr. Brown: You say that you noticed the words "analytical chemist?"—Yes.

Did you see the word "laboratory?"—No.

I mean when you went the first time?—No. Nor did I see it this morning.

Mr. Brown: I understand it is there.

The Defendant: It is.

Witness: I did not see it.

And you have come down from London to prove what you saw at his shop?—Yes, and what I got by the handbill.

Exactly. In the Register now produced there is no register of analytical chemists?—No, not as such.

Just look if you can find the name of Mr. Oswald Wilkinson, analytical chemist—analyst for the borough of Stockport?—There is no such thing.

I want you to look though. Is there a person of the name of Oswald Wilkinson. Is he registered?—Not as a chemist and druggist.

In any way whatever?—No, sir.

Next, look if you can find the name of Mr. Carter Bell, the analyst for the County of Chester.—I cannot.

You cannot. Then look if you can find the name of Dr. Bourgart, analytical chemist, Manchester.

Mr. Yates: You are assuming that he is an analytical chemist.

Witness: I dare say that he will be on the Medical Register.

Mr. Brown: Never mind. Is he there, I ask you?

Witness: I do not think that he is.

Is there the name of Mr. Estcourt, or Estcourt and Co., Analysts for the City of Manchester?

Witness: No.

His Honour: Is it worth while going further into this point, Mr. Brown? You have got several examples.

Mr. Brown: Yes, it is. Here is 'Slater's Directory.' I will just ask the witness to look at this work. (Book handed to witness.)

Is there a heading, "Analytical Chemists?"—Yes, there is.

Under that heading is there Estcourt and Co.?—Yes.

Under that heading is there Oswald Wilkinson?—Yes.

Is there Carter Bell?—Yes.

And in point of fact all these gentlemen are under the heading of "Analytical Chemists?"—Yes.

And yet they are not registered?—Yes, but is that Directory their own act?

Mr. Yates: That is just the point.

His Honour: What is that?

Mr. Yates: The witness say, Is what is in that Directory "their own act?" It is Mr. Slater who calls them analytical chemists, and we have nothing whatever to do with what Mr. Salter calls them.

Mr. Brown having addressed the court for the defendant—

His Honour said: This, I must say, is a very unfortunate case for the defendant, and to the public it is a very important case. The defendant appears to be a person who has served his country in foreign parts and to have been wounded there, and everyone must feel the greatest sympathy for him. From his experience in South Africa it is said that he is considerably skilled in the healing of wounds, and it is also said that he is a competent analyst. Of course I am not prepared to say that he is not thoroughly competent, from his experience in South Africa, both to deal with wounds, etc., such as those he states in his prospectus, and also to sell drugs.

Mr. Brown: He does not sell drugs.

His Honour: You see that I have this bill before me. One of the contentions is that he is not a pharmaceutical chemist. I have here before me his own bill, which says that "James Kelsall, Analytical Chemist, late Surgeon's Assistant, Government Hospital, South Africa, cures burns, scalds, ulcers, bruises, etc., etc., at the little hospital in Sandy Lane." In fact he names nearly all the ills to which flesh is subject, and, therefore, there must be dressings and medicines.

Mr. Brown: He uses patent medicines, for which he has a licence.

His Honour: Now the case on behalf of the defendant has been opened as a very hard one for him, and certainly in one sense it was very hard that everyone should not be able to exercise every faculty they may possess for their own good; but for the protection of society the British Legislature has enacted that which has for its object the protection of the British public from those practitioners in the country who are not fully competent. Now, if the defendant is fully competent he has only to go through the ordinary course of obtaining power to deal as he wishes to deal with these drugs and other medicines. But now comes the question which really has to be settled, and which I must decide. The merits of the case I have thoroughly followed. I wish to state that I have respect for a man who has personally suffered in the service of his country, but then comes the legal question to be decided. This person puts himself forward as an "analytical chemist." He knows thoroughly well what he is about, for as early as August he was reminded by the Pharmaceutical Society that he had no right to the employment of the term "chemist." And what did he say in reply? He said that he did not use it in any sense which would bring him within the meaning of the Legislature in passing the Pharmacy Acts, and his argument has been an argument which has been well put before the court by Mr. Brown. He does not say that he is a chemist at all, because he says he is an "analytical chemist." It seems to me that, having regard to the meaning of the word "chemist," one might as well contend with regard to a man that he was not a man because he is a warm-blooded man. I think that is a contention which cannot be sustained at all. And what is the consequence? Mr. Brown, in his speech, has called attention to the fact that the Act should be strictly construed. I think that in the case of any such person as this, who uses or exhibits the name or title of chemist and druggist, or chemist or druggist, not being a duly registered pharmaceutical chemist or chemist and druggist,—it seems to me that it is impossible on the strictest construction of the terms of the section,—it is impossible to say that a person who publishes himself as an analytical chemist does not come within the meaning of the Act. I think that in this case the defendant has distinctly and clearly infringed the terms of the Act. The case seems precisely to be one of those which the Act is intended to meet, and to be applied to. Defendant has incurred the penalty, and judgment must be for the plaintiffs.

Judgment for the plaintiffs for £5 penalty, and £5 12s. costs.

Liebig's Extract of Meat Company, Limited, *v.* Anderson.

Judgment.

Mr. Justice Field: The action is brought to restrain the advertisement and sale by the defendant of an article known as "Liebig's Extract of Meat" under the designation and in a manner which the plaintiffs allege to be an invasion of their exclusive rights. The facts, not substantially in dispute, are these:—The plaintiff company was established in 1865 for carrying on, and have since carried on the business of manufacturing and selling Liebig's Extract of Meat, an article of medicine and food which has been extensively made and sold under that designation ever since the year 1856. Originally discovered by Proust, the French chemist, and published by him in 1801, the method of preparing it suggested by him was rendered practicable by the late Baron Justus von Liebig, and fully explained by him in 'The Annals of Chemistry and Pharmacy, 1847,' and again in 1851 in his well-known 'Familiar Letters on Chemistry,' published in London. Up to this time used principally as a medicine, the extract soon became an article of food in general demand; and at this period, at all events, Baron Liebig's express wish with regard to the discovery was that the benefit of it should be in no way reserved or made the source of pecuniary advantage to himself, but should be placed at the command of as large a number of persons as possible by the extension of the manufacture, and consequently, a reduction in the cost. The views which he expressed at this time are best to be found in an article published by him in 'The Annals of Chemistry' in 1865, in which he details the steps taken by him to effect these objects, and his intention that a connection which he had, in 1863, formed with a commercial adventure, undertaken by a company known as the Société de Fray Bentos, should not interfere with them. The material parts of this article (it is not necessary that I should read the whole of it) are these:—"Since my examination of the nature of meat, made in the year 1847 ('Annals of Chemistry and Pharmacy,' vol. lxii.), I have constantly endeavoured to promote, in countries where beef is much cheaper than with us, the manufacture of extract of meat according to the method then described." Then he compares the extract with soup tablets and other extracts, and then he says:—"To give an idea of the extensive use of the extract as a medicine, it will, perhaps, suffice to state that in the Royal Pharmacy of Munich nearly 5000 lbs. of beef are employed yearly for its preparation." Then he goes on to show how extensively it is used. Then he says:—"The introduction of extract of meat at half or a third of the price now paid in Europe, from countries where meat has but a nominal value, would be regarded as a real blessing to the people of this quarter of the globe. In Podolia, Buenos Ayres and Australia, I earnestly drew attention to the manufacture of extract of meat, and was always ready to explain the method of preparation to such persons as were desirous of being acquainted with it, and assist them with my advice. I introduced Mr. Giebert to my friend, Dr. Pettenkofer, who willingly admitted him to the Royal Pharmacy, and made him acquainted with the minutest details of the process of preparation." And then he goes on to say that he received samples from Mr. Giebert of his first results of his manufacture of extract of meat. Now comes a very important part of the circular, because it is one of the things on which the plaintiff company rely for a portion of the reputation which they say their extract of meat has obtained amongst the public. He says, "Mr. Giebert expressed a desire that the extract should be designated by my name, *Extractum carnis Liebig*, as it was prepared according to the method prescribed by myself. I agreed to his request." Then he says, "on the other hand, we promised him (Dr. Pettenkofer and myself) that if he would send the entire produce of his extract to Munich we should be willing, without any compensation whatever, to submit each of his consignments to an analysis, and, in the event of its possessing the qualities required by science, to guarantee its genuineness on the condition that the retail price of the extract of meat per pound should not exceed one-third of the present price in Europe. We would not lend our names to support a pecuniary speculation. This arrangement was of course to continue only during the first period of the introduction of the extract into Europe, as it is assumed that when the public is once acquainted with the trade mark of the genuine extract of meat they will no longer need the chemist's guarantee to form their own judgment of its excellence." Now there can be no doubt upon that, that the Baron there does expressly state his view and desire to be that this extract should become an article of common use, and to take away from it all species of monopoly, because he wishes to have it reduced to at least one-third of its then price; and at the same time in the interest of science he says, "I have come to an arrangement with the company by which I will guarantee a quality such as they produce and thereby be assured that the product which they send into the market is one which has been properly prepared according to my method." But the account which he gives of his arrangement with Mr. Giebert is not quite so full as it might have been, for he did not disclose that by the arrangement of 1863 made with the Fray Bentos Company, he and Dr. Pettenkofer were to receive for a period of five years, the pecuniary compensation of 2 per cent. on the annual profits of the manufacture and, which is the important part, that Dr. Pettenkofer and the Baron in return for that 2 per cent. engaged to analyse and certify their approval of the extract produced by the company. Now up to this year of 1865 the bulk, if not the whole of the extract sold in the London market, was the produce of the Fray Bentos Company. There had been, I think, certain persons who, in certain parts of England had manufactured this extract, but it had reached to no great extent up to this year, 1865. Between 1861 and 1865 the value of the extract, as an article of commerce, had become by that time generally known and in that year, or the following year, 1866, various manufacturing chemists in England and elsewhere had commenced or were intending to commence to manufacture, and some of them, including Mr. Giebert, were desirous of securing the advantage of putting their products into the market with a guarantee of quality by Baron Liebig, the inventor of the discovery. The extract thus manufactured was sold in England by some of the manufacturers as "Liebig's Extract," and by other manufacturers as "Baron Liebig's Extract of Meat." Amongst others, a Mr. Robert Tooth, of Sydney, proposed to make use of the waste meat of Australia in the same way as the Fray Bentos Company did of that of Uruguay, and he entered into negotiations with the Baron for the purpose of obtaining his co-operation by his analysis and guarantee in return for a pecuniary compensation to the Baron; and thereupon a correspondence ensued, which was very much relied upon at the trial, and very properly so, and therefore I shall refer to the material parts of that correspondence. On the 16th of September, 1865, there is a letter from Justus von Liebig to Mr. Robert Tooth. Just before that time Mr. Tooth had sent to him his proposal for an arrangement with the Baron for the purpose of securing an analysis, and this is the answer of the Baron to that application:—"Dear Sir, —In acknowledging the receipt of your letter of this day's date, I wish to express my concurrence in the points of the agreement proposed therein, which, however, on my part can only be executed after having arrived at a satisfactory arrangement with Messrs. Giebert and Co. at Antwerp. The process is, however, no secret, and so simple, and you seem to understand it so well, that for the present a more detailed instruction is hardly necessary." On the 23rd of September comes another letter in which he repeats an objection to evaporation, which is not material for the present purpose to discuss. Then he says this:—"I should always prefer your mode of evaporating. The Government in consequence of my recommendation uses already the extract of meat in several hospitals, but you do not want Government, there is no fear of selling every quantity brought to market. I transmit a copy of your letter of the 16th, and in a few days I shall communicate to you some additional articles to be inserted into the document of agreement for your consideration and approval?" It therefore seems that at that time, although the Baron was under the arrangement come to in 1863 with the Fray Bentos Company, he still entertained the proposal of Mr. Tooth for the purpose of seeing whether he could come to some agreement with him, but, as the next letter will show, he did not carry that out by reason of what was occurring at that time. What was happening at that time was this, that the Société de Fray Bentos were utterly unable, with the capital at their command, to meet the demand for extract of meat, which had become so great and universal, and they were at that time preparing to enlarge their operations, as they ultimately did, and form what was called the Anglo-Belgian Company, consisting of Mr. Giebert, who was an Antwerp engineer, and certain English gentlemen, the seat of which was to be in London, for the purpose of extending and promoting the manufacture. During this time, while the correspondence was going on between the Baron and Mr. Tooth, the Baron was already receiving proposals from them by which his name was to appear as the Scientific Director, and it did so appear in the preliminary prospectus of the New Anglo-Belgian Company. This is a letter dated 6th October, from Munich:—"Soon after your departure I have taken all possible steps to free myself from the obligations under which I am towards Messrs. Giebert and Co., but there is no chance to arrive at a satisfactory result with respect to this previous to the 16th of this month. For this reason a personal interview could not possibly lead to any result. I am still most willing to help and assist you in your undertaking, because it would not only be a benefit for the colony but also for the world." Nothing can be more clear or conclusive to show that the Baron wished to extend the advantage of his preparation all over the world and to get it made at as low a cost as possible. "Allow me to tell you that you need not trouble yourself with finding out a new method or a simpler one for the preparation of the Extract of Meat, all this has been done a hundred times; there is only one method for manufactory and this is to mix the chopped flesh with its volume of soft water (without gypsum) and to raise the temperature of that mixture at the temperature of 180° F. To extract the essence with cold water is not applicable for manufacturing." Then he describes what it is. Then he says, "I am told that one of the best houses in London for the sale of the Extract is Allen and Hanbury, another is William Hooper, of Pall Mall. I request you to have the kindness to name me an agent, with full power to act, residing at London, with whom I may further confer on this matter." He, therefore, still continued to hold out, as I said before, a sort of prospect to Mr. Tooth, that he would soon be able to give him the benefit of his analysis. In November appeared the preliminary prospectus of the Anglo-Belgian Company, and, of course, as soon as it appeared that Baron Liebig was the Scientific Director of the Company, his negotiations with Mr. Tooth came to an end. At the same time he also corresponded with Mr. Hooper, a chemist of distinction. I think that only one letter of that correspondence is important, and that is, I think, the letter of October 6. He says:—"Your manufacture is perfect; there is nothing equal in Germany. I have written Messrs. Giebert and Company about the extract of meat, but the demand is so great and the supply so small in proportion that they seem to be unable to send you more, as they did. They are increasing their manufacture and in a few months there will no lack of *ex. carnis.* Mr. Steven Squire has sent me his letter, printed in the *Lancet,* about my food for infants in its improved form. Messrs. Savory and Moore and Hassall have "caught it," and I think that the *extractum carnis* and my food for infants are now better known in England, I should even say, than in Germany." Then another letter comes, which is very important indeed, in which he says this:—"It is very unfortunate that the supply of *extractum carnis* is so small in proportion to the demand, being only 3000 to 4000 pounds per month, presently not sufficient for the town of Berlin alone, but no person in the world could foresee that the article would so soon be appreciated by the public. This great success has led to the transformation of the Fray Bentos Company into a new Anglo-Belgian Company, Limited, with an enlarged capital, and in six or eight months two new establishments will be formed, which, joined to the manufacture at Fray Bentos, are able to produce 30,000 to 40,000 pounds per day. I am not a rich man but I have taken myself one hundred shares. I have undertaken the direction of the scientific part and shall give to the public, by severe chemical control, a guarantee of the genuineness of the article. If you establish a similar manufactory you may be certain to succeed. The produce of the new company, with all its enlargements, will prove insufficient for the wants of the world." Then there is another letter of the same gentleman, later on, in which he says that everything concerning it is in the thirty-second of the 'Letters on Chemistry,' which is one of the letters published in the 'Familiar Letters,' and that the Anglo-Belgian Company has patent rights in Uruguay, Buenos Ayres and the United States, but not in England. That is the correspondence, as far as material, with Mr. Hooper. That as I have said before speaks for itself, showing that the Baron had not the remotest idea that anything he had done, or was about to do, would interfere with the sale, or create a monopoly in England, at all events, whatever may be the state of things elsewhere. Now, at that time, as I said before, he had consented to become a director of the New Anglo-Belgian Company. It was established in 1865. What is now the 137th, but what was formerly the 141st Article of Association, is very important indeed, because it forms the starting point of the plaintiff Company's argument upon which their case rests, and a very strong starting point it is, there is no doubt about that. Now, the article is in these terms:—

"Baron Liebig shall be the first and present Director of the Scientific Department, and for Control of Analysis.' It will be observed that he is here spoken of by his title. He was a Professor at Giessen at that time, and a man of great eminence, and was induced to remove to the Capital of Munich when the King of Bavaria made him a Baron. In this article he is described by his title "Baron Liebig." It says "Baron Liebig shall be the first and present director of the Scientific Department, and for Control of Analysis. The analysis of all extract of meat arriving at the Company's general dépôt at Antwerp shall be under the immediate control of Baron Liebig, and such chemist as may be appointed by him as his delegate." Then the directors are to pay him 2 per cent. on the net annual profits of the Company. That was the arrangement which was come to under that Article. But again, in that Article of Association there is no monopoly of any sort or kind, and no attempt at creating it. It is simply this, you, the inventor, may be of service in analysing the article, and telling the public that the article is a good one, and in return for that we will give you 2 per cent. upon our profits. Services are rendered and there is a reward for those services. Now in the latter end of 1865 or the first six months of 1866, Tooth had brought or was bringing practically into operation his arrangement for manufacturing in Australia, and bringing the extract to the London market. He had in 1865 entered into an agreement with Messrs. Allen and Hanbury, gentlemen who are referred to by the Baron in his letter as being the first chemists in England, for a consignment to them of the article manufactured by Tooth in Australia. It is important to observe that at the time of that agreement in November, 1865, Messrs. Allen and Hanbury, who had dealt considerably before that time in Extract of Meat with the Fray Bentos Company by taking it from Antwerp and consigning to them there, entertained the hope that they would be able to secure the Baron's analysis for themselves, because in the agreement between Tooth and Allen and Hanbury they inserted this proviso that they should not be compellable to sell any extract in Australia unless with the approval, or under the analysis of Justus von Liebig, or, if he declined, some other chemist who might be agreed upon between the parties. In this state of things it appears on the whole to have been thought advisable by those who were interested in the success of the new company, called Liebig's Extract of Meat Company, to tighten the bonds of connection between it and the Baron, and to create if possible an exclusive right to his name and manufacture in them. That was very natural, because there was a competition springing up all round. There was the competition of Harvey and Reynolds, Savory and Moore, Allen and Hanbury and Tooth. This was too valuable an article for anybody who chose to be allowed to deal in, and evidently the Company began to feel the competition and wished to secure the Baron from lending his aid to anybody else, and to secure if possible a monoply for themselves Accordingly, in the month of April, 1866, two documents were signed which are of the greatest possible importance in the present case, and which are greatly relied upon by the plaintiff Company. One is a power of attorney by which the Baron professes to grant "the sole and exclusive right, power and privilege to use the name '*Extractum carnis Liebig,*' or to use my name in any other manner which the said company may from time to time see fit, in naming or indicating the *Extractum carnis*, manufactured according to my method or with any improvements therein." Then it gave them power to take out patents for various other manufactures of the same kind. But a more important instrument was the agreement, signed on the same day, between the Baron and the Company. The agreement of 1863 was for the limited period of five years, and that was one between Dr. Pettenkofer on the one hand, and the Company on the other. Dr. Pettenkofer is not made a party to this second agreement at all. He is an eminent chemist, but I do not know that he succeeded in reaching the reputation that Baron Liebig did. Baron Liebig's name, as we are aware, was a household word; Dr. Pettenkofer was a chemist of great repute in Munich, but still not having that reputation which Baron Liebig had, and therefore, Dr. Pettenkofer, although he was made to play a subsidiary part under this agreement, was not made a direct party to it, nor was the agreement made directly with him as it was in 1863. This is the agreement: It recites the Articles of Association, and then it comes to this, that Baron Liebig grants the full use and benefit of the invention in South America and in any other part of the world. It confirms the power of attorney, and says that for ten years from 1866 "the analysis of all extracts of meat arriving at the Company's general depôt shall be under the immediate control of him, the said Baron Justus von Liebig and his delegate, Dr. Max Pettenkofer." Then it provides that he will keep secret or not disclose the invention. Then there is a clause for the exclusive use of the name of the manufacture so far as the Baron could grant it at that time. I think there is not the smallest doubt that he did grant it. It is to be observed that Dr. Pettenkofer becomes what is called the delegate, which really amounts to this, that when a sample of extract of meat came from America, as Baron Liebig could not analyse it personally he, therefore, appointed Dr. Pettenkofer to do so. If samples go to London they are to be examined by one or the other, as the case may be, and they both certify their approval in the manner which appears on the plaintiffs' labels. Then the course was that of every parcel of extract consigned to the depôt at Antwerp a sample was sent direct from South America to Munich where it was analysed by either Baron Liebig or Dr. Pettenkofer. After they had analysed it they certified to the effect that it contained so much ash, so much water, and so on. Now the Company of course carried on a wholesale business. They dealt with Allen and Hanbury, and Savory and Moore, and everybody who liked to deal with them. They also had an agency in London for the purpose of the sale of their article. They were in the habit of supplying large customers like Allen and Hanbury, in bulk to be sub-divided by them, and again grocers and other people they supplied with small pots for the purpose of selling them retail. Messrs. Allen and Hanbury in 1865 began receiving extract from Mr. Tooth and the description of what they did then is to be found in paragraph 20 of the Bill:—"The plaintiff Company a short time since for the first time ascertained that the defendants have recently commenced selling under the name of "Liebig's Extract of Meat," and in pots closely resembling in size and material and general appearance those used by the plaintiff Company as aforesaid, an extract of meat prepared by a person named Robert Tooth, of Sydney, in Australia. Such pots have burnt in on one side the following words and figures:—"Liebig's Extract of Meat. Allen and Hanburys. Trade (an ox and a plough) Mark, A.D., 1715, London." And on the opposite side is pasted a printed paper describing the mode of manufacture, preparation, and so on. I need not go through all this. There was a paper label which was headed "Liebig's Extract of Meat," and an advertisement also to the same effect. Now the plaintiff Company complained of that; they said as soon as they saw these advertisements (I have got them all here, but it is not worth while going through them) the vice in them, for there was a vice in them, as far as the Company's view of the case was concerned, was that they were calling this thing "Liebig's Extract of Meat." Accordingly in 1866 they filed a Bill against Messrs. Allen and Hanbury for the purpose of restraining the use by them of the words "Liebig's Extract of Meat," or any other title of which the word "Liebig" forms a part. The case came on for hearing before the late Lord Hatherley, then Vice-Chancellor Wood, and his judgment was a direct decision, I will not say conclusive. The evidence before him was very much the same as the evidence before me. The Vice-Chancellor did not call upon the counsel of the defendants, but gave judgment in this way. He says, "I think it is impossible in this case to grant to the plaintiffs an injunction to restrain the sale of the article upon the ground of the use of the term Liebig's Extract of Meat. Then he says, "As to the use of the name,"—which is the great point—"it all turns upon the proposition (which is a simple proposition of fact) whether or not this article which the defendants sell had acquired the name of Liebig's Extract of Meat at the time they adopted the name for the purpose of using it, and irrespective of its being also a common name which was used by the plaintiffs. In other words, whether the only thing then existing in commerce was some article manufactured by the plaintiffs, or by those through whom they claimed a title." Then he says: "The plaintiffs claimed a right to use the name, so that the extract made by them could be thereby distinguished from anything made by the rest of the world." That to my mind is almost the governing proposition in the present case. The claim is the same here. The plaintiffs claimed a right to use the name so that the extract made by them could be "thereby distinguished from anything else made by all the rest of the world, and so as to exclude the rest of the world from taking a title exclusively adopted by the plaintiffs. It appears to me, that the case wholly fails on that ground. It seems to me upon the evidence that the title of the Liebig's Extract of Meat was a title acquired before the firm of Fray Bentos had distinctly acquired any interest whatever, that being in the year 1862." Then he says:—"Looking at the whole of this evidence it amounts to nothing more than this, that having a great reputation he did not wish to see his name bandied about and applied to other articles in the same manner as Dr. Clark's and Dr. Locock's well-known names have been attached to pills and wafers, the composition of other persons. His name was used from 1860 to the end of 1864, according to the statement of Dr. Pettenkofer. The extract being largely used at Munich was quite sufficient to give it a name. The name was not used in any way as a sort of right of property, which the Baron wished to reserve. Nothing of that kind appears, but simply that he did not wish his name to be attached to an improper article. In that way the name became generally known; it was known all over Germany; it was known to some people in this country; but it might not have been known to all, and that might account for the discrepancy (if it may be so called, for there really is none) between the two classes of witnesses." The Vice-Chancellor says that it is a question of fact. His finding on a question of fact does not bind me, nor am I am bound to follow him, but I am bound to say on the evidence before me, which is exactly the same as the evidence before him, that I come to the same conclusion on the question of fact that he did, namely, that up to 1866, when the Baron and the present plaintiff Company entered into that arrangement that the power of the Baron to create what he then did, was gone; it had become before that time in the words of the Vice-Chancellor "common property." Liebig's Extract of Meat had become a commercial article, known under that name, and that ceased to be the distinctive mark, if ever it was, of the manufacture of Liebig. Then he goes on to comment upon the evidence, and says, "I cannot be asked to interfere unless these gentlemen make out that from the character of their business this article would be supposed to be made and sold by them as being exclusively their article:—'The object of this Company is to manufacture on a large scale, not an article of commerce to be called Liebig's Extract, but to manufacture on a large scale the pure and genuine *Extractum carnis Liebig.*'" That is to say, "There is the article, but like everything else it is adulterated. There is a well-known article in commerce known as *Extractum carnis Liebig,* and we are going to give you the genuine article." What follows is relied upon as of great importance by the plaintiffs, and so it is; it is this, with the assistance and under the immediate control of Baron Liebig, and this is the real advantage the plaintiffs possess. They have the Baron's assistance, and they have his fiat to what they issue forth to the world, and no doubt it is a considerable advantage as far as they are concerned. This authority was not at all disputed. Although they gave notice of appeal to the House of Lords, they did not follow that up. That case had been acted upon and is distinctly approved of if, it were necessary, by the present Master of the Rolls in the case of Thorley *v.* Massam. But since that the Company made various alterations, and they altered the designation of their article. Up to that time they called it "Liebig's Extract of Meat." This decision had established that that was common property. A man has a right, as far as I can understand, to carry on his business, so long as he does not interfere with the rights of anybody else. That case established that "Liebig" was common property. There is no suggestion that the article manufactured by Anderson is an inferior article which would not pass in the market on its own merits, but only on the back of the Company's reputation through an imitation of their mark. Therefore, they altered their title. It is very important to see what they did not do and what they did do. They, therefore, first of all made a trade mark. It is very important to see what their trade mark was. It was this "Extractum Carnis Liebig;" they altered that title to "Liebig Company's Extract of Meat;" they did not take the word "Baron" although the word "Baron" was a word known in the market before. This alteration continued until the death of Justus von Liebig in 1873. Dr. Pettenkofer took the Baron's place, and Hermann von Liebig, who is one of the plaintiffs in the present action, took Dr. Pettenkofer's place, and from that time down to the present time the process of analysing has been gone through in the same way, except that the analysis is signed by Dr. Pettenkofer and Hermann von Liebig instead of being signed by Justus von Liebig and Dr. Pettenkofer. The *facsimile* autograph of the Baron was still continued, and has been continued up to the present time upon the labels of the company. In 1881 a company known as the Australian Meat Company, otherwise called the Ramornie Company, who manufactured in Australia in competition with Mr. Tooth, and everybody else, were what is called wound up. Mr. Anderson, the present defendant, had been their secretary. Of course it is obvious that as their secretary, if he attended to his duties properly, which I dare say he did, he would become acquainted with their trade and would know what the character of the article was, and of course a great many of the business connections with it. Under those circumstances he appeared to have made up his mind, which he had a right to do, to undertake the business of selling Liebig's Extract of Meat. The course he adopted was this: there are numerous manufacturers, indeed every place in South America makes extract of meat, and he imported it to London in bulk, and then subdivided that into pots, and sold it in retail either by himself or by means of other houses. By that means Anderson was getting his business in order and disposing of his extract of meat. Now the plaintiff Company complained again of that. They said, "This will not do, you cannot go on doing this." It is perfectly true, they said, "You have a right to call your article Liebig's Extract of Meat if you will; you have a perfect right to use the word 'Liebig,' but you have no right to use the words 'Baron Liebig;' that is wrong. "You may call it 'Liebig," but you must not call it 'Baron Liebig.' Moreover it appears that Mr. Anderson got hold in some way or other of a photograph of the Baron, but I am bound to say that I do not think there is any ground for suggesting that he got hold of it dishonestly. We are perfectly well aware of the effect of pictures, we know how much everything is sold by pictorial illustrations and photographs. Although I must not bring my own evidence into the case, I am perfectly well aware that when I walk along the street, I see everybody photographed. It occurred to Mr. Anderson that if he could put a photo of Baron Liebig on his pots, that that would be an attractive mode of selling the articles, and he was right in his conjecture, for it turned out very attractive indeed. But that is the head and front of his offending. The plaintiff Company complained of the use of the word "Baron" and of the use of this picture, and wrote letters, and the present Bill was filed. Now, having reached this stage it is necessary to describe what it was the defendant did. I have said before he did not call his extract merely as he might have done "Liebig's Extract," but he used the word "Baron," and that word was a word that had been used before in 1865 and 1866, and certainly I rather think at an earlier period by Savory and Moore, and I rather think by Harvey and Reynolds, but it does not matter who used it, because the fact was it had been known before as "Baron Liebig's Extract." The plaintiff Company, it will be observed, had never used the word "Baron," and they had never used a picture of any sort or kind, therefore it cannot be said that this had been any imitation of their use of the word "Baron." Then it was said, although there was no imitation of that kind, yet the word "Baron" and the picture were calculated to mislead. "The object and intention of the defendant in calling his extract by the names and designations aforesaid, and in using the pots aforesaid, and in affixing thereto a likeness whether photographic, lithographic, or otherwise, purporting to be a likeness of Baron Liebig, and the words 'Brand Baron Liebig,' was and is to get (as the defendant has in fact thereby got) the benefit of the reputation in which the plaintiff Company's extract is held, and to mislead (as the defendant has in fact thereby misled) purchasers into the belief that in buying the defendant's extract of meat they were in fact buying the extract of meat manufactured by the plaintiff Company." That being the state of matters the charge against the defendant is twofold. First, it is alleged that the defendant had in fact got the benefit of the reputation to which the plaintiffs' extract is alleged to be entitled, and has in fact misled the public into the belief that in buying that extract they are buying the article which is the plaintiffs' well-known manufacture. Then it is also alleged that in doing that he did it intentionally, with the object of getting that benefit and so misleading the public. Now if the plaintiffs were to be confined to the exact terms of their allegation, the question would have been more limited than it really now is, and that would have been whether the extract sold by the defendant was sold under such a title, because there was but little evidence of any misleading in point of fact. The real question argued before me, which I propose to decide, is whether the extract sold by the defendant is sold under such titles, designations and brands as to be reasonably calculated to deceive and mislead, not the trade, because the trade would not be misled at all, but the ultimate purchasers, the public, into the belief that they were buying the extract of Baron Liebig. As I said before, of actual misleading in point of fact there is very little evidence. That evidence, I think, fails, even if it is to be believed. The question is not what a fraudulent retailer may, by successful manœuvres in his shop, succeed in inducing people to take, but whether, under ordinary circumstances, reasonable people who have got eyes in their heads and who really use them and make use of them fairly and reasonably would be misled. If what the defendant does is so calculated to mislead, of course the plaintiffs would be entitled, at all events, to an injunction, because if it was done originally fraudulently and with an intention to deceive, there is no doubt that action for deceit would lie. Whether or not it is necessary in an action for deceit that fraud should exist, and whether or not it is necessary that there should be held to be a right of property in a mark other than a trade mark, about which the Court has expressed some considerable doubt in the recent case of the Singer Manufacturing Company *v.* Wilson, it is not necessary here to say, because there is no doubt whatever that if a man honestly believes that he is only exercising his *bonâ fide* rights and makes use of any portion of the mark of another, or in any way suggests by reason of any brand or designation of his own that his article is the article of another, there is no doubt whatever, and everybody agrees in this, that as soon as he ascertains and knows that what he has done, innocently perhaps, or ignorantly, possibly, is in violation of the rights of another that imposes a liability upon him of discontinuing the wrong. If in the present case it can be established that the defendant's marks and brand are calculated to deceive the public the plaintiffs would be entitled to the injunction which they ask. I think it is hardly necessary to quote authorities for that, but I will name the two cases which I have taken for that proposition, namely, Wotherspoon *v.* Currie, and the Singer Manufacturing Company *v.* Wilson. That being the law which I want to apply I have to consider whether the facts bring this case within the principle so laid down. In support of their case the plaintiffs called a large number of respectable and very well qualified witnesses in the trade who established to my satisfaction that the plaintiff Company's extract has had and still has a considerable reputation in the market, and that that reputation is due, not only to the fact that Liebig's name is connected with it,—although that, according to the decision in Liebig's Extract of Meat Company, Limited, against Hanbury, ceased to be a distinctive mark,—but it is due, among other things, to that which is pointed out by Vice-Chanceller Page Wood in his judgment, the personal connection of the Baron with the plaintiff Company formed as it was in 1863, and which continued down to his death. It was also continued by the analysis all this time by him and Dr. Pettenkofer, and since then by Dr. Pettenkofer and Dr. Hermann von Liebig. Nobody else has a right to assert, that they have distinctly a right to the reputation of having from the time of the Baron's first connection with the Fray Bentos Company down to the present time had the advantage of having been able to put their goods in the market with the certificate and analysis of the Baron and Dr. Pettenkofer, and after that of Dr. Pettenkofer and Hermann v. Liebig. Now, therefore, that being so, the question is whether or not the defendant suggested, it was not asserted that he had alleged it, that that personal connection exists between his extract and the Baron, and that he has the advantage of any such supervision or control of the Baron. It was said that the word "Baron" and the picture itself did suggest that there was a personal connection between the defendant and the Baron, so as to induce people who bought to believe that goods sold by the defendant had received that analysis and was the product of that personal connection existing between them, so that, in point of fact, if that were true the defendant was able to pass off his goods as the goods of the plaintiffs. Now the reputation of the plaintiffs and their mode of selling was this: they sold in pots, like the pots I have in my hand. (The learned Judge then contrasted the articles as made up for sale by the plaintiffs and the defendant, saying) It seems to me, and the conclusion I have come to is, that the distinctive marks by which the plaintiffs' goods are to be distinguished from anybody else's are to be found in these wrappers and envelopes, and also in their advertisements. I suppose I must not allude to my own personal knowledge, but I may say that I never heard of Dr. Pettenkofer before this case, but I have heard of the name of "Liebig." Whether you call him "The Baron" or "The Professor," or whether, as I think I put it in the argument, you allude to him as a man who wore a blue coat with yellow buttons, does not matter. The thing which is wanted is the thing which Baron Liebig invented and discovered, and brought into practical use, and that is the thing which has become public. The plaintiffs' witnesses stated that they always understood that purchasers asked for "Baron Liebig's Extract of Meat" when they wanted the plaintiffs', but they also stated that the mere use of the term "Liebig's Extract of Meat" would have the same misleading effect. On the other hand, the defendant called witnesses. They said that they did not understand that "The Baron" was anything more than "Liebig." I really think if I had to decide the case upon the weight of evidence that I could not say which side weighed the most. Of course, the great question for me now is to use my own eyes. I am a juryman on this occasion as well as a judge. I have got to determine whether or not I can come to the conclusion that there has been here such a user of marks and brands by the defendant as is reasonably calculated to deceive people into the belief that they have got the plaintiffs' goods. These are the two pots. They are similar in two respects, that is to say, they are both of stoneware, and they are both round; but they are different in size, for, although they hold the same quantity, one is short and the other is tall. I suppose I am now to convert myself into an unwary buyer; I must make myself unreasonable and ask myself a number of questions. Being an unwary buyer, and a supposed ignorant man, and wanting to purchase Liebig's Extract of Meat, I am to suppose that I went into a shop wanting a very good article, and this pot is put into my hands, and I, finding it very good, go to that shop again and ask for some more of that extract, and they give me *this*; then I should say, "Why, goodness, gracious! that is not like the other; there is a capsule instead of there being a trade mark; there is no caution that none is genuine unless the label round the pot is intact." I find here it says, "Baron Liebig's Extract of Meat, guaranteed by R. W. Anderson." If I were relying on the reputation of Liebig, Pettenkofer, and Hermann Liebig, I should say, "Where are the signatures of Hermann Liebig and Pettenkofer? Let me look at their signatures. I do not see their signatures. Where is the blue ink signature of Justus von Liebig?" No, there is nothing of the kind, but it is "guaranteed by Anderson." Then round the capsule there is this: "All Baron Liebig's Extract of Meat guaranteed by me bears my signature thus: Guaranteed by R. W. Anderson." It is said that the use of the word "Baron" indicates a personal connection with Baron Liebig different from that which would be indicated by the use of the word "Liebig." On the other side comes a picture of the Baron, a very intelligent face, and underneath is written "Baron Liebig." It is said also that that has the same effect. But then, I must take all the points of difference as well as all the points of resemblance and I must confess I am inclined to believe those gentlemen who gave evidence for the defence. I am not satisfied with the plaintiffs' case that unwary purchasers might be deceived. Purchasers must use their eyes. Of course I know there are persons who will run against posts at railway stations; so there are people who do not use their eyes, and who buy things which they are said to be deceived by. In this case, like all others, if the plaintiffs say that the defendants have been guilty of culpable conduct, they must make out that conduct by reasonable evidence. It is said that vague conjectures are sufficient. I think it must be more than that. I think that the liberty which there is for every man to sell his goods by the title which he thinks most attractive should not be restrained unless it is proved that what he is doing is reasonably calculated to deceive. Something turned on the question whether there had been any intention to deceive.

If a person were endeavouring to sail as near as he could to the wind, and therefore has done just enough, as he thinks, to sell his goods, one would look on his marks with a very different eye, and would look very carefully at his mark to see whether or not he had infringed. If I found it to be the case, as Mr. Anderson stated, that he had undertaken this as a commercial speculation in the belief that he had not infringed anybody's mark, I must have very strong evidence to prove the contrary. What he said was, "I know all the marks in the trade. I considered this to be a distinctive mark. I did not know that anyone used the word 'Baron,' and I never knew that anybody had used the picture." There really was no evidence of anything else, unless there was evidence from the similarity of the things. Of course one implies to everybody the reasonable consequences of his own acts; therefore, if a man does put into the market a thing which is a copy of a portion, at all events, or the whole of a man's mark or reputation, and then he puts in some slight distinctions which nobody would observe, you imply to him the reasonable consequences of his own acts, and you would say "You are a fraudulent man;" and I should not listen to his oath when he says, "I am not a fraudulent man, and did not intend to do it fraudulently." That was the principle which Mr. Higgins relied upon so strenuously, and that was the principle which was laid down in the case of Seizo *v.* Provezendo. That was a case where Baron Seizo sold sherry with a crown, calling it the "Seizo Crown Sherry." Another man, who happened also to have been a baron, put his coronet upon a cask of sherry, calling it "Seizo," with the addition of something else and he said none would mistake the two. But the Court said:—Here is a crown, and your coronet is very much like it, and then there is the word 'Seizo,' which is common to both." Then there was the Two Elephant trade mark case of Orr-Ewing *v.* Johnstone. In that case the plaintiff's cotton or twist was known by the mark of two elephants. The other man took two elephants, but he put their heads in a different way, or something of that sort, to the two elephants of the plaintiff, and then he put in his marks, which, if read carefully through would be found not to be exactly the same; but as there were two elephants, the Court came to the conclusion that he had done that which was in effect sailing as near to the wind as he possibly could. It was the same in the White Selvage case. In that case also they had taken a distinctive mark; but in the original when the mark was put on the stuff it did not show until it was dyed, which made the differences disappear and then it resembled in all respects the plaintiff's. Then there was another case, in which the same principle was laid down, which is known as the "Dog Head Beer" case. It was the case of Reid *v.* Richardson. One man put the head of a Mount St. Bernard dog and the other man put the head of a terrier dog. The plaintiff's beer had become known as the "Dog Head Beer." In the present case I must say that it is for the plaintiffs to make out their case. Taking the evidence and using my own eyesight I have come to the conclusion that the plaintiffs have not made out that case which I think they ought to make out to establish a case, not merely of fraud, but of unconscientious and continued fraud. Therefore my judgment will be for the defendant.

Defective Lime Water.

At Longton, on Wednesday, November 8, before J. H. Goddard and J. F. Wileman, Esqs., Mr. John Lichfield, chemist, High Street, was charged with selling lime water, which was not of the strength required according to the provisions of the statute.

Major Knight produced the analyst's certificate, which showed that instead of the lime water containing 0·56 grain of lime per ounce, it only contained 0·1 grain per ounce.

Defendant explained that the cost of the lime required was so very small as to preclude the idea of any motive in the amount therein being too little, but that this had come about in consequence of an accidental exposure to the atmosphere. He had always made lime water of the proper strength.

The Magistrates said they quite thought it had been done by an act of carelessness, and not with any intent on defendant's part, and inflicted a fine of 5*s.* and costs.—*Staffordshire Sentinel.*

Obituary.

GEORGE BLANSHARD.

The news of the death of Mr. George Blanshard, late of the firm of Raimes, Blanshard and Co., Wholesale Druggists, Edinburgh and York, will be received with very general feelings of regret and surprise, for until quite recently he was amongst us, hale and hearty as ever.

Mr. Blanshard was born at Angleton, Yorkshire, in 1814. At an early age he was apprenticed to Messrs. J. and R. Raimes, Leith Walk, Edinburgh, in which firm he subsequently became a partner. Eleven weeks ago, while visiting his native place on account of the state of his health, he was prostrated by a paralytic stroke, from which he never rallied. He died on the morning of the 14th inst.

Mr. Blanshard became a member of the Society in 1852. He has been a member of the Council of the North British Branch during most of the time since then, and was elected President for the year 1863–4. Few members took a more lively interest in the affairs of the Branch than he, or have been more regular in attendance at all its meetings, whether business or scientific, although he seldom took a prominent part in the proceedings.

For many years he was a member of the Leith Town Council, and during some of that time occupied a seat on the magisterial bench. It was proposed to raise him to the Provostship, the highest position in that body, but his business engagements led him to decline the honour. He was also for some time President of the Royal Scottish Society of Arts.

Mr. Blanshard was a man of excellent business habits, and a universal favourite amongst a very wide connection of friends. He possessed all the heartiness and geniality characteristic of the Yorkshire gentleman, and these qualities never failed him, notwithstanding the unexpected change of circumstances that somewhat overshadowed his later years.

He is survived by his widow and a family of two daughters and four sons, the eldest of whom is engaged in the establishment of Messrs. Raimes at York.

Notice has also been received of the death of the following:—

On the 26th of September, Mr. John Francis Garland, Chemist and Druggist, Marshfield, Gloucestershire. Aged 52 years.

On the 26th of October, Mr. John Stovin Woodruffe, Chemist and Druggist, Queen Street, Hull. Aged 59 years.

On the 28th of October, Mr. Charles Philip Heyland, Chemist and Druggist, High Street, Redcar. Aged 39 years.

On the 2nd of November, Mr. Robert Fincham, Pharmaceutical Chemist, Baker Street, W. Aged 72 years. Mr. Fincham had been a Member of the Pharmaceutical Society since 1842.

On the 4th of November, Mr. William Walter B. Stoddart, Chemist and Druggist, Grafton Lodge, Sneyd Park, Bristol. Aged 28 years. Mr. Stoddart had been an Associate of the Pharmaceutical Society since 1869.

On the 6th of November, Mr. John Stafford, Chemist and Druggist, High Street, Ross. Aged 42 years. Mr. Stafford had been an Assoeiate of the Pharmaceutieal Society since 1869.

On the 13th of November, Mr. Edward Henry Webb Roswell, Chemist and Druggist, Market Street, Lewes. Aged 62 years.

BOOKS, PAMPHLETS, ETC., RECEIVED.

PRACTICAL CHEMISTRY; Analytieal Tables and Exercises for Students. By J. CAMPBELL BROWN, D.Sc. (Lond). Second Edition. London: J. and A. Churehill. 1882. From the Publishers.

A CONCISE HAND-BOOK OF THE LAWS RELATING TO MEDICAL MEN. By JAMES GREENWOOD, Barrister. Together with a Preface and Chapter on the Law relating to Lunacy Practice. By L. S. FORBES-WINSLOW, M.R.C.P., ete. London: Baillière, Tindall and Cox. 1882. From the Publishers.

THE CONTAGIOUSNESS OF CONSUMPTION and its ANTISEPTIC TREATMENT. By J. BURNEY YEO, F.R.C.P., etc. London: J. and A. Churchill. 1882. From the Publishers.

DIET FOR THE SICK, being Nutritious Combinations suitable for Severe Cases of Illness. By JAMES RIDGE, M.D., etc. Second Edition. London: J. and A. Churchill. 1882. From the Publishers.

DIE PARFUMERIE-FABRIKATION. Auf Grundlage eigener Ehrfahrungen veröffentlicht von Dr. chem. George William Askinson, Parfumerie-Fabrikant. [Chemiseh-teehnische Bibliothek.] Vienna: A. Hartleben. From the Publisher.

A DICTIONARY of MEDICINE, including General Pathology, General Therapeutics, Hygiene, and the Diseases peculiar to Women and Children. By Various Writers. Edited by RICHARD QUAIN, M.D., F.R.S., etc. London: Longmans, Green and Co. 1882. From the Publishers.

DIE CHINARINDEN in pharmakognostischer Hinsicht dargestellt. VON F. A. FLUCKIGER. Berlin: R. Gaertner. 1882. From the Publisher.

Notes and Queries.

[739]. OIL OF PEPPERMINT.—On mixing Hotchkiss's oil of peppermint with rectified spirits of wine a bright green colour was produced.

Similar spirit and oil have been repeatedly mixed before without any like result.

Could anyone kindly explain the reason?

ASSOCIATE.

[740]. BLUE COLOUR FOR PIPE CLAY.—Can any of your readers furnish me with a good reeeipt for colouring pipe clay a deep blue, as used for pipe-claying doorsteps, etc.?

FORTH.

[741]. SMELLING SALTS.—"Agricola" will be glad of a good formula for a pungent smelling salt, that will not require the addition of any liquor ammoniæ.

[742]. POLYGRAPHIC INK.—Would some reader kindly give me, through the Journal, a formula for a good black polygraphic ink?

EURETES.

[743]. PRESERVATION OF ESSENCE OF LEMON.—Could any of your readers inform me the best means of preserving essenee of lemon? I have a considerable quantity of 1881 essenee, and wish to prevent it beeoming terebinthinous. I have been advised to mix it with equal parts of alcohol, the same as is frequently done with oil of lavender. But before doing this I thought I would ask the question through the medium of the Journal.

W. L.

[744]. POTASH POWDERS.—Will someone kindly inform me how to send out potash powders for a 3-pint gasogene, stating strength, etc.?

PULVIS.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE CURRICULUM.

Sir,—In perusing Mr. Candy's letter in a reeent issue, on Dr. Greenhow's report and the currieulum, I regret to see the one-sided view he takes of this important question. The prevailing ideas seem, to postpone the matter to some other time, and will it improve our position when in operation?

There can be no doubt that the present system of "cramming" in many of the sehools will tell, in years to come, and those who have gone into a thorough course of training are the men who will rise in their profession.

Until the curriculum becomes eompulsory, the large majority of the candidates for our examinations will be prepared in this way.

Your correspondent asks, "Are there any businesses which would utilize to the full the scientifie knowledge whieh it is proposed to render imperative?" I affirm that in every pharmaey this seientific knowledge is neeessary and requisite, and till the proper means of acquiring it is made eompulsory, the majority will not seek them of their own aecord. We must move with the times and not rest satisfied on what was done ten years ago.

It would be a poor reward for the man who has expended both time and means in taking the Major qualifieation to be elassed on a level with the ordinary tradesman.

There is no doubt when the eurrieulum is established we shall get a better class of candidates for examination; men who, I hope, will have some ambition to elevate the profession to whieh they belong, and who will not be diseouraged by hard work from attempting to attain the highest point.

I believe when medieal men in the eountry, and those places where they now compound their own medicines, find they can rely upon men who have had a thorough scientifie training, and possess an intimate knowledge of their business, they will see it is to the advantage of both that their medicines should be prepared by the pharmacist.

This, I ean testify from my own experience, is working well in many towns.

Liverpool. C. J. S. T.

THE POWERS NOW POSSESSED BY INSPECTORS OF WEIGHTS AND MEASURES.

Sir,—Permit me to draw attention to the power now possessed in eertain districts by inspeetors of weights and measures of entering the shops of dispensing ehemists and examining the weights and measures used therein.

This appears to me and others to be an odious, degrading and needless interferenee with a delieate and responsible occupation, already overburdened with peculiar distractions and anxieties. The increasing competition arising from co-operative stores eauses a growing reluctanee to pay the ehemist for his skill, that one possession on which he must rely. It fell to my lot to prepare a memorial for presentation to the Hastings Town Council, setting forth the objcetions felt by ehemists to this procedure. This memorial was signed by twenty-one chemists of the Borough of Hastings and St. Leonards, and received the hearty assent of an influential portion of the medical profession there. It was stated that this inquisitorial power was regarded with deep regret and annoyance. That "our weights and measures are those of the British Pharmacopœia, a standard work containing minute directions for the preparation of medicines, with delicate physical and chemical tests and all necessary details. To us the law assigns the responsible and arduous task of preparing, compounding and dispensing medicines at all hours. We are necessarily trusted with this, the greater matter; the greater includes the less; why deem us unworthy of trust in this lesser matter, the use of our own true medicinal weights and measures in dispensing, and why this needless and vexatious interference with our duties? This opens the door to petty tyranny and the odious calling of the informer, from which we have hitherto been free."

Dispensaries of various kinds and surgeries are exempt from the visits of the inspector; it is exceedingly desirable to obtain the same privilege for dispensing chemists who are undoubtedly fully deserving of it. It will be remembered that measures stamped with the legal mark of one district are legal in all others, hence it is usual to purchase measures from the manufacturer which have been duly tested and stamped. This should suffice, as it affords every security.

It will, probably, be necessary to place before Parliament a short Bill exempting dispensing chemists from the operation of that part of the Apothecaries' Weights and Measures Act which empowers inspectors to visit the shops of chemists. This can be easily accomplished. It will then rest with the dispensing chemists of Great Britain to give a hearty and earnest support to this measure by numerous petitions and by letters to as many members of Parliament as possible. The removal of an odious, humiliating and ridiculous espionage is well worthy of some continuous effort.

I shall be glad to receive any suggestions or assistance.

Hastings. G. A. Keyworth, F.C.S.

Citrine Ointment.

Sir,—Your correspondent, Mr. J. E. Saul, writing in last week's Journal on this subject, appears to be unaware of the fact that the question of the composition of "golden ointment" was set at rest some ten years (it may be more) since, when it was shown to be a well-prepared ointment of red oxide of mercury. I am unable, at the present moment to lay my hand upon the paper in which this result was given, but it was published (if not in our Journal) in one of the journals devoted to pharmacy. Be this as it may, he may easily and quickly solve the question for himself thus, as I have just done:—Take about ·5 gm. of the ointment and place it in a test tube with about 4 c.c. of water to which a few drops of nitric acid have been added; boil the mixture gently for a short time, when the red colour will be seen to fade and finally disappear; pour the whole on a filter and place a drop of the filtrate on a gold coin; on placing an iron key in contact with both the coin and the drop of liquid, the mercury will be deposited on the coin and the stain so produced will disappear on heating. Further tests may be applied to the filtrate, but no evidence of an arsenical compound was to be found in the sample of "golden ointment" I thus examined. Incidentally I would mention that I am unable to agree with the statement made in Mr. R. A. Cripps's paper on "The History of Citrine Ointment," that "golden eye salve" is an ointment of yellow oxide of mercury; if by this designation he means the well-known proprietary article—for the colour alone would seem to negative this assumption, it being a bright red and not yellow colour; the colour, in fact, that very finely levigated red oxide of mercury would have. Query, how has Mr. Cripps satisfied himself that it is an ointment of yellow oxide of mercury?

It is somewhat curious that the colleges should have introduced citrine ointment (ung. hydrag. nitratis) as a substitute for "golden ointment," which it could not in any way have resembled; but that they did so we have it on the authority both of Christison and Squire. Quite as curious also is the oft-repeated statement in text books, both English and foreign, that it is an ointment of sulphuret of arsenic, some giving it as orpiment (Dorvault, Beasley, etc.), others as realgar (Paris, Gray, etc.), though in point of fact it resembles neither. The facility with which errors are perpetuated must have struck most of us, and I entirely agree with the expression made use of by a late President of our Society, that there was quite as much good work to be done in verifying or otherwise the results of others, as in striking out new branches of research. There is one explanation, however, which may account for these discrepancies; it is well known that many of these proprietary preparations have varied considerably from what they were originally, and it may, after all, be quite true that "golden ointment" of past time was prepared with a sulphuret of arsenic.

I trust that Mr. Cripps will pursue his researches into the composition of citrine ointment, as there is still much to be worked out.

Tottenham High Cross. Alfred E. Tanner.

Sir,—It is very easy for any person to criticize a paper which must have cost Mr. Cripps hours of study and patient research, but I think Mr. J. E. Saul is justified in calling attention to an error, viz., that "golden eye salve" was "an ointment of yellow oxide of mercury."

Mr. Cripps says Singleton's eye salve was "an ointment of yellow oxide of mercury." How this mistake was made I know not.

Paris most distinctly says:—"Under this name is sold a preparation, which consists of sulphuret of arsenic (orpiment) with lard, or spermaceti ointment." But he adds:—"The unguentum hydrargyri nitrico-oxidi of the London College is also sold under the same title."

Mr. Cripps might have said whether we are really entitled to call the ancient "unguentum basilicum flavum" the "unguentum balsilicum," and the linimentum arcæi of last century by the name "citrine." It is not my object to go further to prove Mr. Cripps's exertions to be at fault than in this respect, that if he is right, any yellow ointment may be called "citrine;" but I hold the "yellow ointment," or "unguentum citrinum" of the Edinburgh Pharmacopœia, 1722, is the real citrine ointment, from which all other colleges have copied, and that was a mercurial ointment—an ointment of "nitrate of mercury."

It will thus be seen that although an ointment of red oxide of mercury was sold as Singleton's, it did not possess the colour of golden eye salve. It was a substitute.

Christison says:—"The object of the officinal processes for this important ointment (unguentum citrinum) has been to imitate, as exactly as possible, a nostrum, well known by the name of the golden eye ointment."

Mr. Cripps does not mention the fact that "sandarach" or "sandaracha" was used long before the Christian era as an application in ophthalmic affections. In Pliny's time it was the red variety, or realgar, that was most esteemed. Whole pages might be written upon this subject, but of one thing I am convinced that Singleton's eye ointment was not an ointment of yellow oxide of mercury, but of yellow sulphuret of arsenic (As_2S_3)—orpiment.

Northallerton. Henry Brown.

Apprentice.—We thank you for the communication; similar absurdities are continually met with, but are hardly worth repeating in print.

Querist (who should have sent his name and address).—Such a preparation would be subject to duty, the only evidence of the payment of which, that we are acquainted with, is the presence of the Government stamp.

S. P. Q. R.—Brush the coins carefully with very dilute acid, then wash them thoroughly in water.

T. W. L.—The definite oleate of mercury is used and the "heavy petroleum oil" is the portion of petroleum having a high boiling point.

J. D. Morgan.—The chloride of calcium will absorb moisture from the atmosphere. Mix the ingredients each in as dry a condition as possible, and send out the divided powders in a closed bottle.

Fritz.—Use 1 grain of very dry soap to each pill, and the pil. galb. co. in powder.

A. T.—Cacao butter.

J. White.—As a rule crystalline substances, when dispensed, should be in powder, but this is not necessary with quinine.

Zinc.—Acid. hydrocyan. dil., B.P.

Medicus.—Seven parts of syr. simp., B.P., contain six parts by weight of sugar; the calculation is easy.

Communications, Letters, etc., have been received from Messrs. Baynes, Brown, Bumpstead, Orton, Abraham, Benger, Illingworth, Allen, Martin, Davies, An Old Subscriber, Chemicus, W.L.P.

THE PHARMACOPŒIA AS A STUDENT'S MANUAL.*

BY PROFESSOR ATTFIELD, F.R.S.

A pharmacopœia, the great medicine book of a country, is not primarily written for pupils. And yet it is the volume which, perhaps before all others, should be placed in the hands of the medical or pharmaceutical student. For it contains a description of the armoury with which as physician or pharmacist he will presently have to carry on, very literally, the battle of life; the fight against ill-health, disease, and decay. A glance through it in his earliest days of pupilage will reveal, even to his still untrained eye, what are unmistakably weapons of offence and of defence; and his general education and his common sense will rightly suggest that with the use of every kind of instrument there mentioned he will some day have to be familiar. Nay, he will rightly conclude that not only with the use, but with the construction, of each weapon he must sooner or later become acquainted. He will, moreover, reflect that before he can be a skilled warrior, or even a trusted armour-bearer, he must largely increase his more fundamental knowledge, both of matter and of force, and must more highly cultivate his powers of thought and of reason. Afterwards, during the period that he is extending that knowledge and maturing those powers, he will now and again glance into the collection, until, having acquired a mastery over underlying principles, he regularly frequents the armoury, and, intelligently, enjoyably and with ease, learns everything connected with the fabrication and properties and uses of the instruments there brought together.

Leaving metaphor, a pharmacopœia, British or foreign, is an index of work, a book which points out or makes manifest the pharmaceutical work which it is our duty and our pleasure to perform. To the student it is an index of educational scientific work, to the principal an index of practical art work, in pharmacy. For pharmacy includes both science and art, and may be regarded not as a distinct and separate art or science, so much as a mosaic of arts and sciences, of the chief details of which the Pharmacopœia is an index or catalogue. Thus, the book embraces physics and mechanics without being a physical or mechanical treatise; it includes chemistry and botany without being a handbook of either; it contains a list of materials for medical prescriptions without being a volume on that combination of subjects known as materia medica; and if, outside physics, mechanics, chemistry, botany and materia medica, there remain anything that can be termed pharmacy, the Pharmacopœia embodies it, yet the book is not a manual of pharmacy. That is to say, it is not a student's manual of pharmacy, whatever it may be for the medical or pharmaceutical practitioner. For either of these latter workers a pharmacopœia is perhaps such a text-book. At all events it is primarily written for them, not for students as students. Indeed, the preface of the British Pharmacopœia — the Pharmacopœia with which we are just now more immediately concerned —states that it is "a book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared and mixed. . . . It is intended to afford to the members of the medical profession and those engaged in the preparation of medicines throughout the British Empire one uniform standard and guide, whereby the nature and composition of substances to be used in medicine may be ascertained and determined." One of its objects is "the definition of substances which the physician prescribes, and which are required to be kept at one uniform standard of strength and composition." Again, "pains have been taken to make the descriptions of all the substances referred to in the work sufficiently comprehensive and minute to afford a clear indication of what the medicines of the Pharmacopœia are intended to be, and to enable those who are engaged in their administration to determine the identity and test the purity of such as are met with in commerce." Here is no direct word for the pupil as a pupil.

But the student of pharmacy, medical or pharmaceutical, hopes and intends, at some future time, himself to administer or to manufacture medicines and to maintain them of standard strength; hence, before he has finished reading even the preface of the work, he will appreciate the thoughtfulness of those who placed the Pharmacopœia in his 'prentice hands and will lose no opportunity of studying a book which promises to give him such an insight into and such a grasp of his future career.

Here a question will arise in some minds as to whether or not a pharmacopœia could perhaps be made, what admittedly it is not now, namely, a systematic educational work for students. Such a course is probably quite impracticable. For to carry it out thoroughly would involve the conversion of a single handy book into a work of many volumes, amongst whose multitudinous pages all that relates to the practical manufacture or administration of medicines would be dwarfed if not hidden altogether. To adopt the plan partially and pithily would involve the giving of high official sanction to that too rapid and superficial acquirement of information still, alas, too common, though now everywhere deprecated; that is, would encourage, not the digestion, assimilation and retention of knowledge by the student himself, but, his mere temporary possession and employment of knowledge which, falsely labelled as his own, has, in reality, been collected and elaborated by others. Some pharmacopœias are more, some less, educationally valuable than the British; but, speaking generally, we may say that a pharmacopœia is not, and probably never will be, what is ordinarily understood by an educational work. Some of its peculiarities may perhaps be retained because their educational value adds weight to other reasons for their retention, but a systematic student's manual it can never become.

How, then, should a medical, and more especially a pharmaceutical, pupil deal with this book, one clearly not designed as a student's book, yet one with which a student must very early make close acquaintance and sooner or later become thoroughly familiar? How should he study the book, not the arts and sciences to which it is the index or guide, but the book as a book? For in the case of a pharmacopœia the student might, I think, with much advantage, at all events in the present stage of progress in British pharmaceutical education, adopt this mode of dealing with a volume. It is an unusual mode, no doubt. Commonly an educa-

* Presidential Address delivered at the opening meeting of the School of Pharmacy Students' Association, 1882-3.

tional work is read for the knowledge it will afford. A man pores over a manual of physics not to consider its construction but to study physics. He brings brain power to bear on a botanical book for the sake of its botany. He cares little for the plan or construction of a chemical treatise, but a great deal for the construction of its formulæ, theories and processes. Occasionally, however, a book is studied from the point of view of construction or method of arrangement. Thus, to write a critique a man must study a work from that point of view. And perhaps a young man intent on mastering his Pharmacopœia might well adopt the attitude or standpoint of the critic, not with the object of the critic, that of criticising, nor with the hope of studying with the ability possessed by a practised critic, but with the endeavour to employ the mode or manner of studying followed by a critic. For the time being his question regarding the Pharmacopœia will then be, not what is contained therein, but how is it contained. Into what classes or categories may its rich stores of facts be divided.

From this aspect, then, the young pupil or apprentice first examines the Pharmacopœia. He has scarcely finished reading the prefatory pages, has not glanced over more than half a dozen leaves, before he finds that the articles or sections have to do with vegetable substances, with mineral substances and with less definite mixtures or compounds. One of several courses he might then follow would be to purchase three small note-books and set to work to produce, as far as his own unaided ability might carry him, a manuscript catalogue of each of the three classes just mentioned; in fact, compile a kind of *catalogue raisonné* or subject-catalogue from one which is arranged alphabetically. Let him but do this earnestly and with reasonable intelligence and he may rest assured he will have laid a trustworthy foundation, at all events, of a knowledge of chemistry, botany and pharmacy.

What the pupil may next do, as regards the Pharmacopœia, will depend on his tastes, on his general mental character as formed by nature, on home-training and school associations, and on the variety of good advice with which he may have been favoured. Perhaps his inclinations will lead him further to divide and subdivide. Perhaps he will still more wisely prefer to spend occasional hours for a month or two with more truly educational books on chemistry, botany, etc., and then again proceed with his analysis of the Pharmacopœia. Sooner or later, however, the pharmaceutical apprentice who means to be something more than a mere mechanical mixer of drugs, and not a mere hand-to-mouth vendor of drugs and sundries, will have himself prepared the following manuscripts:—First, a well arranged list of the chemical substances mentioned in the Pharmacopœia, an improved form of his first rough catalogue of mineral preparations. Secondly, a similarly well arranged list of the vegetable products, with, perhaps, added columns showing the botanical name of the plant, its common name, the part employed, the country whence obtained, etc. Thirdly, a complete list of the compounded drugs or mixtures, with added columns showing the names of their chief or more powerful components, and the proportions in which the active agents occur in the respective preparations, etc. The compounds might be subdivided into powders, pills, ointments, etc.

A philological examination, by the student, of the chemical, botanical and other terms in the Pharmacopœia will be found to be both instructive and entertaining. And if he extends his labours, as he probably will, to the generic and specific names of wayside flowers, he will go far towards fitting himself to be a charming companion for a summer ramble, a strong link in the conversational chain encircling the dinner table, and a valued contributor to the tales and tit-bits of a winter's fireside. He will find poetry associated with a daphne, mythology with an atropa, music murmuring in the Latin name of the elder, history with gentian, lobelia and valerian, and geography with carum and colchicum. He will learn how graphic are the names humulus lupulus, crocus, helleborus, oxalis, digitalis, fœniculum, hyoscyamus. And should he not already be strong in classics he will be instructed by such adjectival terms as æstivus, agrarius, aquilina, arvensis, borealis, campestris, ciliaris, collinus, fluviatilis, gracilis, graveolens, hypnoides, lacustris, littoralis, muralis; nemoralis, petræa, pulchella, riparia, sativus, sylvestris, usitatissimum, vernalis, virosus. A search for the derivations of the chemical names of the Pharmacopœia is also an extremely interesting and instructive task.

An examination of the Pharmacopœia from the geographical standpoint will enlarge a pupil's mind as well as give him knowledge valuable in pharmacy. A few pen-and-ink skeleton maps are easily and quickly drawn, on which may be written, by the student himself, in different coloured inks, the habitats of the minerals and plants yielding officially recognized drugs. These habitats he should himself search out from works on materia medica.

There are formulæ and formulæ in a pharmacopœia. Thus in literary construction the following formulæ are alike:—

Take of—

Fine iron wire	$1\frac{1}{2}$ ounces.
Iodine	3 ounces.
Distilled water	15 fluid ounces.

Take of—

Mercury	2 ounces.
Confection of roses	3 ounces.
Liquorice root	1 ounce.

But in the latter, the proportions of ingredients are fixed by the authorities who issue the Pharmacopœia; in the former, nature, to whom all such authorities must bow, fixes absolute limits to the proportions of constituents in the product. The one product is a mechanical mixture, the other a chemical mixture; and although a student would scarcely be wise in drawing up lists of the whole of the formulæ for the mechanical mixtures of the Pharmacopœia as compared with those for chemical compounds, he may well select a score or so of each, for in so doing he will be planting seeds of information in his mind which, well nurtured, will mature into knowledge of some of the grandest forces of nature.

A medical pupil might, in addition, convert the alphabetical list of official remedial substances into a therapeutical list;—antacids, cathartics, diuretics, narcotics, stimulants, tonics, etc.

The Latin of the Pharmacopœia and even the arithmetic, including all weights and measures, might claim attention in the cases, of course very few, in which pupils feel they are not quite so strong in those subjects as they could desire.

And now, having broken up the great alphabetically arranged catalogue of matters called a pharmacopœia into lists chemical, botanical and pharmaceutical, and, perhaps, lists philological and geographical, the whole forming a manuscript pharmacopœial *catalogue raisonné*, the student will probably find himself nearing the end of his pupilage or apprenticeship. If his career is to be the medical profession, he will soon proceed to a medical school, fortunate if he has had any time to go through such preparatory work. If he is following the calling of a chemist and druggist, he will have completed his reading, so far, and his more or less practical acquaintance with the preparation of confections, decoctions, enemas, extracts, glycerines, infusions, inhalations, juices, liniments, lozenges, mixtures, ointments, pills, plasters, poultices, powders, spirits, suppositories, syrups, tinctures and wines; and will probably soon make such arrangements as will enable him to give some months to the systematic study of chemistry, including much practical chemistry, botany, materia medica and some physics.

This academic course completed, or being within measurable distance of completion, he will doubtless once more return to his Pharmacopœia. In a period of time the shortness of which will astonish him he will have gone through it with ease and with pleasure, adding to his memoranda those explanations of processes and of tests which his chemistry has revealed and those botanical facts which his study of the natural orders of plants has unveiled. Then according to the extent of his knowledge of principles and his personal ability, he will find himself more or less its master. In studying the book as a book, and in regarding it as an index of educational and practical work, he will have acquired a sound knowledge of those branches of art and science which together form pharmacy, and will have gone through an invaluable course of mental discipline.

A word of caution. No student will truly help his friend by lending him his manuscript notes *to copy*. What I have many times said privately, I now say publicly, namely that the value of such a summary lies in its being the result of a student's own reading, own learning, own work, own training. A summary, good enough in itself, but made by somebody else may, no doubt, be committed to memory, but the knowledge it affords will be superficial and ephemeral; it will not train the powers of thought and reason, and will do harm to the mind and the morals.

A word of encouragement. If this short address should meet the eye of any pupil in pharmacy who thinks that the calling will not pay for such effort as is here shadowed forth, let him be confirmed in his idea. The effort would never repay *him*. Let him quit the calling. He has already lost enough time and money in following it; he will lose more if he remain. To the pupil whose heart is in his work, and who believes that such endeavours will bring a commensurate reward, to him due reward will come. Future success in pharmacy will lie with those best educated.

In conclusion, I will only add that the most accomplished pharmacist owes most to the Pharmacopœia, and considers himself bound according to his opportunities to do his best to maintain its value. A true student of the Pharmacopœia, he never ceases to be its student. But his attitude towards it of unquestioning loyalty ever merges into one of good and intelligent scepticism, an attitude which provokes sound experimental research and results in improved processes and products.

CONVALLAMARIN,*

THE ACTIVE PRINCIPLE OF THE LILY OF THE VALLEY.

BY C. TANRET.

At a time when the attention of the medical public has just been called to the lily of the valley (*Convallaria majalis*), I have thought it would not be without interest, to complete, from a pharmacological point of view, the communications of Messrs. Sée and Langlebert.†

Those authors have attempted to ascertain which is the most active part of the plant, but without, in my opinion, arriving at any very clear conclusion. In fact, the roots did not give the results sought for; on the other hand the extract of the flowers exercised a very energetic action upon animals, but produced much less intense effects upon man, while an infusion of five or six grams of flowers remained without effect. The leaves showed so little activity that an extract from them required to be given in a dose three times larger than that of the extracts from other parts of the plant. In short, the best results were obtained with aqueous extracts prepared from the flowers and stems, with an addition of one-third of their weight of roots and leaves.

It will be remarked, first, that the time of flowering is not generally that which is recommended as the best for the collection of leaves and roots, the too aqueous juices of which have not yet been sufficiently elaborated. It follows, therefore, that the results obtained with the lily of the valley might vary when a plant collected in a more advanced stage is employed, a serious consideration in dealing with a rather energetic medicine. When it is added that the extracts alter, more or less profoundly, during their evaporation, it will be seen that in order to reckon upon the action of the lily of the valley, it will be necessary to look, not to the extract, but to the active principle.

This active principle has been known for many years. Walz, in 1858, announced that the lily of the valley contained two glucosides, which he named "convallarin" and "convallamarin." In 1867, Marmé made some physiological experiments with these two bodies, and published his researches under the title, "Ueber Convallamarin, ein neues Herzgift."‡ With convallarin, in doses of 3 to 4 grains, he obtained only a purgative effect; but he found that convallamarin acted principally upon the heart, and in a very small dose when injected into the circulatory system: 7 to 10 milligrams for dogs weighing 7 to 14 kilograms; 3 to 8 milligrams for cats of 2 to 3 kilograms; 2 to 3 milligrams for rabbits of 1 to 1·2 kilograms, etc. He also determined the toxic doses to be a crural injection of 15 to 30 milligrams for dogs, 5 to 8 milligrams for rabbits, etc. Death followed usually a few minutes after the administration of these doses; happening by stoppage of the heart and nearly always accompanied by very intense clonic convulsions. He adds that there is no doubt

* *Journal de Pharmacie*, [6], iii., 355; from the *Bull. Gén. de Thérapeutique*.

† See before, pp. 143, 144.

‡ *Nachrichten von der k. Gesellschaft der Wissens.*, Göttingen, 1867, p. 160.

that convallamarin is a heart poison, and that its physiological action approaches qualitatively and quantitatively that of digitalin, helleborin, the upas principles, etc.

Whilst convallarin is soluble in alcohol, but insoluble in water, convallamarin dissolves in water in all proportions, and is very soluble in ordinary alcohol and methylic alcohol. Convallamarin is insoluble in ether, chloroform and amylic alcohol, and is uncrystallizable. I have observed that it rotates the plane of polarization of light strongly to the left, and I have found its rotatory power in alcoholic solution to be $\alpha_D = -55°$. Pure convallamarin does not reduce Fehling's liquor until it has been boiled with dilute acid, when, according to Walz, it splits up into glucose and convallamaretin. Sulphuric acid dissolves it with a brown colour; but if it be treated with this reagent after having been moistened [? with water], a beautiful violet colour is developed which disappears upon the addition of water. Its taste is bitter, followed by a peculiar after-taste.

As the solvents of this glucoside are the same as those of the accompanying reduced sugar, it did not appear to me possible to obtain pure convallamarin,—not reducing cupric solution,—by the action alone of neutral liquids employed successively upon the plant or its extract. The process of Walz gives a satisfactory product, but as it is long and specially inconvenient, I have modified it in the following manner.

An alcoholic tincture made from the whole plant is precipitated with subacetate of lead and filtered, excess of lead is removed with dilute sulphuric acid, avoiding the use of more than is necessary, and after neutralizing, the tincture is distilled, the last portion of alcohol being driven off in the open air; then the cooled and filtered liquor is treated with tannin, care being taken to keep the liquid neutral by sparing additions of a dilute solution of carbonate of soda. A compound of tannin and convallamarin is precipitated, which, after washing, is dissolved in 60° alcohol, the solution decolorized with charcoal, decomposed with zinc oxide, filtered and evaporated to dryness. In this way convallamarin is obtained nearly white and having the appearance of ordinary digitalin. To free it from the salts that are sometimes carried down by the tannin precipitate it is a good plan to redissolve it in 90° alcohol, filter and then evaporate.

This treatment, applied to the lily of the valley collected in the first days of August in the present year, produced a yield of two grams of convallamarin per kilogram of the fresh plant.

With this process, the preparation of convallamarin will not present any serious difficulties; and if the lily of the valley should remain in the medical armamentarium, its active principle should be substituted for the plant by those who wish to protect themselves from the inconveniences presented by so unequal a distribution of convallamarin in the various parts, its variability according to the time of collection and its alteration in the extracts.

In order to verify this latter point I made the following experiment, based upon the loss of rotatory power which solutions of convallamarin undergo when the glucoside decomposes.

A pound of lily of the valley being taken, of which the strength in convallamarin was known, I commenced by estimating its acidity, which I represented in oxalic acid; then I dissolved in 100 grams of water corresponding quantities of convallamarin and acid. This solution was evaporated in a water-bath to the consistence of an extract, then redissolved in water and examined polarimetrically. The rotatory power had diminished one-half;* one-half, therefore, of the active principle had been decomposed and was no longer present as such in the extract, which, however, had been prepared under the most favourable conditions, the quantity of liquid to evaporate having been very small.

It remains only to refer to an alkaloid which M. Stanislas Martin has stated that he found in the fresh flowers of the lily of the valley and which he named "maialine."† In any case this body would have nothing to do with the activity of the rest of the plant, for I have not been able to find it in the leaves, stems or roots.

ELECTRIC LIGHTING AND THE TRANSMISSION OF FORCE BY ELECTRICITY.‡

Amongst the practical questions that now chiefly occupy public attention are those of electric lighting, and of the transmission of force by electricity. These together form a subject which has occupied my attention and that of my brothers for a great number of years, and upon which I may consequently be expected to dwell on the present occasion, considering that at Southampton I could deal only with some purely scientific considerations involved in this important subject. I need hardly remind you that electric lighting, viewed as a physical experiment, has been known to us since the early part of the present century, and that many attempts have, from time to time, been made to promote its application. Two principal difficulties have stood in the way of its practical introduction, viz., the great cost of producing an electric current so long as chemical means had to be resorted to, and the mechanical difficulty of constructing electric lamps capable of sustaining, with steadiness, prolonged effects. The dynamo-machine, which enables us to convert mechanical into electrical force, purely and simply, has very effectually disposed of the former difficulty, inasmuch as a properly conceived and well-constructed machine of this character converts more than 90 per cent. of the mechanical force imparted to it into electricity, 90 per cent. again of which may be re-converted into mechanical force at a moderate distance. The margin of loss, therefore, does not exceed 20 per cent., excluding purely mechanical losses, and this is quite capable of being further reduced to some extent by improved modes of construction; but it results from these figures that no great step in advance can be looked for in this direction. The dynamo-machine presents the great advantage of simplicity over steam or other power-transmitting engines; it has but one working part, namely, a shaft which, revolving in a pair of bearings, carries a coil or coils of wire admitting of perfect balancing. Frictional resistance is thus reduced to an absolute minimum, and no allowance has to be made for loss by condensation, or badly fitting pistons, stuffing boxes, or valves, or for the jerking action due to oscillating weights. The materials composing the machine, namely, soft iron and copper wire, undergo no deterioration or change by continuous working, and the depreciation of value is therefore a minimum, except where currents of exceptionally high potential are used, which appear to render the copper wire brittle.

* I have ascertained that the glucoside derived from the breaking up of convallamarin is without action upon polarized light.

† *Union Pharmaceutique*, 1865.

‡ From a Presidential Address delivered by Dr. C. W. Siemens, F.R.S., before the Society of Arts, November 15.

The essential points to be attended to in the construction of the dynamo-machine, are the prevention of induced currents in the iron, and the placing of the wire in such position as to make the whole of it effective for the production of outward current. These principles, which have been clearly established by the labours of comparatively few workers in applied science, admit of being carried out in an almost infinite variety of constructive forms, for each of which may be claimed some real or imaginary merits regarding questions of convenience or cost of production.

For many years after the principles involved in the construction of dynamo-machines had been made known, little general interest was manifested in their favour, and few were the forms of construction offered for public use. The essential features involved in the dynamo-machine, the Siemens' armature (1856), the Pacinotti ring (1861), and the self-exciting principle (1867), were published by their authors for the pure scientific interest attached to them, without being made subject matter of letters patent, which circumstance appears to have had the contrary effect of what might have been expected, in that it has retarded the introduction of this class of electrical machine, because no person or firm had a sufficient commercial interest to undertake the large expenditure which must necessarily be incurred in reducing a first conception into a practical shape. Great credit is due to Monsieur Gramme for taking the initiative in the practical introduction of dynamo-machines embodying those principles, but when five years ago I ventured to predict for the dynamo-electric current a great practical future, as a means of transmitting power to a distance, those views were still looked upon as more or less chimerical. A few striking examples of what could be practically effected by the dynamo-electric current, such as the illumination of the Place de l'Opéra, Paris, the occasional exhibition of powerful arc lights, and their adoption for military and lighthouse purposes, but especially the gradual accomplishment of the much desired lamp by incandescence in vacuum, gave rise to a somewhat sudden reversion of public feeling; and you may remember the scare at the Stock Exchange affecting the value of gas shares, which ensued in 1878, when the accomplishment of the sub-division of the electric light by incandescent wire was first announced, somewhat prematurely, through the Atlantic cable.

From this time forward electric lighting has been attracting more and more public attention, until the brilliant displays at the exhibition of Paris, and at the Crystal Palace last year, served to excite public interest to an extraordinary degree. New companies for the purpose of introducing electric light and power have been announced almost daily, whose claims to public attention as investments were based in some cases upon only very slight modifications of well-known forms of dynamo-machines, of arc regulators, or of incandescent carbon lights, the merits of which rested rather upon anticipations than upon any scientific or practical proof. These arrangements were supposed to be of such superlative merit that gas and other illuminants must soon be matters simply of history, and hence arose great speculative excitement. It should be born in mind, however, that any great technical advance is necessarily the work of time and serious labour, and that, when accomplished, it is generally found that so far from injuring existing industries, it calls additional ones into existence, to supply new demands, and thus gives rise to an increase in the sum total of our resources. It is, therefore, reasonable to expect that, side by side with the introduction of the new illuminant, gas lighting will go on improving and extending, although the advantage of electric light for many applications, such as the lighting of public halls and warehouses, of our drawing-rooms and dining-rooms, our passenger steamers, our docks and harbours, are so evident, that its advent may be looked upon as a matter of certainty.

Our Legislature has not been slow in recognizing the importance of the new illuminant. In 1879, a Select Committee in the House of Commons instituted a careful inquiry into its nature and probable cost, with a view to legislation, and the conclusions at which they arrived were, I consider, the best that could have been laid down. They advised that applications should be encouraged tentatively by the granting of permissive Bills, and this policy has given rise to the Electric Lighting Bill, 1882, promoted by Mr. Chamberlain, the President of the Board of Trade, regarding which much controversy has arisen. It could, indeed, hardly be expected that any act of legislation upon this subject could give universal satisfaction, because while there are many believers in gas who would gladly oppose any measure likely to favour the progress of the rival illuminant, and others who wish to see it monopolized, either by local authorities, or by large financial corporations, there are others again who would throw the doors open so wide as to enable almost all comers to interfere with the public thoroughfares, for the establishment of conducting wires, without let or hindrance.

The law as now established takes, I consider, a medium course between these diverging opinions, and, if properly interpreted, will protect, I believe, all legitimate interests, without impeding the healthy growth of establishments for the distribution of electric energy for lighting and for the transmission of power. Any firm or lighting company may, by application to the local authorities, obtain leave to place electric conductors below public thoroughfares, subject to such conditions as may be mutually agreed upon, the terms of such licence being limited to seven years; or an application may be made to the Board of Trade for a provisional order to the same effect, which, when sanctioned by Parliament, secures a right of occupation for twenty-one years. The licence offers the advantage of cheapness, and may be regarded as a purely tentative measure, to enable the firm or company to prove the value of their plant. If this is fairly established, the licence would in all probability be affirmed, either by an engagement for its prolongation from time to time, or by a provisional order which would, in that case, be obtained by joint application of the contractor and the local authority. At the time of expiration of the provisional order, a pre-emption of purchase is accorded to the local authority, against which it has been objected with much force by so competent an authority as Sir Frederick Bramwell, that the conditions of purchase laid down are not such as fairly to remunerate the contracting companies for their expenditure and risk, and that the power of purchase would inevitably induce the parochial bodies to become mere trading associations. But while admitting the undesirability of such a consummation, I cannot help thinking that it was necessary to put some term to contracts entered into with speculative bodies at a time when the true value of electric energy, and the best conditions under which it should be applied, are still very imperfectly understood. The supply of electric energy, particularly in its application to transmission of power, is a matter simply of commercial demand and supply, which need not partake of the character of a large monopoly similar to gas and water supply, and which may therefore be safely left in the hand of individuals, or of local associations, subject to a certain control for the protection of public interests. At the termination of the period of the provisional order, the contract may be renewed upon such terms and conditions as may at that time appear just and reasonable to Parliament, under whose authority the Board of Trade will be empowered to effect such renewal.

Complaints appear almost daily in the public papers to the effect that townships refuse their assent to applications by electric light companies for provisional orders; but it may be surmised that many of these applications are of a more or less speculative character, the object being to secure monopolies for eventual use or sale, under which circumstances the authorities are clearly justified in withholding their assent; and no licences or provisional orders should, indeed, be granted, I consider, unless the applicants can give assurance of being able and willing to carry out the work within a reasonable time. But there are technical questions involved which are not yet sufficiently well understood to admit of immediate operations upon a large scale.

Attention has been very properly called to the great divergence in the opinions expressed by scientific men regarding the area that each lighting district should comprise, the capital required to light such an area, and the amount of electric tension that should be allowed in the conductors. In the case of gas supply, the works are necessarily situated in the outskirts of the town, on account of the nuisance this manufacture occasions to the immediate neighbourhood; and, therefore, gas supply must range over a large area. It would be possible, no doubt, to deal with electricity on a similar basis, to establish electrical mains in the shape of copper rods of great thickness, with branches diverging from them in all directions; but the question to be considered is, whether such an imitative course is desirable on account either of relative expense or of facility of working. My own opinion, based upon considerable practical experience and thought devoted to the subject, is decidedly adverse to such a plan. In my evidence before the Parliamentary Committee, I limited the desirable area of an electric district in densely populated towns to a quarter of a square mile, and estimated the cost of the necessary establishment of engines, dynamo-machines, and conductors, at £100,000, while other witnesses held that areas from one to four square miles could be worked advantageously from one centre, and at a cost not exceeding materially the figure I had given. These discrepancies do not necessarily imply wide differences in the estimated cost of each machine or electric light, inasmuch as such estimates are necessarily based upon various assumptions regarding the number of houses and of public buildings comprised in such a district, and the amount of light to be apportioned to each, but I still maintain my preference for small districts.

By way of illustration, let us take the parish of St James's, near at hand, a district not more densely populated that other equal areas within the metropolis, although comprising, perhaps, a greater number of public buildings. Its population, according to the preliminary report of the census taken on the 4th of April, 1881, was 29,865, it contains 3018 inhabited houses, and its area is 784,000 square yards, or slightly above a quarter of a square mile.

To light a comfortable house of moderate dimensions in all its parts, to the exclusion of gas, oil, or candles, would require about 100 incandescent lights of from 15- to 18-candle power each, that being, for instance, the number of Swan lights employed by Sir William Thomson in lighting his house at Glasgow University. Eleven-horse power would be required to excite this number of incandescent lights, and at this rate the parish of St. James's would require $3018 \times 11 = 33{,}200$ horse-power to work it. It may be fairly objected, however, that there are many houses in the parish much below the standard here referred to, but on the other hand, there are six hundred of them with shops on the ground floor, involving larger requirements. Nor does this estimate provide for the large consumption of electric energy that would take place in lighting the eleven churches, eighteen club-houses, nine concert halls, three theatres, besides numerous hotels, restaurants and lecture halls. A theatre of moderate dimensions, such as the Savoy Theatre, has been proved by experience to require 1200 incandescent lights, representing an expenditure of 133 horse-power; and about one-half that power would have to be set aside for each of the other public buildings here mentioned, constituting an aggregate of 2926 horse-power; nor does this general estimate comprise street lighting, and to light the six and a half miles of principal streets of the parish with electric light would require, per mile, thirty-five arc lights of 350 candle-power each or a total of 227 lights. This, taken at the rate of 0·8 horse-power per light, represents a further requirement of 182 horse-power, making a total of 3108 horse-power, for purposes independent of house lighting, being equivalent to 1 horse-power per inhabited house, and bringing the total requirements up to 109 lights = 12 horse-power per house.

I do not, however, agree with those who expect that gas lighting will be entirely superseded, but have, on the contrary, always maintained that the electric light, while possessing great and peculiar advantages for lighting our principal rooms, halls, warehouses, etc., owing to its brilliancy, and more particularly to its non-interference with the healthful condition of the atmosphere, will leave ample room for the developement of the former, which is susceptible of great improvement, and is likely to hold its own for the ordinary lighting up of our streets and dwellings.

Assuming, therefore, that the bulk of domestic lighting remains to the gas companies, and that the electric light is introduced into private houses, only, at the rate of, say 12 incandescent lights per house, the parish of St. James's would have to be provided with electric energy sufficient to work $(9+12)\ 3018 = 63{,}378$ lights $= 7042$ horse-power effective; this is equal to about one-fourth the total lighting power required, taking into account that the total number of lights that have to be provided for a house are not all used at one and the same time. No allowance is made in this estimate for the transmission of power, which, in course of time, will form a very large application of electric energy; but considering that power will be required mostly in the day time, when light is not needed, a material increase in plant will not be necessary for that purpose.

In order to minimize the length and thickness of the electric conductor, it would be important to establish the source of power, as nearly as may be, in the centre of the parish, and the position that suggests itself to my mind is that of Golden Square. If the unoccupied area of this square, representing 2500 square yards, were excavated to a depth of 25 feet, and then arched over so as to re-establish the present ground level, a suitable covered space would be provided for the boilers, engines, and dynamo-machines, without causing obstruction or public annoyance; the only erection above the surface would be the chimney, which, if made monumental in form, might be placed in the centre of the square, and be combined with shafts for ventilating the subterranean chamber, care being taken of course to avoid smoke by insuring perfect combustion of the fuel used. The cost of such a chamber, of engine-power, and of dynamo-machines, capable of converting that power into electric energy, I estimate at £140,000. To this expense would have to be added that of providing and laying the conductors, together with the switches, current regulators, and arrangements for testing the insulation of the wire.

The cost and dimensions of the conductors would depend upon their length, and the electromotive force to to be allowed. The latter would no doubt be limited, by the authorities, to the point at which contact of the two conductors with the human frame would not produce injurious effects, or say to 200 volts, except for street lighting, for which purpose a higher tension is admissible. In considering the proper size of conductor to be used in any given installation, two principal factors have to be taken into account; first, the charge for interest and depreciation on the original cost of a unit length of the conductor; and, secondly, the cost of the electrical energy lost through the resistance of a unit of length. The sum of these two, which may be regarded as the cost of conveyance of electricity, is clearly least, as Sir William Thomson pointed out some time ago, when the two components are equal. This, then, is the principle on which the size of a conductor should be determined.

From the experience of large installations, I consider that electricity can, roughly speaking, be produced in London at a cost of about one shilling per 10,000 ampère-volts or watts (746 watts being equal to 1 horse-power) for an hour. Hence, assuming that each set of four incandescent lamps in series (such as Swan's, but for which may be substituted a smaller number of higher resistance and higher luminosity) requires 200 volts electromotive force, and 60 watts for their efficient working, the total current required for 64,000 such lights is 19,200 ampères, and the cost of the electric energy lost by this current in passing through 1-100th of an ohm resistance, is £16 per hour.

The resistance of a copper bar one quarter of a mile in length, and 1 square inch in section, is very nearly 1-100th of an ohm, and the weight is about $2\frac{1}{4}$ tons. Assuming, then, the price of insulated copper conductor at £90 per ton, and the rate of interest and depreciation at $7\frac{1}{2}$ per cent., the charge per hour of the above conductor, when used eight hours per day, is $1\frac{1}{2}d.$ Hence, following the principle I have stated above, the proper size of conductor to use for an installation of the magnitude I have supposed would be one of 48·29 inches section, or a round rod 8 inches diameter.

If the mean distance of the lamps from the station be assumed at 350 yards, the weight of copper used in the complete system of conductors would be nearly 168 tons, and its cost £15,120. To this must be added the cost of iron pipes, for carrying the conductors underground, and of testing boxes, and labour in placing them. Four pipes of 10 inch diameter each, would have to proceed in different directions from the central station, each containing sixteen separate conductors of 1 inch diameter, and separately insulated, each of them supplying a sub-district of 1000 lights. The total cost of establishing these conductors may be taken at £37,000, which brings the total expenditure for central station and leads to £177,000. I assume the conductors to be placed underground, as I consider it quite inadmissible, both as regards permanency and public safety and convenience, to place them above ground, within the precincts of towns. With this expenditure, the parish of St. James's would be supplied with the electric light to the extent of about 25 per cent. of the total illuminating power required. To provide a larger percentage of electric energy would increase the cost of establishment proportionately; and that of conductors, nearly in the square ratio of the increase of the district, unless the loss of energy by resistance is allowed to augment instead.

It may surprise uninitiated persons to be told that to supply a single parish with electric energy necessitates copper conductors of a collective area equal to a rod of 8 inches in diameter; and how, it may be asked, will it be possible under such conditions to transmit the energy of waterfalls to a distance of twenty or thirty miles, as has been suggested? It must indeed be admitted that the transmission of electric energy of such potential (200 volts) as is admissible in private dwellings would involve conductors of impracticable dimensions, and in order to transmit electrical energy to such distances, it is necessary to resort in the first place to an electric current of high tension. By increasing the tension from 200 to 1200 volts the conductors may be reduced to one-sixth their area, and if we are content to lose a larger proportion of the energy obtained cheaply from a waterfall, we may effect a still greater reduction. A current of such high potential could not be introduced into houses for lighting purposes, but it could be passed through the coils of a secondary dynamo-machine, to give motion to another primary machine, producing currents of low potential to be distributed for general consumption. Or secondary batteries may be used to effect the conversion of currents of high into those of low potential, whichever means may be found the cheaper in first cost, in maintenance, and most economical of energy. It may be advisable to have several such relays of energy for great distances, the result of which would be a reduction of the size and cost of conductor at the expense of final effect, and the policy of the electrical engineer will, in such cases, have to be governed by the relative cost of the conductor, and of the power at its original source. If secondary batteries should become more permanent in their action than they are at the present time, they may be largely resorted to by consumers, to receive a charge of electrical energy during the day time, or the small hours of the night, when the central engine would otherwise be unemployed, and the advantage of resorting to these means will depend upon the relative first cost, and cost of working the secondary battery and the engine respectively. These questions are, however, outside the range of our present consideration.

The large aggregate of dwellings comprising the metropolis of London covers about seventy square miles, thirty of which may be taken to consist of parks, squares, and sparely inhabited areas, which are not to be considered for our present purpose. The remaining forty square miles could be divided into say one hundred and forty districts, slightly exceeding a quarter of a square mile on the average, but containing each fully three thousand houses, and a population similar to that of St. James's.

Assuming twenty of these districts to rank with the parish of St. James's (after deducting the six hundred shops which I did not include in my estimate) as central districts, sixty to be residential districts, and sixty to be comparatively poor neighbourhoods, and estimating the illuminating power required for these three classes in the proportion of 1 to $\frac{2}{3}$ to $\frac{1}{3}$, we should find that the total capital expenditure for supplying the metropolis with electric energy to the extent of 25 per cent. of the total lighting requirements would be—

$$\begin{aligned} 20 \times \phantom{\tfrac{2}{3}\times}\ 177{,}000 &= £3{,}540{,}000 \\ 60 \times \tfrac{2}{3} \times 177{,}000 &= £7{,}080{,}000 \\ 60 \times \tfrac{1}{3} \times 177{,}000 &= £3{,}540{,}000 \\ \hline & \ £14{,}160{,}000 \end{aligned}$$

or say £14,000,000, without including lamps and internal fittings, and making an average capital expenditure of £100,000 per district.

To extend the same system over the towns of Great Britain, and Ireland would absorb a capital exceeding certainly £64,000,000, to which must be added £16,000,000 for lamps and internal fittings, making a total capital expenditure of £80,000,000. Some of us may live to see this capital realized, but to find such an amount of capital, and, what is more important, to find the manufacturing appliances to produce work representing this value of machinery and wire, must necessarily be the result of many years of technical development. If, therefore, we see that electric companies apply for provisional orders to supply electric energy, not only for every town throughout the country, but also for the colonies, and for foreign parts, we are forced to the conclusion that their ambition is somewhat in excess of their power of performance; and that no provisional order should be granted except conditionally on the work being executed within a reasonable time, as without such a provision the powers granted may have the effect of retarding instead of advancing electric lighting, and of providing an undue encouragement to purely speculative operations.

The extension of a district beyond the quarter of a square mile limit would necessitate an establishment of unwieldy dimensions, and the total cost of electric conductors per unit area would be materially increased; but independently of the consideration of cost, great public inconvenience would arise in consequence of the number and dimensions of the electric conductors, which could no longer be accommodated in narrow channels placed below the kerb stones, but would necessitate the construction of costly subways—veritable *cava electrica*.

The amount of the working charges of an establishment comprising the parish of St. James's would depend on the number of working hours in the day, and on the price of fuel per ton. Assuming the 64,000 lights to incandesce for six hours a day, the price of coal to be 20*s.* a ton, and the consumption 2 lbs. per effective horse-power per hour, the annual charge under this head, taking eight hours' firing, would amount to about £18,300, to which would have to be added for wages, repairs, and sundries, about £6000, for interest with depreciation at 7½ per cent., £13,300, and for general management say £3400, making a total annual charge of £41,000, or at the rate of 12*s.* 9½*d.* per incandescent lamp per annum. To this has to be added the cost of renewal of lamps, which may be taken at 5*s.* per lamp of sixteen candles, lasting 1200 hours, or to 9*s.* per annum, making a total of 21*s.* 9½*d.* per lamp for a year.

In comparing these results with the cost of gas lighting, we shall find that it takes 5 cubic feet of gas, in a good argand burner, to produce the same luminous effect as 1 incandescent light of 16-candle power. In lighting such a burner every day for six hours on the average, we obtain an annual gas consumption of 10,950 cubic feet, the value of which, taken at the rate of 2*s.* 8*d.* per thousand, represents an annual charge of 29*s.*, showing that electric light by incandescence, when carried out on a large scale, is decidedly cheaper than gas lighting at present prices, and with the ordinary gas-burners.

On the other hand, the cost of establishing gas-works and mains of a capacity equal to 64,000 argand burners would involve an expenditure not exceeding £80,000 as compared with £177,000 in the case of electricity; and it is thus shown that although it is more costly to establish a given supply of illuminating power by electricity than gas, the former has the advantage as regards current cost of production.

It would not be safe, however, for the advocates of electric lighting to rely upon these figures as representing a permanent state of things. In calculating the cost of electric light, I have only allowed for depreciation and 5 per cent. interest upon capital expenditure, whereas gas companies are in the habit of dividing large dividends, and can afford to supply gas at a cheaper rate, by taking advantage of recent improvements in manufacturing operations, and of the ever-increasing value of their by-products, including tar, coke, and ammoniacal liquor. Burners have, moreover, been recently devised by which the luminous effect for a given expenditure of gas can be nearly doubled by purely mechanical arrangements, and the brilliancy of the light can be greatly improved.

On the other hand, electric lighting also may certainly be cheapened by resorting, to a greater extent than has been assumed, to arc lighting, which though less agreeable than the incandescent light for domestic purposes, can be produced at less than half the cost, and deserves on that account the preference for street lighting, and for large halls, in combination with incandescent lights. Lamps by incandescence may be produced hereafter at a lower cost, and of a more enduring character.

Considering the increasing public demand for improved illumination, it is not unreasonable to expect that the introduction of the electric light to the full extent here contemplated would go hand in hand with an increasing consumption of gas for illuminating and for heating purposes, and the neck-to-neck competition between the representatives of the two systems of illumination, which is likely to ensue, cannot fail to improve the quality, and to cheapen the supply of both, a competition which the consuming public can afford to watch with complacent self-satisfaction. Electricity must win the day, as the light of luxury; but gas will, at the same time, find an ever-increasing application for the more humble purposes of diffusing light.

In my address to the British Association I dwelt upon the capabilities and prospects of gas, both as an illuminant and as a heating agent, and I do not think that I was over-sanguine in predicting for this combustible a future exceeding all present anticipations.

I also called attention to the advantages of gas as a heating agent, showing that if supplied specially for the purpose, it would become not only the most convenient, but by far the cheapest form of fuel that can be supplied to our towns. Such a general supply of heating separately from illuminating gas, by collecting the two gases into separate holders during the process of distillation, would have the beneficial effects—

1. Of giving to lighting gas a higher illuminating power.
2. Of relieving our towns of their most objectionable traffic—that in coal and ashes.
3. Of effecting the perfect cure of that bugbear of our winter existence—the smoke nuisance.
4. Of largely increasing the production of these valuable by-products, tar, coke, and ammonia, the annual value of which already exceeds by nearly £3,000,000 that of the coal consumed in the gas-works.

The late exhibitions have been beneficial in arousing public interest in favour of smoke abatement, and it is satisfactory to find that many persons, without being compelled to do so, are now introducing perfectly smokeless arrangements for their domestic and kitchen fires.

The Society of Arts, which for more than a hundred years has given its attention to important questions regarding public health, comfort, and instruction, would, in my opinion, be the proper body to examine thoroughly into the question of the supply and economical application of gas and electricity for the purposes of lighting, of power production, and of heating. They would thus pave the way to such legislative reform as may be necessary to facilitate the introduction of a national system.

If I can be instrumental in engaging the interest of the Society in these important questions, especially that of smoke prevention, I shall vacate this chair next year with the pleasing consciousness that my term of office has not been devoid of a practical result.

INFLUENCE OF PEPTONES AND CERTAIN INORGANIC SALTS ON THE DIASTATIC ACTION OF SALIVA.*

BY R. H. CHITTENDEN AND J. S. ELY.

(*Concluded from page 387.*)

First Experiment.

	Wt. Cu in one-tenth. Gram.
Saliva and starch alone	0·0872
Saliva and starch + 0·05 per cent. HCl = 0·025 per cent.	0·0088
Saliva and starch + 0·05 per cent. HCl + 0·012 gram NaCl	0·0132
Saliva and starch + 0·05 per cent. + 0·012 gram Na_2HPO_4	0·0120

Second Experiment.

	Wt. Cu in one-tenth. Gram.
Saliva and starch alone	0·0835
Saliva and starch + 0·05 per cent. HCl = 0·025 per cent.	0·0050
Saliva and starch + 0·05 per cent. HCl + 0·012 gram $CaHPO_4$	0·0079
Saliva and starch + 0·05 per cent. HCl + 0·015 gram $CaHPO_4$	0·0490
Saliva and starch + 0·05 per cent. HCl + 0·024 gram $CaHPO_4$	0·0600

It is thus evident that sodium chloride and phosphate when present to the extent of 0·012 per cent. exercise but a very slight influence on the action of the saliva. Calcium phosphate, however, is seen to decidedly increase the diastatic action, though the amount contained in the

* From the *American Chemical Journal.*

peptones can have but little influence on the formation of sugar. Very striking is the great increase of sugar formed in the presence of 24 milligrams of calcium phosphate. This result is certainly suggestive of a possible utility of the calcium phosphate invariably present in wheat, oats, and carbohydrate matter in general. What may be the exact explanation of the action of the phosphate in such a weak acid solution is of course hypothetical. The salt dissolves, in part at least, in the acid, and is thus probably modified with formation of bodies more favourable to the action of the ferment; it certainly cannot diminish to any extent the strength of the acid.

The influence of the combined inorganic matter of the peptones was now determined by experiment with the ash of No. 1, which contained 1·71 per cent.

	Saliva and starch. Wt. Cu in one-tenth.	+0·05 per cent. HCl. Wt. Cu in one-tenth.	+1 gram peptone. Wt. Cu in one-tenth.	+Ash 1 gram peptone. Wt. Cu in one-tenth.
1.	0·0866 gram	0·0053 gram	0·1058 gram	0·0370 gram
2.	0·0862 „	—	—	0·0123 „

Thus, in the sample containing the largest percentage of ash, and presumably therefore of calcium phosphate, and under the same conditions as this salt appears to work to the best advantage, only a slight increase is noticed in the diastatic action of the saliva. It is therefore evident that while the addition of 50 c.c. 0·05 per cent. hydrochloric acid to an equal volume of saliva and water brings the diastatic action down almost to zero, the addition of 1 gram of peptones to this acid fluid increases the diastatic action of the saliva to above its normal amount. In other words the presence of 1 per cent. of gastric peptones in a salivary mixture containing 0·025 per cent. of acid acts as a stimulant to the diastatic ferment, causing it to act with greatly increased vigour. This fact appears to us to be of prime importance in solving the question as to the possibility of a continued action of the salivary ferment in the stomach. In 1881 one* of us, experimenting with human saliva, found that its diastatic action was increased by the presence of very minute quantities of hydrochloric acid; thus while the quantity of sugar formed by freshly collected saliva was regarded as 100, the quantity formed by saliva of the same collecting in a mixture containing 0·005 per cent. of hydrochloric acid was 110. Increasing the percentage of acid diminishes the diastatic action, until at last, when the fluid contains 0·025 per cent. of hydrochloric acid, the formation of sugar is almost entirely stopped. Again, it was found† on digesting 25 c.c. of human saliva with 50 c.c. of gastric juice containing 0·2 per cent. of hydrochloric acid, at 40° C. for two hours, that the diastatic ferment was entirely destroyed; likewise that simple warming of the saliva with 0·2 per cent. acid at 40° C. for two hours was sufficient to destroy the greater part of the ferment, as was evinced by the low diastatic power of the neutralized fluid. Both of these results have received recent confirmation from the experiments of J. N. Langley‡ on the diastatic ferments of the parotid of rabbits. From his experiments he concludes that the ptyalin is destroyed by 0·2—0·04 per cent. hydrochloric acid in from seven to twenty-four hours at 40° C., and that the presence of 0·014 per cent. of acid is sufficient to destroy all but the merest trace of ferment for five minutes at 39° C. It appears to us, however, that in the case of human saliva at least there may be in the presence of a very dilute acid a simple stopping of the diastatic action without destruction of the ferment; thus, in the presence of 0·025 per cent. of acid there is but little diastatic action, but if that percentage of acid is sufficient to destroy the ferment in such a short time, in what manner does the 1 per cent. of peptones in an acid solution of the same strength cause such an increased formation of sugar? Again, the experiments of Chittenden and Griswold showed that by warming a mixture of starch, saliva, and artificial gastric juice of weak acidity at 40° C. for forty-five minutes, the diastatic action of the saliva was greatly increased; thus, in the digestion of 1 gram of starch + 25 c.c. of water + 50 c.c. of gastric juice, containing 0·5 per cent. hydrochloric acid + 25 c.c. saliva, the amount of sugar formed as compared with the amount formed by the saliva alone was 133 : 100; while, as the present experiments show, the presence of 0·025 per cent. hydrochloric acid alone stops the action almost completely. It therefore seems probable that in the presence of such dilute acids as the above the ferment is simply hindered in its action, the presence of the peptones being sufficient to counteract the retarding influence of the acid. That this view, as to the non-destruction of the ferment is correct, as regards human saliva at least, we think is plainly demonstrated by the following experiment. 75 c.c. of filtered saliva were divided into three equal parts, which were treated as follows:—

1st. 25 c.c. saliva + 25 c.c. 0·05 per cent. HCl warmed at 40° C. for forty-five minutes. Solution then neutralized with Na_2CO_3. One gram of starch made into a paste with 50 c.c. H_2O was then added and the mixture warmed at 40° C. for forty-five minutes. Solution boiled and diluted to 500 c.c. 50 c.c. of this solution reduced 0·0862 gram Cu.

2nd. 25 c.c. saliva + 25 c.c. H_2O + 50 c.c. 0·05 per cent. HCl warmed at 40° C. for forty-five minutes. Solution then neutralized with Na_2CO_3. 1 gram of starch made into a paste with 25 c.c. H_2O was then added and the mixture warmed at 40° C. for forty-five minutes. Solution boiled and diluted to 500 c.c. 50 c.c. of this solution reduced 0·0805 gram Cu.

3rd. 25 c.c. saliva + 75 c.c. H_2O warmed at 40° C. for forty-five minutes. 1 gram of starch made into a paste with 25 c.c. H_2O was then added and the mixture warmed at 40° C. for forty-five minutes. Solution boiled and diluted to 500 c.c. 50 c.c. of this solution reduced 0·0824 gram Cu.

Here it is plainly seen that the ferment has not been in the least affected by the action of 0·025 per cent.* hydrochloric acid at this temperature. In the case of 0·1 or 0·2 per cent. acid the peptones are wholly without influence, since these strengths of acid are capable of destroying the ferment. It is evident that the salivary ferment is ultimately destroyed in the stomach by the gastric juice, but this fact does not necessarily preclude the possibility of a continued action of the saliva in the stomach. There is a growing impression that in the first stage of stomach digestion there is but little or no free acid present; thus Reinhard v. d. Velden† claims, as a result of observation, that for the first three-fourths of

* Chittenden and Griswold, *American Chemical Journal*, iii., 305.

† Chittenden and Griswold, *loc. cit.*

‡ Foster's *Journal of Physiology*, iii., 246.

* It should be mentioned here that the real percentage of acid is somewhat less than 0·025, owing to the slight alkalinity of the saliva. Ordinarily, however, the alkalinity is not so great in a sample of several hundred cubic centimetres as in a small quantity of freshly secreted saliva. That there might be no possible chance of error, 25 c.c. of mixed saliva were carefully neutralized with diluted hydrochloric acid. Then 25 c.c. of 0·05 per cent. HCl were added, making an exactly 0·025 per cent. HCl solution. This mixture was then warmed at 40° C. for forty-five minutes, after which it was exactly neutralized with Na_2CO_3 solution. 1 gram of starch in 50 c.c. H_2O was then added and the whole warmed at 40° C. for forty-five minutes; 50 c.c. or one-tenth of the diluted fluid yielded 0·0882 gram Cu. Thus here, as in the above experiments, it is plainly evident, from the diastatic action of the neutralized saliva, that the ptyalin is not destroyed or even affected by 0·025 per cent. of actual HCl under the above conditions.

† *Zeitschrift f. physiolog. Chem.*, iii., 205.

an hour after eating a hearty meal, human gastric juice fails to contain much if any free acid.

It now seemed desirable to ascertain the rapidity with which starch is converted into sugar by the saliva. 125 c.c. of filtered saliva were thoroughly mixed, and 12 c.c. of this fluid were used in each experiment. The starchy solution was made by boiling 0·5 gram of starch with 40 c.c. of water, and to this solution the 12 c.c. of saliva were added, making approximately 52 c.c. of fluid. The mixtures were kept at a temperature of 40° C. for the specified time, then boiled to destroy the ferment. Each fluid was then diluted to 200 c.c. and the sugar determined as before in 50 c.c. of the mixed and filtered solution. Following are the results:—

Period of digestion.	Wt. Cu in one-fourth.	Total amount of sugar.	Percentage of starch converted into sugar.
1 minute	0·0870 gram	0·4425 gram	39·82 per cent.
5 minutes	0·0963 "	0·4898 "	44·09 "
10 "	0·0991 "	0·5040 "	45·36 "
15 "	0·1005 "	0·5111 "	45·99 "
30 "	0·1040 "	0·5286 "	47·57 "
45 "	0·1087 "	0·5525 "	49·72 "
1 hour	0·1109 "	0·5637 "	50·73 "
2 hours	0·1147 "	0·5842 "	52·57 "

This experiment makes it very apparent that by far the greater part of the starch is almost immediately converted into sugar. It seems, therefore, quite possible, especially in view of the action of peptones in a weak acid solution, that in the case of human beings there may be a continuation of salivary digestion in the stomach, provided the contents of the stomach during the first stage of digestion do not contain more than 0·025 per cent. of free acid.

Influence of Peptones in Alkaline Solution.

Previous experiments have demonstrated that the addition of sodium carbonate to saliva has a retarding influence on salivary digestion. It now seemed advisable to study the influence of peptones in the presence of dilute solutions of sodium carbonate, with especial reference to the pancreatic ptyalin, for presumably in the intestinal canal the diastatic ferment there present acts on starch in an alkaline medium. 0·6 per cent., 0·3 per cent., and 0·1 per cent. solutions of sodium carbonate were employed, experiments being tried with both starch and glycogen. One gram of peptones was used in each case, and as this amount was dissolved in 50 c.c. of the dilute alkali, the digestive mixture of 100 c.c. contained approximately one-half the percentage of alkali employed. The following results were obtained:—

1.—With 0·6 per cent. Na_2CO_3 and 1 gram peptones.

	Saliva alone. Wt. Cu in one-tenth.	Saliva + 50 c.c. alkali. Wt. Cu in one-tenth.	Saliva, alkali, and peptones. Wt. Cu in one-tenth.
Starch .	0·0905 gm.	0·0239 gm.	0·0456 gm.
" .	0·0904 "	0·0222 "	0·0486 "
" .	0·0835 "	0·0214 "	0·0515 "
Glycogen	0·1300 "	0·0312 "	0·0683 "

2.—With 0·3 per cent. Na_2CO_3 and 1 gram peptones.

	Saliva alone. Wt. Cu in one-tenth.	Saliva + 50 c.c. alkali. Wt. Cu in one-tenth.	Saliva, alkali, and peptones. Wt. Cu in one-tenth.
Starch .	0·0904 gm.	0·0393 gm.	0·0685 gm.
" .	0·0835 "	0·0331 "	0·0710 "
Glycogen	0·1281 "	0·0423 "	0·1050 "

3.—With 0·1 per cent. Na_2CO_3 and 1 gram peptones.

	Saliva alone. Wt. Cu in one-tenth.	Saliva + 50 c.c. alkali. Wt. Cu in one-tenth.	Saliva, alkali, and peptones, Wt. Cu in one-tenth.
Glycogen	0·1281 gm.	0·0908 gm.	0·1197 gm.

It becomes evident then from these experiments that in a solution containing either 0·3 per cent. or 0·15 per cent. of sodium carbonate, the presence of the peptones nearly doubles (quite and even more in the case of glycogen) the diastatic action, bringing it up almost to the action of the unaltered saliva. It may be questionable whether these experiments afford proof positive that the peptones stimulate the pancreatic ferment in the conversion of starch into sugar in the intestinal canal, but it is certainly proven that under such conditions as have been described here, the presence of 1 per cent. of peptones in a 0·3 per cent. sodium carbonate solution causes a greatly increased formation of sugar. Thus it seems probable that in the proteid and diastatic pancreatic digestion the formation of peptones, which must go on side by side with the formation of sugar, affords a decided aid to the latter process.

We next endeavoured to ascertain whether the salts already experimented with have any influence on diastatic action in alkaline solutions of the strength specified. The following experiments were tried:—

First Experiment.

	Wt. Cu in one-tenth. Gram.
Saliva and starch alone	0·0872
Saliva and starch + 50 c.c. 0·6 per cent. Na_2CO_3 = 3 per cent. alkali	0·0220
Saliva and starch + 50 c.c. 0·6 per cent, Na_2CO_3 + 0·012 gram NaCl	0·0287
Saliva and starch + 50 c.c. 0·6 per cent. Na_2CO_3 + 0·012 gram Na_2HPO_4	0·0275

Second Experiment.

	Wt. Cu in one-tenth. Gram.
Saliva and starch alone	0·0844
Saliva and starch + 50 c.c. 0·6 per cent. Na_2CO_3 = 0·3 per cent. alkali	0·0225
Saliva and starch + 50 c.c. 0·6 per cent. Na_2CO_3 + 0·015 gram $CaHPO_4$	0·0211
Saliva and starch + 50 c.c. 0·3 per cent. Na_2CO_3 = 0·15 per cent. alkali . . . . . . , . . .	0·0348
Saliva and starch + 50 c.c. 0·3 per cent. Na_2CO_3 + 0·015 gram $CaHPO_4$	0·0395

It is thus very evident that these salts have little or no influence on diastatic action, in alkaline solutions of the strength used. It next remained to try the influence of the ash of the peptones in alkaline solution. The ash of 1 gram of peptones was employed, the experiment being conducted in the same manner as the preceding. The peptones used were those with 1·71 per cent. of ash. Following are the results:—

	Wt. Cu in one-tenth. Gram.
Saliva and starch alone	0·0892
Saliva and starch + 50 c.c. 0·6 per cent. Na_2CO_3 = 0·3 per cent. alkali	0·0216
Saliva and starch + 50 c.c. 0·6 per cent. Na_2CO_3 + ash 1 gram peptone	0·0313
Saliva and starch + 50 c.c. 0·6 per cent. Na_2CO_3 + 1 gram peptone	0·0520
Saliva and starch + 50 c.c. 0·3 per cent. Na_2CO_3 = 0·15 per cent. alkali	0·0305
Saliva and starch + 50 c.c. 0·3 per cent. Na_2CO_3 + ash 1 gram peptones	0·0400
Saliva and starch + 50 c.c. 0·3 per cent. Na_2CO_3 + 1 gram peptone	0·0740

We therefore deem it safe to conclude that the inorganic salts contained in the peptones play but an unimportant part in the stimulating action noticed in an alkaline solution of the strength specified.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 25, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

NEW PHARMACOPŒIAS FOR GERMANY AND THE UNITED STATES.

THE arrival within the last few days of a complete copy of the new edition of the United States Pharmacopœia, preceded as it was a few weeks since by copies of the new edition of the German Pharmacopœia, marks a stage in the history of pharmaceutical literature sufficiently important in these days of running to and fro over the earth to warrant more than a passing notice. Constituting as these works do two out of the four most important Pharmacopœias in the world, they must of necessity occasionally become the text-book of some pharmacists at least in many of the cities and towns of this country of cosmopolitan resort. Moreover, the report that at this moment steps are being taken towards the preparation of a new edition of the British Pharmacopœia will be sure to invest these two important books, issued almost simultaneously, with additional interest, and speculation as to how far our own national Pharmacopœia may be influenced by one or the other, or both, may well be excused, since there can be no doubt as to the qualifications of the members of the two committees to which the revision of these works was entrusted, or the ability they have manifested in accomplishing their respective tasks. It is proposed, therefore, to discuss both these Pharmacopœias in some detail in a series of articles that will shortly be commenced in this Journal, but meanwhile there are a few features that can be referred to briefly now.

It may fairly be said of the two new Pharmacopœias, without disparagement to either, that in many respects they are as unlike one another as can well be imagined, and represent what may be looked upon as two distinct types. On the one hand, there is the German Pharmacopœia, orignated by Imperial decree, having the force of law, written in Latin, and showing a distinct tendency to decrease the number of articles in the list of materia medica and preparations and to confine what is said about those that remain within the narrowest limits, not even chemical formulæ or molecular weights being given. On the other hand, the United States Pharmacopœia is a volunteer work, which is not backed by any authority beyond what it acquires through its acceptance by medical men and pharmacists and a kind of adventitious recognition which it obtains in the legislation in some of the States respecting adulteration; which is written in the vulgar tongue, and which shows a distinct tendency to include within its limits any and every substance or preparation that is ordered with moderate frequency by physicians and to describe them with considerable fulness. Perhaps of all these differences the most noteworthy appears in the fact that whilst from the German Pharmacopœia 360 articles have been struck out and only 48 added, showing a decrease of 312, in the case of the United States Pharmacopœia although 229 articles have been dismissed, there have been 256 added, resulting in an increase of 27. The net result is that whilst the former now contains only 600 articles, the latter includes just under 1000. It would appear, indeed, that whilst in Germany a conservative policy has been followed, similar to that which Professor REDWOOD described at the last meeting of the British Pharmaceutical Conference as ruling the editors of the Pharmacopœia with respect to the introduction of drugs and preparations, the policy followed in the United States has been similar to that advocated by Professor OLDBERG in a paper read before the last International Pharmaceutical Congress, on the disadvantages of therapeutical conservatism in reference to the pharmacopœial materia medica. In that paper Professor OLDBERG argued that instead of a Pharmacopœia being edited in such an exclusive spirit that the fact of a certain substance having been accorded a place in it becomes looked upon as evidence of positive therapeutic value, it should, on the contrary, include descriptions of all new remedies which, in the opinion of the revisers, might present a probability of usefulness, in order that members of the medical profession who might desire to investigate more closely the properties of such remedies might be able to identify them, and ensure the genuineness of the substances they use. It must be admitted that such an argument would in no country have greater force than in the United States, where the competition in searching out new remedies and bringing them before the medical public as specialties is keener than, perhaps, in any other part of the world. Moreover, a United States Pharmacopœia must needs be a somewhat inclusive one, not only in consequence of the vast extent of country over which it is intended to do service, covering many districts capable of contributing to it from their local materia medica, but because of the continual immigration of people of every nationality, each with its peculiarities, prejudices and wants in respect to medicine as well as other things. But in view of the present state of things it is interesting to note that in the preface to the first edition of the United States Pharmacopœia, published in 1820, the fault, *par excellence*, then specified as existing in the lists of materia medica that had been adopted in other countries was their redundancy. In fact, the "secondary list," which has hitherto been a feature of the United States Pharmacopœia, but has now disappeared, appears to have been the result of a compromise between a disinclination to admit articles other than those that had already an established reputation and the impossibility of ignoring altogether many indigenous aspirants to that position.

There are, however, also some important points of resemblance between the two Pharmacopœias. The adoption in the United States Pharmacopœia of the method of expressing formulæ, as a rule, in parts by weight, instead of the actual weights and measures, as in the last edition, and the favour shown towards the metric system where opportunity offered, manifest an important approximation towards the methods followed in its German contemporary. Another point of resemblance, and not the least satisfactory, is that each of these books is the product of the labours of a committee in which pharmacists took part upon an equal footing with the medical profession, and in each case with a result that quite justifies their having been accorded such a position and that reflects honour upon their calling.

THE INTERFERENCE OF PUBLIC SERVANTS IN TRADING OPERATIONS.

A fortnight since, reference was made in these columns to a question that had been set down on the notice paper of the House of Commons, but had not yet been asked, as to the extent to which officials in the public service are permitted to engage in financial, commercial or industrial adventures. In the course of his reply to this question, Mr. Gladstone said that, speaking in general terms, there was no doubt that the claim of the State to the service of those in its employ is an exclusive claim, and he added that there was a rule of the Treasury, which was construed as an absolute rule as regarded that department, that no person employed in it should take any office or employment whatever outside the range of his official duties. But the power of the Treasury appears to be strictly limited to certain special departments, and this particular rule has, therefore, no force in respect to other departments of the public service. Mr. Gladstone, however, promised to lay upon the table some papers bearing on the subject and to consult Sir R. Lingen upon his return to town.

These papers have since been issued as a parliamentary paper and consist of copies of an extract from a Treasury minute, dated March, 1849, and some correspondence upon the subject between the Home Office and the Treasury in 1877. The Treasury minute is definite enough as far as it goes, and states that their Lordships consider that the public is entitled to the whole time of its servants, and that "officers holding situations which require daily attend-"ance should not be allowed to accept employment "as directors of companies of various descriptions "requiring their personal attendance elsewhere dur-"ing office hours." The correspondence between the two departments goes more directly to the root of the question. It originated in a request from the Home Office to be informed as to any regulations issued by the Treasury bearing upon the question of allowing officers to accept nominations to local offices, such as way wardens, members of school boards, etc., and for an opinion as to whether the practice, if thought not consistent with the interests of the public service, should be discouraged or altogether forbidden. The reply from the Treasury recapitulated the points of the minute above referred to, limited as it is to employment within office hours, as representing the rule of action in the department. But their Lordships added their "strong opinion" that such extra employment is generally prejudicial to the public service, because no one can serve two masters, and in private service it was believed to be universally forbidden. Their Lordships further stated that in departments under their control they would be disposed to forbid it, or to regard it as *primâ facie* disqualifying for promotion.

It does not appear from the papers what course the Home Office decided to take in respect to the question raised; but it is a decided gain to have placed on record so clear a condemnation, by an important public department like the Treasury, of the objectionable and now widely spread practice of public servants competing with ratepayers in trading operations. For if a sound objection lies to the acceptance of an honorary office like membership of a school board, it would apply *à fortiori* against engagements entered into for the sake of pecuniary profit.

MEDICAL LEGISLATION.

On Wednesday a deputation from the British Medical Association had an interview with the Lord President and the Vice-President of the Council to urge upon the Government the immediate necessity for legislation upon the basis of the Report of the Royal Commission upon the Medical Acts, in order to remedy the deplorable state of medical education. Lord Carlingford, whilst expressing his inability to make any announcement on the part of the Government, expressed his concurrence as to the necessity for legislation and a hope that it might be effected in the course of next session.

ABERDEEN AND NORTH OF SCOTLAND SOCIETY OF CHEMISTS AND DRUGGISTS.

In June last, at a meeting of the chemists and druggists of Aberdeen and the North-East of Scotland, it was resolved to found a Society to include the district between Forfar and Aberdeen. This has since been done by extending the operations of the existing Aberdeen Society of Chemists and Druggists, and adopting for it the above title. A circular has now been issued, signed by Mr. Alexander Strachan, of Richmond Street, Aberdeen, inviting persons to become members, the annual subscription, dating from March, 1883, being 10*s*. 6*d*.

BRIGHTON ASSOCIATION OF PHARMACY.

A meeting of the Association will be held in the ante-room of the Brighton Town Hall, on Friday next, December 1, when W. D. Savage, Esq., J.P., will read a paper entitled "Some Thoughts suggested by Professor Attfield's Presidential Address to the Pharmaceutical Conference at Southampton." The Chair to be taken at 8.30 p.m. by the President.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The third general meeting of the above Association was held at the Royal Institution, November 9, 1882. The President, Mr. Councillor Woodcock, in the chair.

The minutes of the last meeting were read and confirmed.

The following donations were announced:—The *Pharmaceutical Journal*, from the Society, and the *Canadian Pharmaceutical Journal*, from the Editor.

Dr. Symes then referred to the opinions expressed by the President (in his absence), respecting the examinations of the Pharmaceutical Society, and their proposed partial conduct in the provinces. He was pleased to read the President's opinion on this question, with which he entirely concurred.

The following paper was then read—

Lime Water: its Preparation, Preservation and Estimation.

BY A. C. ABRAHAM.

So simple and common an article as lime water may be thought to be quite unworthy of attention, but it should be remembered that the more simple and easily prepared an article may be, the more blame to us if we do not make it as perfect as possible. Lime water should be a simple saturated solution of hydrate of calcium, but owing to the fact that pure hydrate of calcium is not practically obtainable, the formula of the British Pharmacopœia produces an article more or less contaminated with chlorides, sulphates, and other soluble salts. To eliminate these, it is, I believe, the general practice to use a larger proportion of slaked lime than the British Pharmacopœia orders and to reject the first washings. This practice, which is, I consider, undoubtedly the correct one, may, however lead to error if the matter is not carefully watched.

Having on more than one occasion found the lime water made in the ordinary course not satisfactory, I determined in future to have it made under my own eye and always tested. To enable me to do this, it was necessary to have it made in larger quantities and in such a manner that it could be efficiently kept and conveniently drawn off. For this purpose I devised a little apparatus which I have found to answer all its requirements admirably.

To a wide-mouthed glass bottle of the capacity of 4 or 5 gallons, and having a hole bored near the bottom, is fitted a cork, previously well soaked in melted paraffin, and having two holes, the larger to admit a funnel, and the smaller a vent peg. A large and slightly tapering wooden plug and an ordinary vent peg should be fitted to these holes while the paraffin is still soft. A paraffined cork is also inserted into the tap hole. Passing through this cork is a tube bent upwards inside and projecting slightly outside. Instead of an ordinary stopcock, all kinds of which have objections, an india-rubber tube with a pinch-cock and a bent glass tube is adapted for drawing off the liquid.

Several pounds of lime should now be slaked: a large quantity of distilled water poured on, and, after subsidence, the clear liquid thrown away. This should be repeated until the lime water, when rendered slightly acid with nitric acid, is no longer precipitated by nitrate of silver. When this is the case, it should be stirred up and the lighter portions poured off from any stony matter which may be present, into the bottle before described, which is then filled up with distilled water, well stirred, and allowed to subside.

The advantage of having the tap hole near the bottom of the bottle is that by simply turning the tube, its upper end may be lowered so that nearly all the supernatant liquid can be drawn off from the deposit without drawing with it any of the particles which adhere to the sides of the bottle.

To enable the lime water to be tested without inconvenience each time it is made, I have been in the habit of running off into each of a number of suitable bottles quantities of 40 fl. gr. of volumetric solution of oxalic acid made half the strength of that ordered by the British Pharmacopœia.

I may say that I always use the latter, in consequence of the fact that if made of the full strength it crystallizes out if subjected to a temperature much, if any, below 60° F., and is very troublesome to redissolve without applying a heat which may cause a loss of water.

Each 40 fl. gr. of this solution should, according to the Pharmacopœia, be rendered alkaline by 1 fl. oz. of lime water. For some time after taking these precautions every sample answered perfectly to the required test. At last, however, to my surprise the lime water failed to do what was expected of it. I first blamed the man who had been charged to stir it, but I found that no amount of stirring would make any difference.

It then occurred to me that the chlorides or sulphates might exercise some influence on the solubility. I tried sulphate and chloride of sodium, but although the former, on the first experiment, did raise the standard above that of the Pharmacopœia,* I soon found that it was not to be relied upon.

It had not previously occurred to me that the Pharmacopœia sailed so close to the wind that a few degrees of temperature could make the difference. Such, however, I found to be the case; the weather had become warmer, and, as everyone knows, lime is less soluble in hot than cold water, consequently lime water could not be made at that time of the year of the recognized strength.

Watts, in his 'Dictionary,' quoting Dalton as his authority, gives the solubility at 60° F. as 1 in 778, almost exactly the *minimum* of the Pharmacopœia, which is equivalent to 1 in 781. My experiments very closely tally with these figures as far as 60° F. is concerned. As, however, even our British summers will not always permit this temperature to be maintained, I think that 70° should at least be calculated upon and at this temperature, according to my experiments, the solubility is reduced not very far from 10 per cent.

I would, therefore, suggest the reduction of the quantity of volumetric solution given as the minimum required from 200 to 180 fl. gr.

I regret that I am unable to give the exact solubilities at all temperatures between 60°, and, say, 75° or 80°, but the difficulties are greater than might be supposed, owing to the rapidity with which the lime is dssolved if the liquid is allowed to cool even, for instance, from the exposure during filtration. The only estimations, indeed, upon which I can rely, except those in which an even temperature was maintained for some time, were made by using a filter under the surface of the liquid from which samples were drawn by means of a syphon.

I should say that before adopting the plan described I had been in the habit of using a syphon, passing through a cork and started by means of a blow-tube. This arrangement had, however, several disadvantages.

Mr. Conroy, in proposing a vote of thanks, said that he also had found it impossible sometimes in preparing lime water to attain the Pharmacopœia strength, but had not recognized the cause, not indeed being aware of the great effect of temperature. He asked Mr. Abraham whether he had found it necessary to re-stir the lime water from time to time, to make good the loss due to surface carbonation. He also expressed his decided preference for the method recommended for drawing off, compared to that previously adopted by Mr. Abraham, viz., by a syphon and a blow-tube, by which means carbonic acid was introduced from the lungs.

Dr. C. Symes thought that no apology was necessary

* No doubt by slightly lowering the temperature.

for bringing this subject forward, especially seeing that there had been prosecutions, and indeed one was then pending, for selling lime water which was not of the proper strength. It was therefore of importance to have placed before them any means by which the preparation could be made, so as to insure chemists from the danger of being prosecuted for an unintentional fault. The apparatus described seemed to fulfil the required conditions. He had at one time himself been in the habit of using, for the purpose of drawing off the supernatant liquid from deposits, a glass tube passing upwards from the bottom of the vessel and sliding through a short piece of india-rubber tube. This arrangement he thought had one advantage, viz., that by moving the tube above the surface of the liquid, the settlement therein of lime, after stirring, which he thought might involve the running off of a gallon or say half a gallon of liquid, was avoided. He concluded by supporting the vote of thanks.

This having been given, Mr. Abraham replied. He explained that he had not found it necessary to re-stir the lime, and that indeed the diffusion more than neutralized the effect of carbonation, which was extremely slight. As air only contained a very minute quantity of carbonic acid, and as his plan had been adopted so that only sufficient air should be admitted to allow the liquid to run out, this difficulty was avoided. Mr. Conroy's objection to the method of using a blow-tube, was no doubt correct, although practically, very little air was required from the lungs to start a small syphon. The plan sketched by Dr. Symes was, no doubt, a good one, but for this purpose, he preferred his own. With regard to the quantity of liquid requiring to be drawn off to remove any sediment from the exit pipe, he had not found nearly so much as a gallon necessary; on the contrary, one or two ounces, he believed, was sufficient.

There was one matter which he had not mentioned. the Pharmacopœia ordered the use of lime water for the preparation of oxide of silver, but did not recommend any means for the removal of chlorides. If chlorides were not well removed before using for this purpose, there would probably be more chloride than oxide of silver present in the product.

The proceedings then terminated.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION AND SCHOOL OF PHARMACY.

The fourteenth annual meeting was held in the Memorial Hall, on Wednesday evening, November 8, Mr. W. Wilkinson, Vice-President, in the chair.

The annual report of the Council was read by Mr. Benger, Honorary Secretary. Since the last annual meeting, the members had not been called together monthly as in former years, the attendance at meetings of a scientific character having become too small to encourage authors of papers to expend time and trouble in preparing for them. The Council had, however, met frequently, a fourth edition of the 'Manchester Price List' had been published and they had endeavoured, as far as their influence went, to encourage a spirit of loyalty to each other amongst members of the trade in the district. Late in the autumn a letter had been received from Mr. Siebold, who had for so many years conducted the classes in connection with the Association, stating that his numerous engagements compelled him to relinquish the post he had held with so much pleasure. In accepting Mr. Siebold's resignation, the Council had expressed their regret at losing his valuable services. It was then too late to reorganize classes for the present session, but some important propositions had been received from the leading educational institutions of the city, and the Council hoped shortly to have a programme ready to lay before the members. In the meantime classes were being held in Manchester by private teachers which would meet the immediate requirements of pharmaceutical students.

The following report on the classes had been received from Mr. Siebold:—

"Gentlemen,—The lecture courses of the past session of the Manchester School of Pharmacy commenced on October 11, 1881, and terminated on May 19, 1882. In accordance with the circular issued by the Honorary Secretary in September, 1881, the following courses were delivered by me during the session:—Pharmaceutical Chemistry, including the Elements of Physics: thirty-five lectures, on Tuesday evenings, from 7.30 to 8.45. Fee 35*s*. Materia Medica and Pharmacy: twenty-five lectures, on Tuesday evenings, from 8.45 to 9.45. Fee 25*s*. Structural Botany: fifteen lectures, on Friday evenings, from 7.30 to 8.30. Fee 15*s*. Composition fee, admitting the student to all three courses, £3 10*s*. Fourteen students entered for the chemistry course, twelve for the course of materia medica and pharmacy, and eight for the botany course, making a total of thirty-four entries. The fees received amounted in all to £42. Throughout the session the regularity of attendances and the attention paid by the students to the lectures were very satisfactory; and it gives me the greatest pleasure to remember that I was able to report in equally favourable terms at the close of every one of the twelve sessions during which I have filled the post of lecturer to our Society's school.

"In now resigning my appointment into your hands I have great pleasure in thanking you most sincerely for the confidence and kind appreciation of my services with which you have always favoured me, and in thanking the students of all the past sessions for their kind and sympathetic attention."

Mr. G. S. Woolley, Treasurer, presented his statement of account, showing a balance in hand of £7 1*s*. 8*d*. on the general account, and £11 1*s*. on the Library Fund.

The Chairman, in moving the adoption of the report and Treasurer's statement, said he regretted very much, as he was sure they all would, that the state of the President's health did not allow him to come amongst them, for they all knew how much they had been indebted to Mr. Brown, who was always ready to further the interests of the Society by every means in his power. The report was not so satisfactory as could be wished, but the truth was that the efforts of the Council were not supported by the members of the trade, and it was useless attempting to hold meetings for scientific discussion or other purposes if the members would not attend. With regard to the lectures and classes of study, they had not been able to arrange them, in consequence of Mr. Siebold's resignation, but it was hoped that before another session some satisfactory arrangements would be made if only a sufficient number of students presented themselves. Speaking of the price list, it was satisfactory to find that it was in pretty general request in various parts of the country; indeed, the chief reason for the issue of the new edition was that Mr. Silverlock was continually applied to for copies which he could not supply; the last edition, published in 1880, being out of print. There were no burning questions in matters affecting pharmacists at present, but should any such arise he had no doubt that the Association would be found at the front and do good service, as it had done on former occasions.

Mr. Woolley regretted that so few of the chemists of Manchester and Salford took an interest in the affairs of the Association. This was the more deplorable and incomprehensible when the advisability of united action was becoming every day more and more obvious. He had hoped that a sufficient number of members would have been present to have had a discussion on the educational question, of which a good deal had been heard lately. Surely it was worth while to devote an evening occasionally to the discussion of topics of such vital importance to the trade, and which were continually cropping up. He quoted an instance, showing that the actual meaning of the words "compulsory curriculum" was not understood in all quarters; they had a somewhat harsh sound, and the idea of being compelled to do a thing was distasteful. Still, if they would consider the proposal fairly, they would see that there was nothing but good in it, the object aimed at being the welfare of the young men engaged in, and who may enter the trade in the future.

After some further remarks on the subject of the curriculum, Mr. Woolley pointed out the importance of those young men, who wished to join classes, sending in their names so as to enable the Council to make suitable arrangements. He also alluded to the new edition of the 'Manchester List of Retail Prices,' upon which the committee had expended a considerable amount of labour. Former editions had been favourably received, and largely appreciated throughout the country.

Mr. Benjamin Robinson, in supporting the motion, begged to observe, in answer to a question just asked, that the Council, in making arrangements for the various classes each session, had always been mindful that the lectures and instruction given at those classes should be specially adapted to meet the requirements of the students. The great obstacle that the Council had to contend with was not the organization of classes, but the difficulty of getting a sufficient number of young men to attend them. The Council at the present moment was in this dilemma. Two educational institutions in the city were quite willing to enter into arrangements for a series of lectures to be delivered solely for the instruction of pharmaceutical students, but the Council was deterred from entering into any engagement with them, in consequence of the great indifference shown by the majority of the young men for whom these lectures were intended.

Mr. J. L. Slack said, although there were some depressing circumstances connected with the meeting, arising from the apathy of those for whose benefit the Association was formed, he could not allow that in any sense the Association was a failure. The Council was able and willing to carry on lectures and classes if the fees were forthcoming, but not to incur pecuniary loss. The Association had done great good by bringing the trade together, affording the only means for the druggists to become personally known to each other; thus increasing the mutual confidence and respect that ought to exist, and also affording the readiest means of acting in case any emergency should arise threatening the trade interests.

Mr. A. H. Jackson, B.Sc., Mr. Holt, Mr. Benger, Mr. Cooper, Mr. Stokoe, Mr. Boden and others took part in the discussion.

The following gentlemen were elected officers of the Council for the ensuing year:—

President, Mr. W. Scott Brown; Vice-President, Mr. W. Wilkinson; Treasurer, Mr. G. S. Woolley; Honorary Secretary, Mr. F. B. Benger, F.C.S. Other members of Council:—Messrs. Blain, Boor, Botham, Bowden, Drinkwater, A. H. Jackson, B.Sc., S. Kay, Robinson, Slack, Stones, Westmacott and Hermann Woolley.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES ASSOCIATION.

A lecture was delivered at the rooms of the above Association, on Wednesday evening, November 15, by Mr. H. Pickering, on "Galvanic Electricity." The chair was taken by Mr. J. J. Edwards, President, and there was a large attendance.

The lecturer had explained in a previous lecture the theory of the subject, and the different kinds of batteries, their structures and powers. He now explained the electro-magnet and its use in the electric telegraph, which he illustrated by experiment. A model electric railway was also shown in working order, also a small electric engine suitable for working a powder mixer or pill coater. Edison and Swan's lamps for the electric light were shown and their adaptability for general use explained. The lecturer also performed a number of experiments, showing the different uses to which this important science was applied, which brought a very instructive and interesting lecture to a close.

Mr. Edwards proposed a hearty vote of thanks to the lecturer which was ably seconded by Mr. Thully, and carried unanimously.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, November 16, Professor J. Dewar, F.R.S., Vice-President, in the chair.

It was announced that a ballot for the election of Fellows would take place at the next meeting (December 7).

The following certificates were read for the first time:—J. Brock, A. M. Chance, H. C. Foote, W. Fox, J. A. M. Fallon, F. Gothard, Joowansinghji, R. B. Lee, T. Turner, J. E. Tuit.

During the evening a ballot was held and the Scrutineers, Dr. Japp and Mr. J. M. Thomson, declared the following to be duly elected Fellows:—J. Ferrier, T. Hughes, J. Hodgkin, F. Jordan, G. Jarmay, W. C. Nicholson, H. H. Robinson, L. Reid, J. E. Stead, G. H. Sharpe, P. G. Sanford, E. S. Spalding, C. J. Waterfall.

Mr. Warington then read a paper entitled—

Contributions to the Chemistry of Tartaric and Citric Acids. By the late BEAUMONT J. GROSJEAN.—Mr. Warington said that for five years, 1870–1875, he had worked in the laboratory at Millwall with the author of this paper, who had since then been the sole chemist till his death in June, 1882. Mr. Warington had, with the consent of Sir J. B. Lawes, compiled from the laboratory note books of the late author an abstract of his numerous unpublished investigations. 1. On the different rates of loss of different specimens of citric acid in dry air. Three specimens of different samples of citric acid were powdered and placed in two desiccators over fresh oil of vitriol on April 21, 1880; on May 6 one specimen had lost 0·68 per cent., the second 6·25 per cent., the third 8·55 per cent. On May 15 the first had lost 1·75 per cent., the second 8·55 per cent. On June 21 the first specimen had lost 8·47 per cent. The theoretical amount of moisture present was 8·57 per cent. 2. Determination of citric acid in lemon and other juices. The method used by precipitation with $CaCl_2$, etc., has already been described (*Chem. Soc. Jour.*, 1875, 931). It appears that the precipitable acid in commercial concentrated lemon juice is, on the average, very nearly equal in quantity to the free acid present. Thus, in 65 analyses, representing 895 pipes, the precipitated acid averaged 99·2 per cent. of the free acid. Some exceptional samples gave numbers from 85·8 per cent. to 103·6 per cent. In bergamot juice the average number from 90 pipes was 98·4 per cent.; in lime juice 91 to 92 per cent. In orange juice about 68·5 per cent. of the free acid was found to be precipitable. Thus, while the determination of the free acid gives trustworthy results with lemon juice, it furnishes with lime and orange juice a very unsafe guide to the quantity of citric acid present. 3. Influence of heat on solutions of tartaric acid. Forty grams of tartaric acid were dissolved in water and concentrated till a crust formed. The acidity was now reduced to 97·9 per cent. of the original acid, while the orthotartaric acid, precipitated by potassium citrate, was only 74·6 per cent. On diluting and boiling for two hours the solution gave 99·0 per cent. free acidity and 99·9 per cent. orthotartaric acid. The metatartaric acid, formed as above, is also slowly reconverted into orthotartaric acid by standing in dilute solution at the ordinary temperature. Thus, the percentage of orthotartaric acid in the above solution increased after standing two months from 74·6 to 90·0. 4. Influence of sulphuric acid on the crystallization of tartaric acid. Sulphuric acid considerably diminishes the solubility of tartaric acid. Much more tartaric acid crystallizes out from a saturated solution in dilute sulphuric acid than from a hot saturated aqueous solution; the latter deposits only 50 per cent. of its tartaric acid on cooling, whilst a hot solution in 1 volume of water and 1½ volume of oil of vitriol deposits 70 per cent. of its tartaric acid. 5. Actions of solutions of potassium and sodium sulphates on calcium tartrate. In the ordinary manufacture of tartaric acid, moist gypsum is added to decompose neutral tartrate of potash and precipitate calcium tartrate; under certain conditions this reaction is reversed, and if the solutions of potassium or sodium sulphate be sufficiently strong, practically the whole of the tartaric acid in calcium tartrate may be brought into solution as potassium or sodium tartrate. 6. Destruction of citrates and tartrates by peroxide of hydrogen. 7. Destruction of neutral tartrates when their solutions are heated with iron salts. 8. Determination of free sulphuric acid in tartaric acid liquors. To ascertain when enough sulphuric acid has been added to decompose the calcium tartrate, the workman usually adds a few drops of calcium chloride solution; if a precipitate appears in a few minutes, free sulphuric acid is present. It is proved in the present paper that this test, with certain precautions as to time and dilution, may be used quantitatively. 9. Determination of tartaric acid by precipitation as acid potassium tartrate. The ordinary method consists in the precipitation of tartaric acid with an excess of potassium citrate, washing the precipitated bitartrate with a 5 per cent. solution of potassium chloride, saturated with bitartrate, and determining by titration the acidity of the precipitate. This method is subject to two errors, one of excess due to the precipitation of an acid citrate, and one of deficiency due to the solubility of bitartrate in solutions of citric acid and potassium citrate. The author concludes that in all accurate determinations it is necessary to make preliminary experiments with graduated quantities of potassium citrate to discover the proportion which gives a precipitate of maximum acidity. This being ascertained a final determination is made with this quantity, the precipitate thoroughly washed and its acidity determined. If much sulphuric acid is present the result is usually about 1 per cent. in excess of the truth. 10. Detection of tartaric acid in the presence of citric acid, Cailletet's bichromate test (*Chem. Soc. Jour. Abstracts*, 1879, 674) gives satisfactory results. 11. Determination of organic acids from the neutralizing capacity of the ash of the salts. With potassium or sodium salts the ignition must be effected by a spirit lamp, *i.e.*, at a low temperature to avoid loss. 12. Standardizing of alkali used in titration. The best material for this purpose is acid potassium tartrate; it is easily prepared pure, can be dried at 100, is not hygroscopic, and being of low acidity a large weight can be taken.

Mr. C. F. Cross then communicated briefly the three following papers:—

Contributions to the Chemistry of Bast Fibre. By C. F. Cross and E. J. Bevan.—The authors detail further experiments showing that lignified fibres are to be regarded as a chemical whole, rather than the mixture which is involved in the incrustation theory. Fractional solution in the Schweitzer-Pelouse reagent and precipitation by acid give amorphous modifications of the fibre substance exhibiting uniformity in characteristic properties. With respect, moreover, to the property of giving a yellow colour with anilin sulphate, a diminution was observed, and after a second precipitation it had disappeared. That this reaction was not due to the lignose itself, but to some product of its decomposition, was confirmed by other experiments. The authors find that the mairogallol of Stenhouse and Groves gives with sodium sulphite the brilliant colour reaction characteristic of chlorinated derivatives of lignose; this, together with similarity of formula points to a probable connection between the aromatic derivatives of fibres and the trihydric phenols. The authors describe a higher chlorinated derivative of jute, $C_{33}H_{44}Cl_{11}O_{16}$, a body of identical formula being obtained from *Musa paradisiaca.*

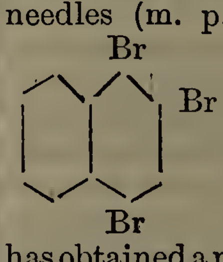
On the Oxidation of Cellulose. By C. F. Cross and E. S. Bevan.—By the action of boiling 60 per cent. nitric acid, cellulose is converted into an amorphous substance, which swells up on washing to a gummy mass. On analysis it gave constant numbers, although obtained from various sources, indicating the formula $C_{18}H_{26}O_{16}$. The authors propose the name oxycellulose. This substance yields a trinitric ether. In this and other properties it exhibits undoubted cellulosic characteristics.

On the Analysis of certain Vegetable Fibres. By C. S. Webster.—The author has investigated the following fibres:—*Ananassa S.*, *Musa P.*, *Agave*, *Phormium T.*, *Bœhmeria P.*, *Crotalaria J.*, *Linum U.*, *Urtica H.* His results comprise ultimate elementary analysis, determinations of cellulose by chlorination, and a statement of general properties and reactions. None of these fibres appear to preserve the definiteness and uniformity of the jute fibre.

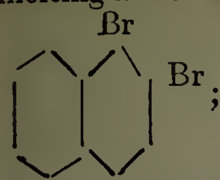
Mr. Warington asked whether the jute fibre was entirely soluble by repeated treatment with bromine and ammonia.

Professor Thiselton Dyer said that he was much indebted to the authors for the explanations which they had given him, from time to time, of their work in the Jodrell Laboratory, at Kew. There was no doubt that the field which lay in the borderland between vegetable physiology and organic chemistry, and in which these chemists had worked, was regarded by many scientific men with the greatest curiosity. The botanists arrived at various results empirically and were obliged to make up a sort of spurious chemistry to explain them. Thus in some way cellulose is converted into lignin; the chemist infers that cellulose is related to starch and some believe that starch is the starting point of plant life. This position is challenged by Strasburger, who thinks that cellulose and starch are formed by the breaking up of proteids. It seemed admitted by the chemist that the subject was one of the greatest importance, and yet upon turning to chemical books the crust of the subject was found to be scarcely broken; the voice of the chemist was silent where the botanist ardently desired information. He was, therefore, only too glad when two chemists expressed their intention of, at any rate, driving a furrow into this unknown tract. The botanist met constantly with such common substances as starch, cellulose, lignin, mucilage, etc., and yet the present state of knowledge about these substances was such that he was almost ashamed to ask a question about them at an examination.

On the Constitution of some Bromine Derivatives of Naphthalene. (*Third Notice*). By R. Meldola.—A careful comparison has been made by the author between Glaser's α-dibromnaphthalene produced by the direct action of bromine on $C_{10}H_8$, and the author's metadibromnaphthalene (m. p. 64°), and he concludes that these two modifications are isomeric and not identical. β-dibromnaphthalene (m. p. 81°) has been obtained by the diazo-reaction from Rother's bromnaphthylamin, thus confirming the view that this modification is a para-compound. By means of the diazo-reaction a new tribromnaphthalene has been obtained from the author's dibromnaphthylamin. This substance forms white needles (m. p. 113°–114°), and has the constitution—



By means of the diazo-reaction, the author has obtained a new dibromnaphthalene from Cosiner's brom-β-naphthylamin; it crystallizes in oblique rhombic prisms melting at 63° and is an orthocompound of the formula—



; by the further action of bromine on orthobrom-β-acetnaphthalide the author has prepared a tetrabrom derivative of m. p. 138°. By brominating paranitracetnaphthalide a monobrom derivative has been obtained, isomeric with that of Liebermann and Scheiding; it forms pale yellow needles, m. p. 224°–225°. The author proposes that naphthalene derivatives in which the substituents are in the same benzene nucleus should be called *homonucleal*, and those in which they are in different nuclei, *heteronucleal*. It seems to be a general rule that the homonucleal diderivatives melt at lower temperatures than their heteronucleal isomerides. Thirty specimens of naphthalene derivatives obtained in the course of this and former investigations were exhibited by the author.

On the Constitution of Lophin. By F. R. Japp.—Radziszewski has communicated (*Chem. Soc. Journ. Abstracts*, 1882, 1063) a new synthesis of this substance by the interaction of benzil, benzaldehyde and ammonia and he comes to the conclusion that lophin has the constitution

$$\begin{array}{l} C_6H_5—C=N\diagdown \\ \quad\quad\;\; | \qquad\qquad CH—C_6H_5 \\ C_6H_5—C=N\diagup \end{array}$$

and rejects the formula proposed by the author, which represents this substance as belonging to the class of anhydrobases described by Hübner. This latter formula was based by the author chiefly on certain analogies drawn from the reactions of phenanthraquinone with aldehydes and ammonia, and in the present paper it is shown that these analogies are well founded, and that the formula explains the known reactions of lophin more consistently than that of Radziszewski. In conclusion, the author describes an experiment which, though not absolutely conclusive, affords a strong presumption in favour of the anhydrobase formula. If it were possible by heating lophin with hydriodic acid and amorphous phosphorus to split up this body, Radziszewski's formula should yield benzaldehyde, which should be reduced to toluene; the anhydrobase formula should yield benzoic acid. Lophin, when thus heated to about 300°, does yield benzoic acid. This temperature, though high, is 100° below the temperature at which lophin boils without decomposition.

The Society then adjourned to December 7, when a ballot for the election of Fellows will be held, and the following papers will be read:—1 "On the Condensation Product of Phenanthraquinone with Ethylic Aceto-acetate," by F. R. Japp and F. W. Streatfield; 2 "On the Condensation Products of Oenanthol, Part I.," by W. H. Perkin, jun.; 3 "On the Formula of Lophin," by H. E. Armstrong; 4 "On the Molecular Weight of Basic Ferric Sulphate," by S. U. Pickering; 5 "On Certain Brominated Compounds obtained in the Manufacture of Bromine," by S. Dyson.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The first meeting of the present session was held on Thursday, November 16, 1882. Professor Attfield, F.R.S., President, in the chair.

After the confirmation of the minutes, Messrs. F. Ransom and W. H. Ince were appointed Scrutineers to examine the voting papers by means of which the election of officers is carried on.

The following gentlemen were elected officers for the ensuing session:—Vice-Presidents, Mr. H. G. Greenish and Mr. R. H. Parker; Members of the Executive Committee, Messrs. A. T. Job, W. E. Crow, W. F. Gulliver, J. B. Barnes; Honorary Secretary and Treasurer, Mr. Wyndham R. Dunstan, 17, Bloomsbury Square, W.C.

Mr. Hamilton then proposed, and Mr. Ince seconded, a vote of thanks to the outgoing officers, which was replied to by Mr. F. W. Short.

The President then delivered an address upon "The Pharmacopœia as a Students' Manual," which will be found on p. 421.

A discussion followed, in which Messrs. Braithwaite, Elborne, Giles, Parker, Taylor and the Secretary took part.

On the motion of the Secretary, seconded by Mr Elworthy, a vote of thanks to the President for his address was carried unanimously.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held at 32A, George Street, Hanover Square, on Wednesday, November 14, 1882, the President, Mr. Wrenn, in the chair, when a paper on "The Relation between Insects and Flowers" was read by Mr. H. Cracknell.

Mr. Cracknell alluded to Sprengel as being the first who noticed that a relation existed between insects and flowers, but he pointed out that it was not until the late Charles Darwin studied the subject that we had any positive proofs of the existence of that relation. He then gave a general description of the relation existing between insects and flowers and the advantages obtained thereby, also showing how, that although plants presented at first sight every arrangement for self-fertilization, nature had really provided means in most flowers for the prevention of self-fertilization, the principal arrangements for this purpose being:—1st, the stamens and pistil are in different flowers; 2nd, the stamens and pistil are not mature at the same time; and 3rd, there exists a difference between the relative length and position of stamens and pistil. He then proceeded to give a descriptive account of how plants are fertilized by means of insects, showing also how they are adapted to the visits of insects. The first plant mentioned was the *Arum maculatum*. He showed how insects visited this plant, and when they reached the bottom of the spathe they are prevented, by means of a row of hairs pointing downwards, from leaving the flower until the stigmas have ripened, when the hairs shrivel up,—but in the meantime the anthers having ripened, the insects as they left the flower were dusted with pollen, which, if they then visited a younger flower, they deposited on to the stigmas of this flower, and thus cross-fertilization was effected. He then gave an account of the fertilization of the *Geranium pratense*, pointing out the remarkable movement of the stamens. The next flower alluded to was the *Lamium album*. This flower, he said, showed the adaptation of flowers to insects very clearly. There were also other flowers in the *Labiatæ* which were just as markedly adapted to the visits of insects, the *Salvia* being one of the most remarkable, especially as regards the arrangements of its anthers. He then mentioned the *Primula*, drawing attention to the difference in the relative length of stamens and pistil, also pointing out the difference in the size of the pollen of the two forms of *Primula*, and at the same time stating the advantages gained by these differences. He described the *Lythrum Salicaria* as being a trimorphous plant, showing the number of modes of union possible between this plant. He then proceeded to give an interesting account of the fertilization of the *Orchis mascula*. In conclusion, he drew a graphic account of insectivorous plants, *Drosera rotundifolia* being quoted as an example.

The paper was profusely illustrated by diagrams, which were very accurately drawn.

A lively discussion took place, in which Messrs. Wrenn, Alcock, Winfrey, Parkinson, Perkins and others took part.

A hearty vote of thanks to Mr. Cracknell for his valuable paper terminated a very successful meeting.

Parliamentary and Law Proceedings.

CONVICTION UNDER THE WEIGHTS AND MEASURES ACT.

On Thursday, November 2, at the Clerkenwell Police Court, Mr. John Knowles, chemist, 40, Seymour Street, was summoned for having two measures that were false and unjust.

The inspector said he had cautioned defendant in April last. He found he had still some weights and measures unstamped on his second visit. One of the measures mentioned in the summons was a 60 minims measure; it held 70 instead of 60 minims. As this measure was used for poisons and other potent drugs it was most important that it should hold the proper quantity and be stamped.

Mr. Barstow said it was a serious matter, and fined the defendant 20*s*. and costs.

IMPORTANT PROSECUTION UNDER THE SPIRITS ACT.

On Tuesday, November 21, at the Lambeth Police Court, Mr. W. J. Bush, wholesale chemist and distiller of essential oils, essences, etc., having works and premises in Artillery Lane, Bishopsgate Street, and Ash Grove, Hackney, appeared to answer several summonses under the Excise laws which had been first before the Court in August last.

The several summonses set forth the following alleged offences:—First, for using a still on July 27 last without a licence; second, for carrying on the trade of a compounder of spirits and for compounding spirits without a licence; third, for retailing spirits on July 27 without a licence; fourth, a similar offence on July 24; fifth, a similar offence on July 24; sixth, for separating gum resin from methylated spirit mixed with gum resin on July 27.

Mr. N. J. Highmore, barrister, and Mr. Squires, one of the solicitors to the Inland Revenue Department, prosecuted; and Mr. E. Pollock defended.

The case was reported upon the first hearing, when it was shown that Mr. R. W. Parry and Mr. Harper, supervisors of Excise, visited the premises of the defendant at Hackney, and found various stills at work, varying from 30 to 1000 gallons contents. Methylated spirit was found running from the worm end of the still. In answer to questions put a man there said they were distilling "a varnish or finish." Close to the still the officers found several drums containing 110 gallons of methylated spirit from which the gum had been extracted. The defendant, when spoken to, said it was the practice of the trade, and that he was ignorant of the law on the subject. An ordinary still licence was produced at the time. A visit was paid to the premises in Artillery Lane, City, where purchase was made by one of the officers of some "essences of brandy, gin, port wine, and curaçoa."

Upon the first hearing Mr. Pollock cross-examined the several witnesses and put forward his contention with regard to the meaning of the word "spirits." He also pointed out that the defendant had carried on the business for many years, and produced circulars of many others who, he said, had carried on a similar trade, and likewise pointed out with regard to the "essences," that as long back as the Exhibition of 1851, medals had been awarded for such "essences," and yet no proceedings had been taken.

After a long argument, Mr. Chance decided to adjourn his decision to give him an opportunity of looking fully into the question.

Upon the matter being again brought before the Court yesterday, Mr. Chance gave judgment. After referring to some of the facts of the case, he said that the question remaining was what penalties he ought to impose. He would take the last-named offence first, "for separating gum resin from methylated spirit mixed with gum resin," and with regard to that, he did not think there was the slightest excuse for a violation of the section of the Act, which to his mind was as clear as possible on the subject. He then proceeded to read the 131st section of the 43 and 44 Vict., bearing on the matter, and added that anyone reading that could scarcely make a mistake. With regard to that offence, he find the defendant £200. Then for using a still the same remarks would apply, and for that he imposed a penalty of £500. His only doubt at first was with regard to the offence of "compounding," but in carefully considering the various points those doubts were removed, and he did not feel justified in mitigating the penalty for that, which would be £500. With regard to the three remaining offences of retailing without a licence, he imposed three fines of £25, instead of £50 each.

Mr. Pollock said there were various points of law which he would should like to carry still further.

Mr. Chance replied that he would be glad to hear an application on a future day, and to grant a case for a superior court.

Mr. Pollock, after some further argument, asked that payment of the penalties should be suspended until he had decided what course to take.

Mr. Highmore said he had no objection so long as security was given for the payment.

Mr. Pollock said there was not the slightest objection to that.—*Standard.*

Reviews.

DIET FOR THE SICK, being Nutritious Combinations suitable for Severe Cases of Illness. By J. JAMES RIDGE, M.D., B.S., B.A., B.Sc., Lond., etc. London: J. and A. Churchill.

This is altogether an admirable little book. It is small in size, excellent in arrangement, clear in direction, scientific in principle, and is destitute of padding.

It commences with directions for making beef-tea. We all know what horribly flavourless messes sometimes go by the name. The beef is conscientiously boiled to rags, the whole is then strained, and the result is that the so-called beef-tea contains little more than gelatin.

Dr. Ridge's directions are entirely free from any scientific terms, and are capable of being understood by anyone. For making beef-tea they are so good that we reproduce them *in toto*.

"BEEF-TEA.

"1. Take 1 pound of lean gravy beef and cut it into pieces as small as possible. A sausage-machine will accomplish this most thoroughly, and thus save half the time of step No. 5, while it will enable you to extract all the goodness of the meat more thoroughly.

"2. Place the meat in a preserve jar with one saltspoonful of salt, and put the jar in a saucepan sufficiently large to allow the lid to be placed on when the jar is in it.

"3. Mix in a large jug equal quantities (carefully measured) of boiling water and cold water.

"4. Put half a pint of this mixed water into the jar which contains the meat, and pour sufficient of the remainder into the saucepan outside the jar to reach as high as the water inside the jar, then put the lid on the saucepan and place it on the hearth, *not* on the fire or on the hob. It will do no harm to cover the saucepan with a cloth or anything which will keep in the heat.

"5. The meat must remain in the jar from three-quarters of an hour to two hours, according to the fineness to which it has been chopped, being stirred every quarter of an hour. If cut into pieces a little smaller than dice, one hour and a half will be sufficient. At the end of this time take out of the jar and strain through a hair sieve, or through muslin, with gentle pressure.

"6. Place the red meat juice thus obtained in a small saucepan, and heat it to boiling while you stir. It will turn brown and curdle. Strain off the solid flakes and rub these thoroughly with a small teaspoonful of arrowroot or cornflour, then boil these again five minutes with the liquor which was strained off, and set it on one side for the present.

"7. Now take the meat which was left in the sieve at the end of step No. 5, and put it into a saucepan with a quart of boiling water, cover, and let it simmer over a slow fire for three hours; then allow it to boil and strain immediately.

"8. Now boil this strained liquor down to half a pint.

"9. Then mix this half pint with the half pint left at the end of step No. 6, and you will have 1 pint of strong beef-tea containing all the soluble portion of the meat."

Reasons for this process are then clearly and simply given, and then follow directions for making beef-teas modified to meet varying circumstances.

The uselessness of Liebig's extract given solely as a food to the exclusion of other things is pointed out, but its value as a stimulant is fully recognized.

The book contains directions for making all kinds of broths, meat biscuits, milk and farinaceous preparations, wheys, teas and various refreshing drinks, and concludes with processes for preparing digested and partially digested foods and enemata. Dr. Ridge's methods are throughout uniformly simple and sound. We smack our lips over some of them, and though we hope we are in the most robust health, we could heartily relish some of the varieties of spoon-food, if our anything-but-neat-handed Phyllis below stairs would condescend to follow Dr. Ridge's directions.

Chemisch-Technisches Repertorium. Uebersichtlich geordnete Mittheilungen der neuesten Erfindungen, Fortschritte und Verbesserungen auf dem Gebiete der technischen und industriellen Chemie mit Hinweis auf Maschinen, Apparate und Literatur. Herausgeben von Dr. Emil Jacobsen. 1881. Berlin: R. Gaertner. 1882.*

This 'Repertorium,' as stated in its title, consists of short abstracts of communications upon the latest discoveries, progress and improvements in the domain of technical and industrial chemistry, systematically arranged under suitable headings. It is now issued quarterly, the four parts of one year containing the history of the previous twelve months. Although the majority of the subjects lie outside pharmacy, few of them are so far removed as to be devoid of interest to the student of chemistry in this direction, and to any person able to read German the work presents an epitome of the technical literature scattered over a wide field, no less than one hundred and twenty-two journals being represented in the references, each by a particular number. The abstracts appear to be made with judgment; brief, but not too curt to be of use. As an example one may be quoted, not as being the best suited for the purpose, but simply because it refers to a subject upon which information has been asked for by correspondents:—

"Starch Glaze Preparations.— . . . Several specimens of the so-called 'starch glaze,' which at present is sent into commerce in considerable quantity, were examined. Only three samples, in powder, were analysed quantitatively. Their composition was as follows:—

	Water per cent.	Mineral Substace (Borax) per cent.	Starch calculated from difference. per cent.
No. 1 . . .	29·80	32·27	37·83
No. 2 . . .	29·94	41·04	29·22
No. 3 . . .	22·95	21·00	56·04

"The complete solubility of Nos. 1 and 2 in hot water, as well as their appearance under the microscope, showed that the starch used in their preparation had previously been rendered soluble. Probably this was done by strongly heating it under pressure and only then mixing it with the borax finely powdered. But a similar preparation may also be obtained by boiling the starch for a long time in a concentrated solution of borax, evaporating the starch solution obtained to dryness, and reducing the dried mass to a fine powder. By both methods a fine powder, consisting of borax and starch, is obtained, that with hot water forms a solution from which no starch separates upon cooling. Sample No. 3, which dissolved only after considerable boiling, was evidently only a mechanical mixture of finely powdered borax with ordinary rice starch, not rendered soluble. The addition of borax has probably for its chief object to bring the starch into solution so that it may penetrate into the tissue and thus render the pieces stiffer upon drying. But a too great addition of borax may act injuriously on the articles washed by rendering them brittle."

* Large 8vo., Part I., pp. 1-112; Part II., pp. 113-216.

A Compendium of Modern Pharmacy and Druggists' Formulary. Fourth Edition, with Supplement. By Walter B. Kilner, Pharmaceutist. London: Henry Kimpton. 1882.

A few months since a notice of Mr. Kilner's useful book in this Journal (vol xi., p. 756) drew forth a number of inquiries as to whether copies might be obtained in this country. We are therefore glad to have the opportunity of saying that a fourth edition has now been issued, and that it is published by Mr. Kimpton, of High Holborn.

Notes and Queries.

[739]. Oil of Peppermint.—I have noticed the same green colour; it is no doubt due to the ol. menthæ pip., as on opening a fresh bottle I found it mix with the same bulk of same sample s. v. r., quite a pale straw colour.—Inceptor.

[741]. Smelling Salts.—Equal parts of pulv. potassæ carb. (dry) and pulv. ammon. mur., rubbed together thoroughly and a few minims of ol. lavand. and ol. geranii will make a very pungent salt.—Inceptor.

[743]. Preservation of Essence of Lemon.—I have kept ess. limonis for years without any deterioration, by adding ½ pint distilled water to ½ gallon of essence. After a time the water at the bottom of the bottle appears loaded with resin, etc. I then decant the essence carefully and put it into another bottle and add more water, and repeat this when required. By this plan I have kept essence of lemon unaltered for eight years.—Percy Wells.

[743]. Preservation of Essence of Lemon.—W. L. would find 10 per cent. of alcohol quite sufficient.—374.

[743]. With reference to the query concerning the preservation of ess. lemon. I would state that having heard some years ago that ess. lemon might be preserved in its purity of odour by keeping it with its bulk of water in small bottles, I placed some in a small vial; after the lapse of at least a twelvemonth, it was apparently unaltered.—H. J. B.

[743]. I have found the best way to keep essence of lemon, is to mix it with equal parts of absolute alcohol, or to put it into ℥j. or ℥ij. bottles, and hermetically seal it, only using from one bottle at a time.—Fossil.

[744]. Potash Powders.—I should think potash powders could be made as ordinary gasogene charges, only substituting pot. bicarb. for sodæ bicarb.—374.

[745]. Boracic Acid Lint.—Will any reader kindly inform me how to make "Lister's boracic acid lint?"—W. L. P.

[746]. Cleaning of Fossils.—I have a number of fossils, etc., which have become discoloured. Could anyone kindly inform me the best way to clean them? Also to clean white coral?—Fossil.

[747]. Pulv. Alk. Co.—The formula for "pulv. alk. co." as prescribed by Dr. Bell, of Glasgow, would greatly oblige.—23.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Golden Ointment.

Sir,—While thanking Mr. Alfred E. Tanner for his courtesy in publishing the result of his examination of Singleton's golden eye ointment, an analysis that undoubtedly establishes the composition of the article as at present manufactured, I must, in the absence of the paper to which he refers, and which a search I have made with some diligence has altogether failed to discover, ask his pardon for disagreeing with one of the opening sentences of his contribution, in which he states that the matter has some time since been set at rest and can no longer be considered a debatable question.

Coinciding, to a certain extent, with his opinion that the work of former investigators would be much the better for verification or otherwise by persons who could bring to their aid the discoveries which a long lapse of years has produced, I do not think that modern experimentalists should, without the deepest consideration and almost incontrovertible proofs, cast doubts upon the deliberate assertions of authorities who, like Dr. Paris, stand, preeminent amongst the pharmacologists of our country.

Mr. Tanner, I think, will readily acknowledge that no one with the attainments of the author of such a work as 'Pharmacologia' would be unable to tell the difference between an ointment prepared with red oxide of mercury and another containing such a totally dissimilar ingredient as orpiment, nor would he, after stating that the ung. hydrarg. nit. oxid. of the London Pharmacopœia was sold as a substitute for the original preparation, affirm that the genuine "golden eye-salve," which, according to Mr. Tanner, would be almost identical in appearance, owed its properties and colour, not even to the red sulphide, realgar, but to a yellow pigment like orpiment; and when the citrine or yellow ointment of Edinburgh was introduced into the London Pharmacopœia for the purpose, as Dr. Christison wrote in 1842 ('Dispensatory,' 1st edition, p. 531) of "imitating as exactly as possible a nostrum well-known by the name of golden eye-ointment," a view in which he is supported by Nevins, Royle, Squire and others, can any one consider that the compilers were attempting to produce a preparation which would be recognized by the general public as identical in composition with the so-called "golden ointment" they had been accustomed to?

Since Mr. Tanner's letter has appeared I have been at some pains, by an examination of contemporary authors, to gain a little light upon the subject. I find Cooley in 1855, more than thirty years after the statement of Dr. Paris had appeared, after quoting the remarks in 'Pharmacologia,' writing:—"There appears to be some mistake in this, as that sold us under the name had nearly the same composition as the ung. hydrarg. nit. oxid. of the Pharmacopœia. It did not contain of arsenic or sulphur. The action of the nostrum and the reputation it has acquired fully justify our conclusions."

This effectually proves that the ointment as sold at that time was composed of the red oxide of mercury, but does not by any means assert that the preparation was the same at the time to which Mr. Cripps referred in his paper; and I may add here that the last sentence of the paragraph I have quoted from Cooley cannot be advanced in evidence to the contrary, as there is no doubt but that orpiment is not only a good, but a valuable remedy for certain eye diseases, and especially for those in which the "golden ointment" was recommended. This fact may possibly not be so apparent to many of your readers, therefore I may just mention that the following prescription, published in the *Dublin Quarterly Journal of Medical Science* (September, 1870), was put forward as a valuable specific for granular lids and in all cases of chronic ophthalmia:—

℞ Arsenici Sulphureti . .	gr. ij.
Unguenti Citrini .	ʒij.
Axungiæ Præparatæ	ʒvj.

Misce bene.

My researches have led me to the conclusion that the original "golden ointment" which was the indirect means of securing a place for ung. hydrarg. nitratis in the London Pharmacopœia was of a yellow and not of a red colour, in fact the hue was so pronounced that Christison, Duncan, and others undoubtedly considered it to consist only of well prepared citrine ointment, and hence their endeavours to improve their own formulæ; in support of this statement I may mention that Barker and Montgomery ('Transl. Dub. Pharm.'), writing in 1830, say that they think the difference in the two preparations was due to the fact that unsalted butter was used as the basis of the secret nostrum. Duncan, also ('New Dispensatory,' 12th edition, p. 1050), about the same date expressly mentions that both the "empirical remedy" and the citrine ointment, as prepared by his namesake's process, had a "fine golden colour," a description which could not justly be applied to a preparation of the red oxide.

On these grounds I think that the question is narrowed to one of the following substances:—the yellow oxide of Mr. Cripps, citrine ointment or arsenious sulphide. There are several reasons why the yellow oxide of mercury may not be considered the specific ingredient; in the first place the substance itself is only of recent introduction and cannot be said to possess in any special degree the particular remedial qualities "golden ointment" was famous for. Again I am unable to see what authority Mr. Cripps has for noticing it, unless a statement by the compiler of the 'Chemists and Druggists' Diary (1881) will account for the circumstance; the writer, after quoting Dr. Paris, asserts that a very general impression is current that Singleton's "golden ointment" is prepared with precipitated mercuric oxide, and this is the only case in which I find the yellow oxide even mentioned. With regard to citrine ointment I do not think it in any degree probable that Dr. Paris, well acquainted with the ordinarily accepted opinion, would have gone out of his way to state definitely that orpiment was the active constituent without having first satisfied himself by careful analysis that the announcement would be correct.

The only way in which I can account for the statement in Gray and Redwood's 'Supplement,' etc., that the ointment was prepared with realgar is by supposing that having seen the sulphuret of arsenic mentioned by Paris, they, from a superficial examination of the proprietary article, considered that he had intended the red variety, realgar, and not orpiment as stated.

Elden Grove, Rockferry, Cheshire. J. E. Saul.

M. Leigh.—A *résumé* of one of the most interesting cases of the occurrence of disease germs in milk will be found in vol. i. of the present series of this Journal, p. 616.

Chemicus and *An Apprentice.*.—We cannot supply technical information to anonymous correspondents who do not comply with the rule printed weekly at the commencement of the "Correspondence."

Inquirer.—The book is a good one as far as it goes, but you are advised not to limit your chemical studies to the pages of a single work.

Inquirer.—The General Medical Council does not conduct a preliminary examination.

X.—See a note on green extracts in suppositories in vol. ix., p. 949.

G. L. Lloyd.—See the last paragraph in a note by Dr. Vulpius, printed in the *Pharm. Journ.* for April 8 last, p. 825.

R. G. Bumpstead.—The names of the writers were appended to all the letters that appeared on the subject.

W. Miller.—(1) Yes. (2) Too fragmentary to determine. (3) *Cornus sanguinea.* (4) Yes. (5) *Clematis vita-alba.* (6) *Euphorbia amygdaloides.*

Chemicus.—The subject has already been frequently discussed in this Journal. See several papers in vol. xi. of the second series, and especially one on p. 542.

An Old Subscriber.—We should think that dilute glycerine would answer the purpose.

Communications, Letters, etc., have been received from Messrs. Shenstone, Pollard, Tichborne, Napier, Hogg, H. J. B.

"THE MONTH."

The weather, with the exception of a few frosty nights, has been so favourable to vegetation during the past month, at all events in the south of England, that many of our spring flowers may be found in blossom. Kentish primroses are being sold in the London streets, whilst an Isle of Wight correspondent forwards the red poppy, the winter heliotrope (*Petasites fragrans*), and the *Lamium album* in flower, and states that the primroses are in blossom, the hazel catkins are budding, and the *Daphne Laureola* is almost in flower.

On the rockwork at Kew, *Gentiana Kurroo* is now in flower and also *Erigeron philadelphicum*. In the Economic House, *Monodora myristica*, or Calabash nutmeg, is in full bloom.

In the Economic House at Kew may also be seen a specimen of the "tonga" plant. According to Mr. N. E. Brown, who has just described the "tonga" plant in detail (*Journ. Bot.*, Nov., p. 332) it must now pass under the name of *Epipremnum mirabile*, Schott, instead of *Rhaphidophora vitiensis*, the supposed two plants having proved to be identical and the former name having been given to the plant fifteen years before the latter. It would appear that it is by no means confined to Fiji, but has been found in Java, Baly, Amboina, Timor, and Tropical Australia. It has been some time in cultivation in this country, having been grown by Mr. W. Bull. The youngest leaves are entire, but the subsequent leaves are divided on the left and right hand side alternately, both sides finally becoming divided and forming a pinnatifid leaf.

In the same Journal, it is stated that a very rare British plant, *Eriophorum gracile*, has been found by Mr. Bolton King, in three bogs in the New Forest within a range of about two miles. A yellow-fruited variety of *Rubus discolor*, which does not appear to have been recorded as British since the time of Bobart, in 1696, has been detected by Mr. J. W. White, near the Mendip Hills.

The *Gardeners' Chronicle* (p. 566) records two curious facts which, although they have no apparent bearing on pharmacy, yet may lead to valuable results. One is the successful attempt to graft potato tubers and so form hybrids. As the potato is an underground stem, this is something like the grafting of cinchonas, which also promises good results. The other fact is the development of a variety of the apple, without any core. How this was produced is not stated, but it is known that pears having a similar character are sometimes produced by a plentiful supply of moisture being suddenly given to the tree after a long drought and while the pears are in course of formation.

An interesting account of the effects of the stinging tree, *Laportea gigas*, is given in the same journal (p. 567), by Mr. N. E. Brown. The pain produced by the sting of a single hair on the right hand gave rise to remarkable symptoms, the pain being confined to the right side of the body and being succeeded by a numbness and slight paralysis. Besides the pain, a sensation of losing the senses, or rather, of becoming insane, was experienced. The severe symptoms lasted two hours; the spot pricked remaining constantly painful for nearly a month after being stung. Mr. Brown expresses surprise at the fact that the pain extended to the right side of the brain instead of the left, it being generally received that the right side of the brain governs the left half of the body. Dr. Ferrier, in *Brain* for October, mentions a singular condition in which impressions on one half of the body are referred to the corresponding point on the opposite side, a phenomenon termed "allochiria" by Obeisteiner; and considering the effect of *Laportea* on the brain, as described by Mr. Brown, this may be a further illustration of the same phenomenon (*Lancet*, p. 709). As the liquor injected could not have been more than the dot over an *i*, such a virulent poison could not possibly be used in medicine except in a homœopathic dose; but the chemical nature of the substance is deserving of investigation, if only to discover an antidote for its effects. Mr. A. W. Bennett has recently, in this Journal, called in question the common statement concerning the nettle owing its stinging property to formic acid, and suggested that the irritant is more probably of an alkaline nature.

According to M. Maumené (*Comptes Rendus*, xcv., 924), the colouring matter of black grapes and of red wines, to which he has given the name of "œnocyanine" is colourless during eight to twelve days before its complete formation. He finds that if a green grape be taken from a bunch in which some are already turning red, and dried over strong sulphuric acid, the seeds when quite dry become yellowish, but that in a few minutes after their removal from the bell-glass they rapidly absorb oxygen and atmospheric moisture and can be seen to darken in a few minutes to the natural colour that they would have in the ripe grape. He therefore concludes that iron has nothing to do with the coloration.

The purple-red colouring matter of the fungus, *Agaricus ruber* (*A. sanguineus*) has been examined by Dr. T. L. Phipson, who proposes to name it "ruberine" (*Chem. News*, Nov. 3, p. 199). It is described as soluble in water and in alcohol, the solution being of a beautiful rose-red colour when seen by transmitted light, but presenting a very vivid blue fluorescence, and giving in its spectrum two dark absorption bands in the green. In these latter characters it differs from "palmelline," the colouring matter obtained by Dr. Phipson from *Palmella cruenta*, a solution of which is also rose-red by transmitted light, but presents an intense yellow fluorescence and shows dark absorption bands in the yellow part of the spectrum. Dr. Phipson has also separated from the peeled fungus a substance, which he considers to be an alkaloid, and which he proposes to name "agarythrine." From a solution in ether it was deposited upon evaporation as a white or yellowish-white amorphous substance, soluble in alcohol, ether, and dilute hydrochloric acid, and having a distinctly bitter taste, followed by a burning sensation on the tongue. When treated with nitric acid, or oxidized by contact with air, the solution acquired a rose-red colour, and for this and other reasons Dr. Phipson thinks that the colouring matter, "ruberine," is derived from the alkaloidal substance, "agarythrine," under the influence of the air and solar rays. It may be presumed that the fungus referred to is the *Russula rubra*, Fr. (Cooke's 'Handbook'), that species being bitter, whereas *R. sanguinea* is not. Red colouring matter occurs also in several other species.

A contribution to the settlement of the question as to how far the vital processes of plants are influenced by various mineral compounds presented by the soil to their roots has been made by Mr. F. C. Phillips (*Chem. News*, Nov. 17, p. 224), who has carried out a number of experiments with geraniums, coleuses, ageratums, achyranthes and pansies, planted in soils containing one-half per cent. of carbonate of zinc, copper or lead, or arsenate of lime. The most strongly marked effect was observed to be produced by the arsenate of lime, and from the general results Mr. Phillips concludes (1) that healthy plants grown under favourable conditions may absorb through their roots small quantities of lead, zinc, copper and arsenic; (2) that lead and zinc may enter the tissues in this way without causing any disturbance in the growth, nutrition and functions of the plant; and (3) that compounds of copper and arsenic exert a distinctly poisonous influence, tending, when present in larger quantity, to check the formation of roots, and either killing the plant or so far reducing its vitality as to interfere with nutrition and growth. It will be obvious that these conclusions have an important practical bearing upon the extensive use of Paris green (arsenite of copper) as an agricultural insecticide in the United States.

A further contribution to the knowledge of the conditions attending the reduction of nitrates in soils under the influence of a ferment has been made by Messrs. Dehérain and Maquenne (*Comptes Rendus*, xcv., 854). When the fermentation was provoked artificially by adding solution of sugar and potassium nitrate to garden soil, multitudes of vibrios could be seen, with the aid of a microscope, presenting all the characters of *Bacillus amylobacter*, the "butyric ferment" of Pasteur. The composition of the gas evolved differed with the rate of fermentation. When this was slack it was found to consist of CO_2, 80·5; NO, 8·2; N, 11·3; and when more energetic of CO_2, 67·3; H, 31·5; N, 1·2. The butyric ferment obtained from other sources was found to act similarly; but when the lactic fermentation was set up alone no reduction of nitrates was effected. The authors think that the hydrogen produced by the butyric fermentation has the same action upon nitric acid as nascent hydrogen is known to have.

M. Marcano, who recently pointed out the intervention of microbes in the fermentation of an Indian beverage prepared from ungerminated maize (see before, p. 184) has been extending his observations in other directions. His results appear to confirm the opinion previously expressed that under the influence of a micro-organism, which occurs under the three forms of vibrios, spores and mycelial tubes, and is easily detected on the pellicle of maize and other grains, starch is converted into dextrin, sugar, and afterwards alcohol, apart from the action of any diastatic ferment emanating from the vegetable cells. There appears, however, to be a considerable quantity of diastase formed as "a product of the vital activity of the vibrios," for when the microbes were cultivated for a time under favourable conditions in a mixture of ungelatinized starch and water, containing some albumen, and then rendered inert by the action of chloroform, it was found that the liquid in which the action had been going on possessed, after filtration, a diastatic action equal to good extract of malt. The same microbe is said to be the cause of the fermentation of cane juice during the manufacture of sugar, and to be easily detected in the cells of the stalks. It is also capable of fermenting lactose, and this property may be utilized in the preparation of koumiss, by sowing the microbes in lukewarm milk, to which lactose has been added in proportion to the alcoholic strength desired. The fermentation goes on very actively, and even tumultuously, at the ordinary temperature, for eight or ten hours, or until all the sugar is transformed, and the sourish tasted alcoholic liquor produced contains a large proportion of diastase.

Some comparative experiments, made by Dr. W. Detmer, of the University of Jena (*Zeits. f. phys. Chem.*, vii., 1), appear to show that the action of the diastatic ferment upon starch is considerably accelerated when it takes place in an atmosphere of carbonic acid. A similar result has been found to follow the addition of minute quantities of citric, phosphoric and nitric acids to the liquid containing the starch and ferment, the activity increasing with the proportion of acid added up to a certain point, which being exceeded the action was again proportionally retarded. On the other hand, when the liquid was made extremely faintly alkaline the breaking up of the starch went on very slowly, and when made more alkaline it completely stopped. The formation of sugar was not much interfered with by the presence of even relatively large quantities of carbolic acid.

Fehleison has found that in erysipelas micrococci are constantly present in the lymphatic vessels of the skin (*Lancet*, Nov. 4, p. 771). When cultivated in gelatine prepared by Koch's method they were found to grow rapidly, and the fourth generation of these organisms was capable of producing the disease when inoculated into the skin of human beings.

In the *British Medical Journal* (Nov. 25, p. 1051), attention has been directed to the use of naphthalin. It appears that in Strassburg it has been used for dressing wounds as an antiseptic, all animal or vegetable micro-organisms being destroyed by it, whilst neither wounded surfaces nor the healthy structures around them are in the least irritated. It has also been used for the disinfection of sick rooms and closets, as a parasiticide in certain skin diseases, and as an inhalation in infectious diseases involving the respiratory organs, such as diphtheria. The crystals have the disadvantage of cutting the flesh by their sharp edges, when applied to wounds. Naphthalin is soluble in various fixed oils, in cold ether and in warm alcohol, but not in dilute acids or alkalies.

At a recent meeting of the Medical Society of London, Dr. Richardson read a paper on the properties of ammonia, chloroform, and ammoniated chloroform, as antiseptics (*Lancet*, Nov. 25, p. 892). He also exhibited two small specimens of lung, which had been preserved in chloroform vapour and had remained untouched in their respective bottles for thirty-five years, and were still well preserved. As an illustration of the antiseptic power of ammonia vapour, he showed a specimen of blood which had been drawn from a sheep's neck in April, 1862, and kept in a well-corked bottle ever since; it was still perfectly fresh and fluid. He found that structures containing much fat became saponified unless chloroform were mixed with the ammonia, and that when it was desirable to retain the colour of the blood, the addition to the chloroform of coal gas which contained sufficient carbonic oxide for the purpose was entirely successful. The knowledge that it is possible to retain specimens of viscera in a perfectly sound state, during a long investigation, in ammonia or chloroform vapour, will be welcome to analysts and toxicologists. Dr. Richardson remarked that he feared the process could not be carried out on the large scale. He added that he had found that chloride of zinc and spirit embalmed a body perfectly but made it too hard for dissection.

Dr. Von Mering has recently been investigating the physiological properties of acetal (*Med. Times and Gaz.*, Nov. 11, p. 585, from *Berliner klin. Woch.*). He finds that it causes gradual loss of consciousness and then stops the respiration before arresting the action of the heart. In experiments upon frogs, rabbits, dogs and cats, it was found that when death occurred from its use it resulted from apnœa caused by paralysis of the respiratory muscles. Eight experiments have been made with men, in six of these there was a notable effect both in the relief of pain and in the procuring of sleep. The author points out the remarkable fact that such bodies as alcohol, ether, paraldehyde, acetal and several other bodies not containing chlorine, act primarily and more powerfully on the respiratory centre, whilst chloral, chloroform, and bichloride of methylene affect the circulation and respiration in almost an equal degree.

In the *British Medical Journal* (Nov. 11, p. 934), an account is published of Dr. W. Squire's further inquiries into the action of bromide of ethyl. He remarks that the safety of anæsthetics depends in some measure upon the readiness with which they are cleared from the lungs by ordinary diffusion, the rate of diffusion depending upon the vapour density. Thus nitrous oxide of density, 1·5, and ether, 2·56, allow of more rapid return to consciousness than bromic ether, the vapour density of which is 3·75 or chloroform, which has that of 4·2. Bromic ether, however, possesses the valuable property of acting as an anodyne without causing complete unconsciousness and hence can be used to allay labour pains, the vapour being diffused from the lungs during the intervals of pain. For the relief of spasmodic affections, such as whooping cough and angina pectoris, a solution of 1 part of bromic ether in 200 parts of water could be given. Dr. Squire considers that far too large a proportion of anæsthetics is generally used, a less amount, more largely diluted, being quite as successful and much safer. In the discussion on the paper, Dr. Spanton remarked, concerning the use of bromide of ethyl as a local anæsthetic, that when used in the form of spray insensibility of the skin can be produced by it without causing actual freezing, as is necessary when ether vapour is applied, and hence the tissues can be cut while still soft and the subsequent pain of thawing is entirely avoided. He also remarked that he had found the inhalation of small quantities of great service in some cases of asthma supervening on old standing bronchitis.

Another new test for albumen, which promises to prove a very convenient one, has been described by Dr. George Johnson (*Lancet*, Nov. 4, p. 737). It depends upon the application of an observation published by his son in 1874 (*Jour. Chem. Soc.*, Aug.) that albumen is coagulated by picric acid. It has been found that when albuminous urine is treated with an equal volume of saturated solution of picric acid it immediately becomes turbid with coagulated albumen. This test is said to be even more delicate than the nitric acid test, while the coagulum produced is about equally insoluble in water; but the coagulum is readily soluble in caustic potash and ammonia, so that an alkaline urine should be neutralized before applying the test. A small crystal or powder of picric acid quickly dissolves and produces the same effect in the urine, and Dr. Johnson suggests that a few crystals in a bottle, or, better still, solid pellets made of the powder, would be much preferable to nitric acid as a portable test.

Subsequent to the above communication, Dr. Johnson announced (*Lancet*, Nov. 18 and 25, pp. 869 and 898) that picric acid also furnishes a very valuable test for grape sugar, by increasing to an extraordinary degree the delicacy of Moore's test for sugar in urine, *i.e.*, boiling it with an equal volume of liquor potassæ. In order to prevent the obscuration of the test by the intensity of colour produced, a weak solution of potash, not exceeding 2 per cent., must be used, and only enough picric acid that the picrate of potash formed shall tinge the liquid yellow. Upon boiling this alkaline solution of picrate of potash with a liquid containing grape sugar, an intense deepening of colour takes place immediately, and so delicate is the reaction that it is reported to indicate that a trace of grape sugar is present in all normal urine. The reaction does not occur when only cane sugar is present.

Very contradictory statements have been made as to the behaviour of hydrated calcium chloride when submitted to a temperature of from 180° to 200° C. According to Mitscherlich the compound containing 6 molecules of water ($CaCl_2 + 6H_2O$) loses 4 molecules only at 200° C., whilst according to Legrand calcium chloride in aqueous solution, boiling at 179·4° C., already contains less than 2 molecules. To clear up this point Herr Weber has heated pure hydrated calcium chloride ($CaCl_2 + 6H_2O$) to 200° C., and he reports (*Berichte*, xiv., 2316) that at that temperature it becomes practically anhydrous, losing not more than another ¼ per cent. in weight when fused. The product forms a porous mass, very suitable for drying purposes; it has an alkaline reaction, probably through loss of hydrochloric acid and formation of oxychloride, but the alkalinity is greatly increased by fusing.

About eighteen months since Dr. Hofmann communicated the results of some experiments (*Berichte*, xiv., 705) from which it appeared that the true formula for coniine was $C_8H_{17}N$, instead of $C_8H_{15}N$, by which its composition had hitherto been expressed. Assuming this to be correct it became evident that a revision was necessary of the published statements with respect to conydrine, the other base discovered in conium by Wertheim, which had been represented to be a hydrate of coniine ($C_8H_{17}NO$) from which a molecule of water was removable by treatment with phosphoric anhydride, leaving a base that was identical with coniine; for either the formula for this base also would have to be increased by H_2, or the decomposition could not be so simple as had been stated. Dr. Hofmann therefore made some analyses (*Berichte*, xiv., 2313) of purified conydrine, which agreed in indicating that Wertheim's formula, $C_8H_{17}NO$, represents the proper proportion of hydrogen present in the base. Further, upon treatment of the same substance with phosphori-anhydride a strongly basic volatile oil was obtained, which though it had the smell of coniine, proved on nearer examination to be a mixture of various bodies, requiring further investigation to clear up their composition.

"Kairine" and "kairoline" are the names of two synthetically prepared bases which form the latest additions to the already large number of substances put forward as possible substitutes of quinine. They are said (*Pharm. Zeitung*, No. 89) to be two out of many similar bodies, prepared by Dr. O. Fischer and Dr. W. Königs, whose investigations in connection with the alkaloids are well known. In the belief that the characteristic properties of quinine are not referable to a chinoline nucleus, as has been assumed, but to a hydrogenized chinoline nucleus, and keeping in view the presence of oxygen in quinine, Dr. Fischer worked in the direction of preparing compounds in which hydrogen was introduced into chinoline in the form of hydroxyl or other oxygen-containing groups, whilst Dr. Königs prepared compounds by the introduction of molecules free from oxygen. After a large number of different compounds had been prepared they were entrusted for therapeutical experiment to Dr. W. Filehne, of Erlangen, who found that the power of reducing the temperature in fevers is possessed by those compounds in which the nitrogen atom, besides its combination with two atoms of carbon in the chinoline ring, is joined to the carbon of a methyl or other alcohol group. This condition is present in three known compounds, Dr. Fischer's oxychinolinmethylhydride, which has received the more convenient name of "kairine," Dr. König's "chinolinmethylhydride," similarly named "kairoline," and Wischnegradzky's analogous "chinolinethylhydride." The last two appear to be at present put out of court by difficulties attending their preparation and their disagreeable taste. Kairine, represented by the formula $C_{10}H_{13}NO$ (that of chinoline being C_9H_7N), is represented as forming a hydrochlorate which is a crystalline powder, not quite white (greyish-yellow), easily soluble in water, and having a mixed saline bitter and aromatic taste, the latter similar to guaiacol, but not burning. Upon healthy powerful full-grown persons doses of 1 to 1·5 gram are said to be without physiological action and produce no disagreeable effects; but upon full-grown invalids, or weakly persons, a dose of 1 gram every two hours must not be exceeded, or cyanotic symptoms may result. The dose recommended in cases of fever in adults is 0·3 to 0·5 gram at intervals of not more than an hour or an hour and a half.

The attention of several pharmacists in Germany and Austria has been directed recently to working out a satisfactory method of preparing quinine tannate, one of the slowly soluble, and therefore nearly tasteless, compounds of that alkaloid. Herr Dukla (*Pharm. Zeitung*, No. 92) recommends to suspend 20 parts of quinine sulphate in 80 parts of distilled water, add about 20 parts of dilute sulphuric acid so as to completely dissolve the quinine, then dilute with sufficient distilled water to bring the entire quantity up to 1000 parts and add to the filtered solution, under diligent stirring, a solution of 40 parts of sodium carbonate in 160 parts of water. The resulting precipitate of quinine hydrate is to be collected on a filter, washed well in cold distilled water, allowed to drain, and then dissolved whilst moist in 200 parts of 96 per cent. alcohol. The alcoholic solution is filtered, and allowed ot trickle, under constant stirring, into a clear solution of 60 parts of tannic acid in 1000 of water, prepared in the cold, the mixture being occasionally stirred during some hours after and then allowed to settle. The abundant nearly white precipitate should be collected on a moistened paper filter, washed with distilled water at 30° C. until the water running off no longer has an astringent taste, dried on blotting paper at a temperature not exceeding 30° C., and rubbed to a powder. The neutral tannate of quinine thus obtained is described as nearly white, and entirely without odour or taste.

Dr. T. Browne, of Yarmouth, has published, in the *Brit. Med. Journ.* (Nov. 25, p. 1030), the results of his experiments upon the therapeutic value of hyoscyamine. He used in his experiments Merck's crystalline hyoscyamine, and arrived at the following conclusions concerning its use: That the action of hyoscyamine when given by the mouth is very uncertain and dangerous; that no curative action could be claimed for it, although it proved capable of moderating, in maniacs, violence of action and of soothing without causing sleep; that hypodermic injection was the only safe method of using the drug. The following formula was the one which was employed, but while satisfactory as regards strength, it was found to lack stability.

Hyoscyamine (Merck's crystallized) .	4 grains.
Glycerine and distilled water, of each	½ ounce.
Carbolic acid	2 minims.

Dissolve without heat.

Of this solution 4 to 8 minims are injected hypodermically. Dr. Browne states that it is very important to make the solution without heat, as heat renders the alkaloid nearly inert. He finds that the strength of any solution yet devised cannot be depended on for more than a month.

Dr. Chahbazian, of Paris, has recently been experimenting with Tanret's ergotinine (*Med. Times and Gazette*, Nov. 18, p. 624). He finds it to act more quickly than the so-called ergotine (watery extract) and that it does not cause local abscesses or indurations. The strength used for hypodermic injection was 5 to 10 minims of a solution of $\frac{1}{30}$th of a grain in 20 minims. Ergotinine is soluble in alcohol or chloroform, and insoluble in water; but the solvent used in the experiments is not stated. The activity of this alkaloid should be very great, seeing that only 3 grains are obtained from 1 lb. of ergot.

A case of strychnia poisoning is reported (*Lancet*, Oct. 28, p. 724), in which the symptoms were delayed by the action of laudanum taken at the same time. The doctor who attended it hints that opium might be used when chloral is not at hand. Except in the eastern counties (the case happened in Lincolnshire) laudanum is not more likely to be at hand than chloral, whereas tobacco, mentioned by Dr. Neligan as an antidote to strychnia, is almost always to be obtained easily and quickly.

Mr. J. D. Forbes has recently examined the potato beetle, *Doryphora decemlineata*, and finds that it contains a vesicating principle, which he has extracted in the form of a dark oily fluid; but no evidence of the presence of cantharidin has been detected (*Amer. Journ. Pharm.*, [4], xii., 550).

The *Lancet* (Oct. 28, p. 716) directs attention to a new styptic, which was discovered during the French expedition to Mexico. This remedy is a plant named *Tradescantia erecta*, which in a crushed or chewed state is said to possess the property of stopping any hæmorrhage, its action exceeding that of all styptics as yet known, as for example, perchloride of iron. A specimen was planted by the discoverer at Versailles, in 1867, and is said to retain its properties unimpaired by the difference of climate. This plant belongs to a natural order *Commelynaceæ*, remarkable rather for the mucilaginous than for the medicinal character of its members.

In the *Practitioner* (November, p. 327), Dr. Murrell gives an account of the action of white agaric (*Polyporus officinalis*) in the sweating of phthisis. After numerous experiments he has arrived at the conclusion that it is a good remedy, and that there are times when it may be used with advantage; but he much doubts if it is equal to atropia, picrotoxin, pilocarpine or Dover's powder. In small doses it is uncertain in its action, whilst in large doses it purges violently. The agaric was given in doses of 3 grains up to 30. The drug in 3 grain doses acted slowly, and not with certainty, 3 grains of extract, equal to 9 grains of the powder, acting better; whilst 30 grains purged violently. A tincture 1 in 6 and a fluid extract 1 in 3 have also been prepared. The active principle, agaricine, has been given in the dose of $\frac{1}{12}$ of a grain and was found to check cough and to promote sleep as well as to restrain sweating.

An "emplastrum impermeabile russicum" is being introduced upon the continent which is said to be likely to throw English plaster into the shade. It is described (*Pharm. Zeitung*, No. 89) as a white enamel-like ribbed membrane, made adhesive on one side by a coat of isinglass. A sample examined by Herr Dietrich was found, after removal of the isinglass, to dissolve in ether-alcohol to collodion, with a separation of a white powder which was recognized as zinc oxide. The collodion shaken with chloroform yielded a thick oily residue which proved to be castor oil. Herr Dietrich therefore thinks the probable method of making the plaster is to use a flexible collodion containing sufficient castor oil to bind some zinc oxide, afterwards to add collodion, and then to dip glass plates into this mixture two or three times, or until a sufficiently thick membrane has been deposited upon them; to this a coat of strong solution of isinglass is given, and the plaster, when dry, can be removed from the glass.

Some further information concerning the production of opium in the Zambesi district (see *Pharm. Journ.*, [3], viii., 1007; ix., 63) has been given by M. Guyot (*Comptes Rendus*, xcv., 798), who recently visited the locality. The cultivation, which is carried on at Chaïma, lying between the Muto and Quaqua rivers, was commenced in 1879, and now occupies about three hundred labourers. The collection of opium is effected about seventy-five days after the sowing of the poppy seed, and the yield appears to compare favourably with that usual in India. The product, in its viscous condition, is said to exhale an odour *sui generis*, but no particulars are given as to its average morphia strength; indeed the whole of it is stated to be sophisticated on the spot by the addition of 80 to 100 per cent. of a special matter the composition of which is known only to the European cultivators. The mixture is made up into balls weighing about 500 grams, which are packed in boxes at the bottom of which is a bed of powdered empty capsules and poppy leaves covered over with a layer of indigenous cotton. After the collection of the opium the capsules are allowed to completely ripen and then gathered for the sake of the seed.

According to a 'Commercial Report,' issued by Messrs. Sachsse and Co., several of the largest producers of citronelle oil have given up its production in favour of coffee cultivation, and the price is consequently expected to be higher. Lavender is said to have yielded a larger harvest than last year, and this has brought about a decline in price. The peppermint crop is reported to be an almost total failure, both in England and the United States.

At the drug sales this month, three bales of false buchu leaves, *Empleurum serrulatum*, and five bags of a new buchu with linear obtuse leaves, and also the leaves of *Barosma vulgaris*, were offered. A bag of a bitter bark, apparently that of a species of *Esenbeckia*, and some of which has on previous occasions been sold as Cusparia bark, was again placed on the market. Seventy-five bags of the stems of *Coscinium fenestratum* were offered as Colombo root, and some of the mouldy ipecacuanha, mentioned last month, after having been washed and dried, was again put up for auction. Adulterated matico was also offered for sale. Among the rarer drugs there were observed the following:—Korarina cardamoms, Ceylon cardamoms, condurango barks, salep, castoreum, and Yunnan musk.

Mr. N. Stevenson has recently utilized the electric light in a novel direction, by using a small incandescent lamp, fitted into a vulcanite cup, for illuminating the cavity of the mouth during dental operations. The vulcanite cup serves to keep the mouth open (*Lancet*, Nov. 25, p. 928).

In a paper presented to the Academy of Sciences (*Comptes Rendus*, xcv., 841), M. Delacharlonny describes a new ferric sulphate and its application to the making of blood manure. When blood is treated for this purpose with solution of ordinary ferric sulphate it is coagulated and forms a pasty mass that requires considerable evaporation before it is dry. A better effect is said to be produced by using an acid ferric sulphate, corresponding in composition to the formula $Fe_2O_34SO_3$, which is prepared by oxidizing ferrous sulphate with nitric acid, adding to the solution a sufficient quantity of sulphuric acid to make up the relative proportions, and concentrating, when it forms a crystalline mass. A solution of this salt, sp. gr. 1·4, added to fresh blood is said to convert it almost instantaneously into a stiff clay-like but elastic paste, from which most of the water drains away, leaving only a small quantity to be removed by expression or heat. The new salt forms a hydrate which crystallizes readily with twelve molecules of water.

Mr. E. H. Cook has contributed a thoughtful and interesting paper to the *Philosophical Magazine* ([5], vol. xiv., p. 387) on "Carbon Dioxide as a Constituent of the Atmosphere." The sources whence the air derives its carbon dioxide are taken as four, namely, (1) combustion of carbonaceous bodies; (2) respiration of animals; (3) decomposition of vegetable and animal substances; (4) volcanoes and other subterranean supplies. The author deduces from calculation and statistics that these four sources yield at least 50,000,000,000 kilogrammes of carbon dioxide daily. Further, he states that the amount of carbon dioxide in the atmosphere would be double what it is at present in about one hundred years if there were no means of compensation. The compensating influences are taken as three: (1) fixation of carbon by growing plants; (2) removal of dioxide by zoophytes; (3) absorption of dioxide by inorganic chemical actions. After making all allowances the author considers that terrestrial vegetation absorbs as much as 900,000,000,000 of kilogrammes of dioxide per day, an amount which is much greater than that produced from all sources taken together. Mr. Cook believes that the second compensating cause, although very powerful, seems rather to be one whose influence is only felt after the lapse of many years, and for activity cannot be equal to the first one. The third cause is apparently almost as great as the first, inasmuch as Dr. Sterry Hunt has shown "that a weight of carbonic dioxide equal to more than twenty-one times that of our present atmosphere would be absorbed in the production from orthoclase of a layer of kaolin extending over the earth's surface with a thickness of 500 metres, an amount which evidently represents but a small proportion of the results of felspathic decay in the sedimentary strata of the globe." Reliable data are not available for definitely answering the question as to the maintenance of a constant proportion of carbon dioxide in the atmosphere. The author, however, inclines to the belief that the causes at work removing atmospheric dioxide are more powerful than those producing it, and that the greater part of this so removed is becoming fixed in the earth's crust. The question as to the source of the immense quantities already fixed in this way is still left an open one. Brongniart has suggested that it all at one time formed part of the atmosphere of the globe. Dr. Sterry Hunt considers that a universal atmosphere of the same quality as that of the earth's exists, from which the carbon dioxide now fixed in the earth's crust has been derived. It is pointed out that if Dr. Hunt's hypothesis be a correct one it is interesting to remember that the carbon contained in our bodies may have existed at one time as a portion of the body of an inhabitant of the most distant member of the universe.

In the course of the past month the Council of the Royal Society has made known its decision as to the award of medals for the current year. The Copley medal goes to Professor Cayley, for his researches in pure mathematics, and the Rumford medal to Captain Abney, for his investigations in connection with photography. One Royal medal is awarded to Professor W. H. Flower for zoological work and another to Lord Rayleigh for his papers on mathematical and experimental physics. Lastly, the Davy medal is to be presented in duplicate, the recipients being Professors D. Mendelejeef and Lothar Meyer, in recognition of their discovery of the periodic relations of the atomic weights.

A NEW FORM OF APPARATUS FOR ESTIMATING AMMONIA IN POTABLE WATERS.*

BY C. R. TICHBORNE, LL.D., F.C.S., ETC.

According to the generally accepted method of examining potable waters, the estimation of minute traces of ammonia existing as such, and the ammonia which results from the oxidation of nitrogenous organic matter, are looked upon as being of the greatest importance in arriving at a conclusion as regards the quality of the water. The process may be concisely described as distilling off a third of the water, and estimating the ammonia in the distillate by Nessler's delicate process, which leaves nothing to be desired as regards its accuracy.

As the amount to be determined does not much exceed 1 part in 10,000,000 parts, it is evident that is it necessary to avoid any accidental contamination from atmospheric ammonia. This is particularly the case in chemical laboratories, where ammoniacal solutions are constantly undergoing evaporation, and the air is contaminated with that volatile base.

The fact is, of course, well recognized by all expert analysts, and is generally guarded against by the use of a special cupboard or chamber, in which the whole operation can be performed. Such a method is more or less imperfect, because the gas-burner used will itself, under certain conditions, become a source of ammonia. Also, it is evident that a general ammoniacal atmosphere in the adjacent laboratory will find its way into the chamber by the ordinary laws of diffusion.

The capacity of the vapour of water (when in the act of condensing) of absorbing traces of ammonia is something extraordinary, and can only be appreciated by the practical worker.

In distilling potable waters, I was accustomed to work with an ordinary retort and receiver—the latter being provided with a specially-contrived mercurial valve. Now, although this was satisfactory in closing the interior of the retort and receiver from general contact with atmospheric impurities, occasionally a regurgitation would take place, and admitted a little of the laboratory air.

The following arrangement has been lately adopted by myself, and, both as regards simplicity and efficacy, leaves nothing to be desired. It is, in fact, so simple that, to a superficial observer, my communication might at first sight appear superfluous, but the importance of the question involved renders any apology unnecessary.*

At ordinary temperatures very weak solutions of ammoniacal gas (such as we have to deal with in the analysis of potable waters) are fairly permanent; but, in the gaseous conditions, owing to the different tensions of the vapour of water and ammonia, this stability no longer exists. Again, small traces of ammonia in the gaseous condition are instantly absorbed by water in the non-gaseous condition. These are the two equal sources of error to be guarded against in the distillation of ammonia from potable waters, and, bearing these two points in view, I adopted the arrangement figured on the next page.

It consists of a retort fitting into a fairly long-necked receiver, with an india-rubber stopper. The arrangement must be air-tight. The receiver is connected with a bent tube proceeding from its stopper, and connecting it with two bulb tubes of a special form, and marked respectively "A" and "Z." This marking is to prevent any confusion in the hurry of manipulation, as they are exactly the same shape. The bulb tubes are somewhat, similar to a flat Liebig's potash bulb, but with two pear-shaped bulbs on each side, to prevent regurgitation of the fluid, and three absorption bulbs at the bottom. The centre bulb of these three is provided with a glass tap for filling and emptying the apparatus.†

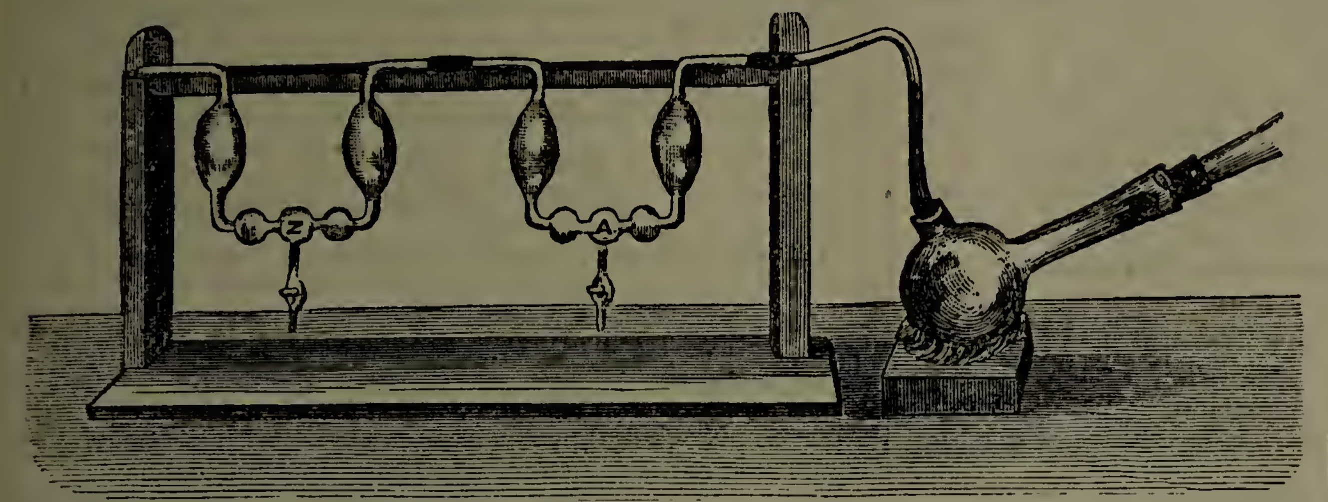
The water to be examined is poured into the retort and one-third distilled over gently, but at a fairly good rate. If operating upon half a pint, the operation should take about one hour. The whole apparatus is previously connected together, and the two bulbs are filled with

* Paper read before the Royal Dublin Society, February 20, 1882. From the *Scientific Proceedings* vol. iii., part v.

* One of the recent important works upon chemistry, is Roscoe and Schorlemmer's 'Treatise on Chemistry.' In that book there is a description of the determination of ammonia in potable waters, but there is no provision against this fruitful source of error. If the determination were carried on as it is figured at page 252, vol. i., of that work, the results would be utterly unreliable in any laboratory where other analyses were being performed.

† Bulbs of my pattern are made by Messrs. Cette and Co., of London.

water free from ammonia (*i.e.*, water which has been boiled rapidly in a flask, until it gives no reaction with



the Nessler reagent). The bulbs are easily filled by opening the tap, inserting the point of the tap tube into a beaker of the water, and sucking with the breath gently—at the same time, stopping the other end of the bulb tube by the finger.

After the operation is completed, the most of the ammonia, if not all, is present in the receiver, whilst any vapour which might have escaped therefrom is caught in the tube "A;" at the same time, any atmospheric ammonia which enters by regurgitation is caught in the bulb tube "Z." "A" is run into the distillate in the receiver, whilst "Z" is rejected. In practice, it is not necessary that the water in "Z" should be changed for twenty or thirty operations, providing that an increased amount of ammonia is not about in the laboratory atmosphere; but if so, it is desirable to change with each experiment.

If we consider the points that I have dwelt upon as being sources of error, we shall see that this simple apparatus fulfils absolutely the necessary conditions, and that the tube connecting the bulbs "A" and "Z," *contains an atmosphere perfectly neutral as regards ammonia*, because it is the space between two liquids which do not give off ammoniacal gas, and which give off vapour of an equal tension.

I may mention that, on submitting it to experimental proof, the use of an acid in either of the bulb tubes proved a mistake.

It is not necessary to give further details, but I may as well state that in many crucial experiments, I have been in the habit of estimating the amount of ammonia in the receiver, and both bulbs "A" and "Z." The following, as regards Vartry water, will serve as an illustration:—

Distillate in receiver	0·003 per 100,000.
Bulb "A" (nearly)	0·001 "

Bulb "Z" gave an indication which affected the Nessler, but which was not sufficient to estimate.

A SUMMARY OF THE CINCHONA BARKS OF COMMERCE.*

BY WILLIAM ELBORNE,

Assistant Curator of the Museum of the Pharmaceutical Society of Great Britain.

The important genus Cinchona gives its name to the order of which it is a member, namely, *Cinchonaceæ*. Botanically the genus includes trees of various sizes, some reaching an altitude of 80 feet and upwards, with evergreen leaves and deciduous stipules. The flowers are of a white or pinkish colour, very fragrant and arranged in panicles. The corolla is salver shaped, and nearly, if not quite, conceals the five stamens. The ovary is crowned with a fleshy disc; the style simple; the stigma two-cleft. The fruit is an ovate capsule, grooved on both sides, crowned by the limb of the calyx, and dehiscing from below upwards, in order to allow of the escape of the numerous winged seeds, which latter peculiarity is especially characteristic of the order. According to the enumeration of Bentham and Hooker, thirty-six species have been distinguished; but of these not more than about a dozen have been economically utilized as furnishing the commercial cinchona, or Peruvian bark. The plants are natives of the western mountainous regions of South America, their geographical range extending from 10° N. to 22° S. lat.; and they flourish generally at an elevation of from 5000 to 8000 feet above the level of the sea, although some have been noted as growing as high as 11,000 feet, and others have been found down to 2600 feet. Of the commercial barks there are several varieties They are as follows:—

I.	*C. officinalis*, var. *a*, *Condaminea* " " *b*, *Bonplandiana* " " *c*, *crispa*	yielding crown bark.
II.	*C. succirubra* (Pavon)	yielding red bark.
III.	*C. lancifolia* *C. cordifolia*	yielding Colombian bark.
IV.	*C. Pitayensis*,	yielding Pitayo bark.
V.	*C. nitida* *C. micrantha* *C. Peruviana*	" grey bark.
VI.	*C. Calisaya*	" yellow bark.
VII.	*Remijia Purdieana* " *pedunculata*	yielding Cuprea bark.

The official barks of the British Pharmacopœia are four in number:—(1) The pale Loxa or crown bark (*cortex cinchonæ pallidæ*), yielded by *Cinchona officinalis*; (2) The yellow or Calisaya bark (*cortex cinchonæ flavæ*), the produce of *C. Calisaya*; (3) The red bark (*cortex cinchonæ rubræ*), derived from *C. succirubra*; and (4) Colombian bark, *C. lancifolia*, directed to be used as a source of quinine. These are the sources of the tinctures, extracts and other preparations, while, in common with several others, they also yield the alkaloids which now constitute the chief form in which the active principles of the barks are administered in medicine. Their great value depends upon the presence of these alkaloids, viz., quinine, quinidine, cinchonine and cinchonidine, which exist principally in the cellular tissue outside the liber, in combination with kinic and tannic acids. It is found that certain barks contain more of one principle than of another; hence their greater or less commercial value, and the skill and complex knowledge required by the manufacturer to distinguish the different varieties. The *C. Calisaya*, *C. officinalis* and *C. lancifolia* from Colombia are species rich in quinine, which, in the form of sulphate, is the alkaloid most extensively employed in medicine. Among the other barks used as sources of quinine, etc., the principal are:—Colombian bark, *C. lancifolia*; Pitayo bark, *C. Pitayensis*; grey or Lima bark, *C. micrantha*, *C. nitida* and *C. Peruviana*; and a variety of Carthagena bark, *C. lanceolata*. In addition to quinine the *C. Pitayensis* specially contains quinidine, the *C. succirubra*, cinchonidine, and the *C. nitida*, *C. micrantha* and *C. Peruviana*, from the Huanuco region, cinchonine. These alkaloids, extracted from the barks, are recognized by their several distinctive chemical characteristics, while the barks producing them are likewise distinguished by a careful scrutiny of their external appearance, the lichens, etc., growing on them, the way in which they break, their taste and odour, as well as by their microscopical and chemical characters. The manner in which barks break transversely, or their fracture, as it is termed, depends

* Paper read before the Chemists' Assistants' Association.

on their anatomical structure, and affords an important criterion of the quality of the bark, cellular tissue breaking with a short or smooth fracture, woody tissue with a fibrous fracture. The best characteristics by which barks containing much quinine may be distinguished are the shortness of the fibres which cover the transverse fracture and the facility with which they may be detached, instead of being flexible and adhering as in bad barks. Thus when dry Calisaya is handled a quantity of very small splinters run into the skin causing much irritation, and this forms one of its distinguishing marks. The importance of cinchona barks in medicine renders it necessary to give some account of the manner in which they are collected and dried in their native forests and prepared for exportation. The following notice has been extracted, therefore, chiefly from Weddell and Markham.

The hardships of bark collecting in the primeval forests of South America are of the severest kind, and undergone only by the half-civilized Indians and people of mixed race, in the pay of speculators or companies located in the towns. Those who are engaged in the business, especially the collectors themselves, are called *Cascarilleros,* from the Spanish word *Cascara,* meaning *bark.* A *major-domo* at the head of the collectors directs the proceedings of the several bands in the forest itself, where provisions, and afterwards the produce, are stowed away in huts of light construction.

The cascarillero, having found his tree, has usually to free its stem from the luxuriant climbing and parasitic plants with which it is encircled. This done he begins in most cases at once to remove, after a previous beating, the sapless layer of outer bark. In order to detach the valuable inner bark, longitudinal and transverse incisions are made as high as can be reached on the stem. The tree is then felled and the peeling completed. In most cases, but especially if previously beaten, the bark separates easily from the wood. In many localities it has to be dried by a fire made on the floor of a hut, the bark being placed on hurdles above, which proves a serviceable arrangement. In Southern Peru and Bolivia, however, even the thickest Calisaya bark is dried in the sun, without requiring the aid of a fire. The thinner bark as it dries rolls up into tubes or quills, while the pieces stripped from the trunks are made to dry flat by being placed one upon another and loaded with weights. The bark of the root was formerly neglected, but is now in several instances brought into the market. After drying, the barks are either assorted, chiefly according to size, or all are packed without distinction in sacks or bales. In some places, the bark is even stamped, in order to reduce its bulk as much as possible. The dealers in the export towns enclose the bark in *serons* of raw bullock-hide, which, contracting as it dries, tightly compresses the contents of the package (100 lbs. or more).

The ports to which bark is conveyed for shipment to Europe are not very numerous. Guayaquil, on the Pacific Coast, is the most important for produce of Ecuador; Pitayo bark is largely exported from Buenaventura in the Bay of Choco, further north.

Payta, the most northerly port of Peru, and Callao, the port of Lima, likewise export bark, the latter being the natural outlet for the barks of Central Peru, from Huanuco to Cusco. Islay, and more particularly Arica, receive the valuable barks of Carabaya and of the high valleys of Bolivia. Among other ports may be mentioned Santa Marta, Savanilla and Maracaibo.

Our imports for 1881 and 1880 were thus made up:—

	1881.	1880.	
Calisaya . .	7,020	6,580	serons and cases.
Soft Colombian, New Granadian Pitayo.	87,200*	44,500	„ „ bales.

* This includes cuprea, the imports of which, in 1881, were 60,000 packages.

	1881.	1880.	
Carthagena .	5,720	6,480	serons and bales.
East Indies and Ceylon	15,400	20,690	„ cases and ballots.

The receipts in America, mainly direct from Colombia and New Granada, were as follows:—

1881.	1880.	
31,400	32,800	serons and packages.

The imports into France were also thus made up:—

	1881.	1880.	
Calisaya . .	9,915	8,590	packages.
Colombian, etc.	16,550	11,580	„

From the above tables it is noticeable that the richer barks still continue to be consigned to England.

The reckless system of bark cutting in the forests of South America, which has resulted in the utter extermination of the tree from many localities, has, within recent years, aroused the attention of the Old World, and at length prompted serious efforts to cultivate the tree on a larger scale in other countries. The enterprise undertaken by Markham in 1859, of introducing the cultivation of Peruvian bark trees into British India and Ceylon, is now an assured success. During twenty years the enterprise has since steadily progressed. There are now more than 900 acres under cinchona cultivation in the Government plantations on the Nilgiri Hills, besides 4000 acres of private plantations on the Nilgiris, in Wainad, Coorg, and other hill districts of Southern India. In British Sikkim the Government plantations cover an area of 2242 acres. The annual bark crop from the Government plantations of British India alone is already 500,000 lbs. In 1879–80 the quantity of bark sold in the London market, from British India and Ceylon, was 1,172,060 lbs. Moreover, the East India source of bark supply is now a most important one as regards both quantity and quality. Thus the whole enterprise of introducing all the valuable cinchona species from South America into India, Ceylon and Jamaica, has been made complete in all its parts, and as at present *C. succirubra* and *C. officinalis* greatly preponderate, these species will form the main sources of the future bark supply from India.

The methods adopted in India of harvesting the bark are also worthy of comment, as they have proved a means of considerably increasing the yield of alkaloids. They comprise the two different systems known as "mossing" and "coppicing." The "mossing" system consists in longitudinally stripping eight-year old trees of their bark at intervals of about 2 inches apart, winding moss all round the decorticated parts and tying it on with fibre. At the end of six or twelve months the strips of bark left untouched at the first stripping are removed, and the intervals they occupied on the trunk are mossed. At the end of twenty-two months, on an average, the spaces occupied by the bark originally taken are found to be covered with *renewed* bark, much thicker than the natural bark of the same age, and this renewed bark can be removed and a fresh process of renewal again be fostered by moss. The enrichment of the renewed bark is said to be at the expense of the bark outside the mossed region; and also that the renewal is prevented or much retarded by the least injury to the cambium layer. The protection from light afforded by the moss also has been proved to increase the supply of alkaloid.

The "coppicing" system consists in cutting down the trees near the ground and allowing one or more of the young crops of the shoots which rise from the stumps to grow. The trees are barked at the proper season by coolies, to whom the felled stems and branches are made over as soon as they are cut. Provided with a stout knife, the coolie first marks the bark off into long narrow strips by putting his knife under it and pressing upwards. The end being freed, the remainder of the strip readily comes off; the bark is then laid to dry in sheds fitted with open shelves made of split bamboo.

Of the barks used in pharmacy, as before stated, four in number are official in the British Pharmacopœia. Of these, *C. officinalis*, *C. succirubra* and *C. Calisaya* are the sources from which the pharmaceutical preparations are directed to be made, while *C. lancifolia* is alluded to as a source of quinine. The following is a brief description of the distinguishing characters of these important barks:—

Cinchona Officinalis, Pale Cinchona, Loxa or Crown Bark (*Cortex Cinchonæ Pallidæ*).—This species is a native of Ecuador and Peru, existing under several varieties. It forms a large tree having lanceolate leaves, usually pointed, glabrous and shining on the upper surface. The flowers are small, pubescent, and in short panicles and are succeeded by oblong or lanceolate capsules, ½ an inch or more in length. The bark yielded by this tree, which formerly was the ordinary Peruvian bark of English medicine, is only found in the form of quills, which are occasionally as much as a foot in length, but more often in fragments of a few inches. The quills are from ⅜ to ¼ of an inch in diameter, having a blackish-brown or dark-grey external surface, variously blotched with silver-grey, and frequently covered with large and beautiful lichens. The surface of some of the quills is longitudinally wrinkled and moderately smooth, but in the majority it is distinctly marked by transverse cracks. The inner side is closely striated and of a bright yellowish brown.

The bark breaks easily with a fracture which exhibits very short fibres on the inner side. Though chiefly afforded by *Cinchona officinalis*, other species occasionally contribute to furnish the Loxa bark of commerce, as shown in the table above. Owing, however, to the bark having become nearly extinct in its native regions, at the present day it is scarcely possible to obtain genuine Loxa or crown bark from South America; the immense plantations on the Nilgiri Hills of Madras, in the Sikkim Himalayas and elsewhere in India, Ceylon, and Jamaica, are at present the chief sources of the bark in commerce.

The analyses of Howard show that the different varieties of crown bark vary much in the proportion of alkaloids they contain, South American bark yielding on an average ·5 to 1 per cent. of alkaloids, while the Indian bark yields as much as 4·30 to 5 per cent., consisting principally of quinine, and next in order cinchonidine and cinchonine. It might also be noticed here that the official pale bark of the United States Pharmacopœia also includes the kind of bark which is derived from *Cinchona micrantha*, a bark which was formerly official in the Edinburgh and Dublin Pharmacopœias under the name of *Cinchona cinerea*, and which is known to commerce as grey or Huanuco bark.

Cinchona Succirubra, Red Bark (*Cortex Cinchonæ Rubræ*). The tree yielding this species, although formerly growing in all the valleys of the Andes, is now almost entirely confined to the forests of Guaranda on the western declivities of Chimborazo, at 2000 to 5000 feet above the level of the sea. The tree has broadly ovate leaves attaining about a foot in length, nearly glabrous above, pubescent beneath, and large terminal panicles of rose-coloured flowers, succeeded by capsules from 1 to 1¼ inch long. Red cinchona bark occurs in quills and flat pieces. The quills vary in diameter from ¼ to 1½ inch, and in length from 4 to 12 inches or more. The so-called flat pieces are frequently slightly incurved, from 1 to 5 inches broad, ⅝ of an inch in thickness and about 2 feet in length. Red cinchona bark is generally coated and consists of liber, the cellular and tuberous coats, and usually more or less of the epidermis; its outer surface is generally rough, furrowed and frequently warty. The colour of the epidermis varies; in the thinner quills it is reddish-brown; in thick quils and flat pieces it varies from a reddish-brown to a chestnut-brown, frequently with a purplish tinge. Cryptogamic plants are not so frequent on this as on some other kinds of bark. The cellular coat of the flat pieces is very thick and spongy, much more so than in yellow cinchona bark. The inner surface of the quills is finely fibrous, giving a comparatively smooth fracture, while the fracture of the flat pieces is both fibrous and splintery. As to the proportion of alkaloids in red bark, the thick flat sort contains only 3 to 4 per cent. of alkaloids, but a large amount of red colouring matter. In reference to the brick-red colouring matter which, as Ruiz observes, is not found in the growing plant, but in the dried bark, Mr. J. E. Howard considers that it is really an excretory product of vegetation, a part used up and brought by contact with the air into a state in which it can no longer be serviceable to the living plants, and from which it still degenerates by a still further degeneration into *humus*. The pieces of flat red bark possessing the finest colour are generally remarkable for their specific lightness, having a texture analogous to that of wood that has lost its firmness by incipient decay. Indeed, it is by a process of *eremacausis* that the red bark acquires its colour, the cinchotannic acid in which it abounds having become oxidized and changed into cinchona red, and under these conditions the alkaloids also appear to undergo some corresponding alterations. They are now implicated with resin, which appears to have also become oxidized so as to act the part of an acid, and is with difficulty separated. But the most remarkable feature is the altered conditions of the alkaloids themselves. Quinine, which formed a considerable portion of the whole, is now greatly diminished, while cinchonine and cinchonidine remain much the same. The quill red bark of the Indian plantations is a much better drug, some of it yielding 5 to 10 per cent. of alkaloids, less than a third of which is quinine and a fourth cinchonidine, the remainder being cinchonine and sometimes traces of quinidine.

The experiments of Mr. J. E. Howard and others have also proved that the bark of the root contains a larger proportion of alkaloids than that of the stem; and further that the proportion of alkaloid diminishes as we go up the stem to the branches.

Mr. David Howard has also shown that the nature of the alkaloid varies according to the part of the tree from which the bark has been taken.

Cinchona Lancifolia, Soft Colombian.—Of the barks not used in pharmacy the most important are afforded by *C. lancifolia* and *C. Pitayensis*, natives of the Cordilleras of Colombia. These barks are largely imported and used for making quinine, the former under the name of soft Colombian, Carthagena or Caqueta bark. The bark of *C. lancifolia* varies much in appearance, but is generally of an orange-brown; the corky coat, which scales off easily, is shining and whitish. It also often occurs in more or less curved or quilled pieces of tolerable thickness, having externally the remains of a whitish silvery epidermis; but their greatest distinguishing character is their very fibrous fracture. Their anatomical structure, according to Hanbury, agrees, in all varieties, in the remarkable number of thick-walled cells of the middle cortical layer and the medullary rays. In percentage of alkaloids, Carthagena barks are liable to great variation.

The *Pitayo* barks are restricted to the south-western districts of Colombia, and are usually imported in short flattish fragments or broken quills. The middle cortical layer exhibits but few thick walled cells; the liber is traversed by very wide medullary rays, and is provided with but a small number of widely scattered liber fibres, which are rather thinner than in most other cinchona barks. The Pitayo barks are usually rich in alkaloids, quinine prevailing. *Cinchona Pitayensis* is one of the hardiest species of the valuable cinchonas, and is, therefore, particularly suitable for cultivation, which, however, has not been carried out as largely as that of either *C. officinalis* or *C. succirubra*. The hard Colombian bark of commerce, which occurs usually in flat pieces and also in quills, is obtained from *C. cordifolia*. The quills are usually large, heavy and without periderm, with a fracture not so fibrous as that of *C. lancifolia* (soft Colombian bark). The flat pieces are thin, hard, somewhat curved, with the remains of a white periderm.

In reference to the *grey* barks of commerce, *C. micrantha, C. nitida* and *C. peruviana*; they abound in the province of Huanuco, which is their principal source, and are all imported under the name of Huanuco or grey bark. The name of grey bark refers to the striking effect of the overspreading thallus of various lichens belonging to the order *Graphideæ*, forming groups, and indicating that the trees have grown in an open situation, exposed to rain and sunshine. These barks occur in quills and flat pieces; the former are eagerly sought after by manufacturers on the continent, while the flat pieces are just as readily sought for here, because they very much resemble in appearance the flat calisaya, for which at present they are very extensively substituted on account of the great scarcity of the latter. They each yield from 2 to 3 per cent. of cinchonine and cinchonidine, with scarcely any quinine.

Cinchona Calisaya, Yellow Bark (Cortex Cinchonæ Flavæ).—This valuable species was discovered by the late Dr. Weddell in 1847. It grows in the valley forests on the borders of Bolivia and South Peru (Carabaya). The bark was formerly imported in serons, principally from Arica, the nearest port to the Bolivian district of La Paz, where it was chiefly collected; but the supply of calisaya bark from its natural habitats is at the present time very uncertain. The cultivation of this bark in India has not been hitherto so successful as that of *C. succirubra* and *C. officinalis*, although recent accounts have been more favourable. For its introduction to India, as well as that of other species of Cinchona, we are more particularly indebted to Mr. Markham. Two varieties of this bark are distinguished in commerce—flat and quilled.

Flat Calisaya.—The pieces of this bark are flat, or nearly so, as their name implies. They are generally uncoated, consisting almost entirely of liber, which is sometimes ⅓ or nearly ½ an inch thick. Their texture is compact and uniform; the transverse fracture is finely fibrous, the fibres being short and readily detached, so that when this bark is handled it causes much irritation. Externally the colour is slightly brownish-tawny yellow, frequently interspersed with darker patches; the surface is marked by shallow longitudinal depressions, commonly termed digital furrows, which are caused naturally on separating the periderm from the liber, and not by the instrument used in detaching it as formerly supposed. Internally the surface has a wavy fibrous appearance; the taste is very bitter—the bitterness being gradually developed on chewing. The bark of the root is readily known from that of the trunk and branches, by occurring in short more or less curved or twisted pieces. Calisaya bark is the best of all the cinchona barks; but little, however, is now obtained from South America, our supplies being chiefly derived from plants under cultivation in India and Java. One variety of *Cinchona Calisaya*, which has been more especially cultivated in Java, and known as var. *Ledgeriana*, yields a bark of extraordinary richness in alkaloids.

Calisaya bark is remarkable for the large amount of quinine it contains, good qualities yielding at least 5 or 6 per cent. of this alkaloid.

Amongst other valuable barks which occur extensively in the market must be mentioned cuprea bark and the bark from *C. pubescens*, a variety of *C. robusta*.

The *cuprea bark*, which of late has been imported in enormous quantities, is furnished by two very distinct regions, viz., the base of the great eastern branch of the Cordillera of the Andes, and the valleys of the Rivers Meta and Guavire, affluents of the Orinoco. The centre of exportation is Bacaramanga, in the State of Santander. Cuprea bark is yielded by trees belonging respectively to at least two distinct species which, though nearly allied, are yet different from each other, and belong to the genus *Remijia*, which comes very near that of *Cinchona* and to the closely allied genus, *Cascarilla*. These species are *Remijia Purdieana* and *Remijia pedunculata*, Triana. The resemblance between the barks of the two species is very great and it would be difficult to find characters sufficiently marked to distinguish them. They are both, in fact, hard, very compact, relatively heavy, the inner surface smooth and of a wine-red colour; the epidermis is thin and striated longitudinally. The cuprea bark which yields cinchonamine is, however, heavier and more compact and more filled with red resinous colouring matter, and its fracture generally appears to be horny. The yield of quinine from cuprea barks varies between 1 and 2 per cent., according to the conditions of vegetation of the trees, which have not yet been sufficiently studied. From a chemical point of view, the characteristic and remarkable feature which distinguishes the cuprea barks from the true cinchonas is the absence of cinchonidine and the presence of a peculiar alkaloid called homoquinine or ultra-quinine, the salts of which very closely resemble those of quinine.

Cinchona pubescens.—This valuable bark is taken from a hairy leaved tree, believed to be a hybrid between *C. Calisaya* and *Cinchona officinalis* and on that account was at one time called *C. officinalis*, var. *pubescens*. The tree produces enormously thick bark and is one of very rapid growth. In a letter to Mr. Howard, Mr. McIvor writes, "If under all conditions this bark be found to yield 12 per cent. of alkaloids consisting of 6 per cent. quinine sulphate, it is certainly the best plant we can grow, being hardy and of rapid growth, and perfectly free from canker and other diseases to which the *Calisaya* and *Officinalis* are liable." The appearance, therefore, of these extraordinary plants, with their enormous yield, indicates the importance of cultivators paying close attention to the phenomena of hybridization and of studying the subject with a view of further improvement.

Pharmacy.—In the opinion of pharmacists the bark most suitable for medicinal use is the *Cinchona succirubra*, and as I have the privilege of addressing those directly or indirectly connected with pharmacy, it would not, perhaps, be out of place to mention the cause of this preference and the names of the writers who speak the strongest in its favour.

Mr. Holmes, in a paper read some time ago, pointed out that the red bark supply would in all probability be always equal to the demand on account of its growing at a much lower elevation, and consequent distribution over a much wider area, the amount of that bark grown was greater comparatively than of the other cinchonas. Mr. Holmes also pointed out that it could be procured of good quality, that it contains all the alkaloids with the exception of aricine, and that it was less liable to be mixed with hybrids, on account of its characteristic appearance.

Professor Flückiger also suggests the use of *Cinchona succirubra*, in 'Pharmacographia;' and both Mr. Umney and Mr. R. W. Giles have repeatedly pointed out the unsatisfactory results of using the yellow barks for pharmaceutical preparations.

Dr. de Vrij, some months ago, published a form for the preparation of red bark extract; the advantages it claims over most of the extracts now met with are its easy mode of preparation, and especially the production of a clear solution when it is mixed with water.

In conclusion, I have to thank Mr. Holmes for much valuable information and for the use of the Museum specimens, also Mr. W. E. Crow, one of the present Bell Scholars, for many useful suggestions. For much of the information contained in this paper I am also indebted to the following works:—Howard's 'Nueva Quinologia,' Markham's 'Peruvian Bark,' Bentley and Trimen's 'Medicinal Plants,' Flückiger and Hanbury's 'Pharmacographia.'

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THE ABUSE OF NARCOTICS.

THE report on page 456, of an inquest held a few days since at Croydon, furnishes another instance of the lamentable spread of the habit of opiate drinking to which we have frequently called attention in these columns as having undoubtedly been greatly fostered by the present lax state of the law in regard to the sale of poisons under the guise of patent medicines. If, too, it correctly represents what took place at the inquest it well illustrates the mischievous rubbish which is sometimes talked when witnesses and jurymen are under the temporary excitement caused by such an inquiry. For, supposing that the statement of the medical witness be correct, that the bottle found near the deceased originally contained one hundred grains of chloral hydrate, as well as his speculation that the deceased had made up this quantity by going to different chemists and obtaining small quantities from each, apparently by the use of a prescription, it is not evident how this warrants the denunciation of chemists or the assumption that they supply drugs of the description of chloral in a wholesale fashion to any person who asks for them. It seems to us to be rather a matter for comment that a woman known to have been in the habit, for several years past, of taking chloral hydrate "to quiet her nerves" should have been in possession of a prescription ordering an indefinite quantity of that narcotic. Certainly if, armed with such a document, the deceased had to go to several chemists before she could make up the hypothetical one hundred grains, it cannot be justly said that the dispensers did not exercise the "discretion" which seems to have been wanting in the writer of the prescription.

But quibbling as to whether as much as one hundred grains of chloral hydrate was or was not jointly supplied on a prescription by several chemists is mere child's play in the face of actual facts. It is well known that under the cover of the patent medicine stamp narcotics quite as powerful and dangerous may be bought in unlimited quantity, even from grocers, drapers and "stores." An important paper upon the subject, recently read before the Border Counties Branch of the British Medical Association by Dr. HENRY BARNES, and published in the *British Medical Journal* last week, opportunely illustrates the growth of this traffic. A hospital nurse, aged twenty-four, who came under the author's notice, was suspected of indulging in some narcotic in excess. Upon being questioned she admitted that she was in the habit of taking chlorodyne, and that in less than seven weeks, during which she had been employed in the hospital, she had squandered nearly twenty pounds on its purchase. This confession was confirmed by the presence in her box of fifty-four empty chlorodyne bottles, and she admitted having thrown away half as many more. Those found consisted of one of the 11*s.* size, thirty of the 4*s.* 6*d.* size, fifteen of the 2*s.* 9*d.* size, and eight of the 1*s.* 1½*d.* size, representing together 91½ ounces. She stated that the 11*s.* bottle lasted little more than twenty-four hours, and that her usual dose was a 4*s.* 6*d.* bottle. With this experience, Dr. BARNES calls attention to the fact that this preparation, extensively advertised as it is and having a large sale as a patent medicine, is "said to consist of morphia, hydrocyanic acid, "chloroform and probably also Indian hemp and "belladonna, or its alkaloid, atropia, with some "other ingredients of a less active nature, used to "disguise its real nature and make it palatable." And yet this preparation, containing, if this statement as to its composition be true, five poisonous ingredients, four of which are scheduled poisons, is not even labelled as being poisonous in its nature, and is sold not only by druggists, but even by grocers and miscellaneous patent medicine vendors. Indeed, Dr. BARNES mentions that he recently obtained a specimen from one of the latter class, in whose trade list he found, as an additional recommendation, a statement that he sold it at lower prices than were charged by his neighbours, the duly qualified pharmacists. Of course, the value of the particular preparation referred to in this case, when properly used, is not in question, and the fact that it is issued under the auspices of a gentleman whose name is on the Medical Register, and that it has received a *quasi* endorsement in the prescriptions of other medical gentlemen, is a mere accident. Its position in respect to the law regulating—or rather not regulating—its sale would be the same if it were any one of the numerous class of compounds with eccentric names, which are so extensively advertised as soothing syrups, cordials, carminatives, cough tinctures and essences, though it might be the poisonous concoction of the most ignorant charlatan, and its proprietor a bootmaker or tailor, whose only evident skill was shown in his success in hiding its capability for harm. The point is that the trade in these preparations—whether skilfully prepared or not—is at present carried on under conditions that not only favour, but invite, the widest and most indiscriminate use of powerful opiates by the public.

Impressed with the great increase in the number of victims to the habit of taking narcotics, Dr. BARNES, in his paper, discusses what steps should be taken to aid in weaning them from their be-setting vice, and with this object he passes in review the poison clauses of the Pharmacy Act, 1868, which he says "was intended to prevent the public from obtaining unlimited supplies of poisonous drugs." Without quite accepting this statement as to its *raison d'être*, we feel warranted in saying that those entrusted with the carrying out of the provisions of the Act will be glad if it can be utilized in combating the growing evil. Dr. Barnes appears to think that the provisions of the Act with respect to the sale of poisons should be made more stringent, and that the distinction as to the two parts of the schedule of poisons should be abolished, or at least that the regulations enforced in the sale of poisons in Part 1 should be extended to chloroform, chloral hydrate and preparations containing morphia. It is not, however, at all clear how this would affect the sale of narcotic "patents." His remarks appear to us to be more to the purpose when he refers to the necessity—which we have before alluded to in speaking of the Croydon poisoning case—for watchfulness on the part of physicians as to the purposes for which their prescriptions may be used. He refers to a prescription of his own, for a mixture of equal parts of spirit of chloroform and tincture of cardamoms, which he was startled one day to find had been repeated to the extent of fifty ounces in eighteen days, when his attention appears to have been drawn to the matter by a pharmacist. Dr. Barnes is, in consequence, disposed to urge that prescriptions containing narcotics should not be repeated more than a certain limited number of times without revision by the prescriber. We have already expressed our opinion that, considering the general feeling of the public in regard to this question, the first step in this direction must be taken by medical men, and that it is especially within the province of prescribing medical practitioners to impose such limitations upon the use of their prescriptions as they may deem fitting and may be able to obtain their patients' assent to.

It may be remarked in conclusion that a parliamentary return, just issued, showing the quantity of opium annually imported into the United Kingdom, has considerable significance in respect to this question. It shows that the quantity of opium imported during the year 1881 was 793,146 lbs., or nearly double as much as was imported in 1880 and nearly four times as much as in 1860. Of this rather more than one half (401,833 lbs.) was re-exported, so that the quantity retained in this country nearly equalled the entire imports of the preceding year.

PHARMACY IN TASMANIA.

A correspondent, writing respecting the laws regulating the practice of pharmacy in Tasmania, informs us that the sale of poisons and all medicines in that colony is carefully restricted to the registered chemists, the only exemption made being in favour of the wholesale vending of medicines. Possession of the Minor qualification of the Pharmaceutical Society of Great Britain entitles the holder to registration; otherwise a person has first to pass an examination conducted by a medical board, acting under the provisions of the Tasmanian Medical Act; this is described as a tolerably good practical examination. Our correspondent adds: "It is quite refreshing to escape the contagion of the "'stores,' and to feel once more that he is getting "a decent remuneration for his exertions."

EXPLOSION IN AN ETHER FACTORY.

On Sunday evening last a tremendous explosion, followed by a fire, occurred at Mr. Polglase's Tyneville Chemical Works, Newcastle, due to the boiling over of a still containing ether, which appears to have been the principal article manufactured in the works. The effects of the explosion were felt over an area covering more than a mile in each direction from the point at which it occurred, but fortunately no lives were lost. The building was entirely demolished, and Mr. Polglase has been compelled to issue a circular explaining that he will be unable for the present to execute orders.

THE NEW UNITED STATES PHARMACOPŒIA.

The great interest excited among United States pharmacists in respect to the new national Pharmacopœia is manifest from the fact that the whole of the first issue was sold before the work was published. A second issue has been prepared, but we understand that copies are not expected to be in the hands of the booksellers in this country for another fortnight.

THE NEXT EVENING MEETING.

An Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, the 6th inst., when the following papers are to be read:—"The Crystalline Constituent of Jafferabad Aloes," by Mr. W. A. Shenstone; "The Sale by Public Auction of Spurious and Worthless Drugs," by Mr. E. M. Holmes, and "Further Observations on Arsenic," by Messrs. W. A. H. Naylor and J. O. Braithwaite.

CHEMISTS' ASSISTANTS' ASSOCIATION.

We are requested to say that in consequence of the Evening Meeting of the Pharmaceutical Society there will be no meeting of the above Association next Wednesday.

THE CHEMISTS' BALL.

We learn from a circular that has been issued in respect to stewards to the Chemists' Ball, that the date fixed for it is Wednesday, the 10th of January. As the Ball has always hitherto taken place on the third Wednesday in January, it may be convenient to some readers to point out that the next one will take place a week earlier than usual.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The third meeting of the present session was held in the Pharmaceutical Society's rooms, Edinburgh, on Wednesday evening, November 22, Mr. Peter Boa, President, in the chair.

The minutes of the former meeting having been read and confirmed,

The Chairman called upon Mr. Peter MacEwan to read a paper on—

Alkali Manufacture.

BY PETER MACEWAN.

A change for the better in the chemical industry a few years ago tempted the late Lord Beaconsfield to predict that the general trade of this country was on the eve of improvement. The country smiled at the noble lord's prediction, for it assumed that the basis of it was an unimportant factor in our commerce; but, nevertheless, there was much truth in the forecast of the far-seeing statesman; he knew that most of our important industries are dependent upon the chemical industry for some of their supplies, that increased demands for chemicals means greater activity in textile industry, for instance, for the alkali manufacturer supplies cleaning and bleaching agents to this and allied industries. The manure manufacturer cannot make his superphosphates without sulphuric acid, and if he make greater demand for that article, we must infer that agricultural districts are brisk. Alkali manufacture is the back-bone of the soap trade, and soap is so important an article in the world's commerce, that someone has given it as a truism that a country's position in the scale of civilization may be judged by the quantity of soap which it consumes. I hope, therefore, that apart from the purely technical nature of the subject which I bring before you to-night, there is in it something interesting and of general importance to occupy your thoughts.

The alkali industry is a large one; its products are many, and the methods of production numberless. But our time will only permit us to consider the production of the ordinary soda compounds, and the recovery of useful materials from waste products.

Previous to the French Revolution, the greater part of the carbonate of soda used was obtained from Spain as *barilla*. For the production of this various algæ (salsola, salicorna, etc.) were cultivated. The dried plants on burning yielded an ash consisting of from 5 to 20 per cent. of soda carbonate, with chloride and sulphate, the carbonate being a product of combustion. This ash was the barilla of commerce; its production was necessarily limited, hence industries dependent upon it were conducted on a small scale, and their products were correspondingly dear. The commerce between France and Spain being shaken during the Revolution, barilla reached a high figure, and the industries requiring supplies were almost at a stand-still. Napoleon, therefore, offered a high premium for the invention of a process which would utilize French resources in the manufacture of alkali. Many chemists entered the competition, and the adjudicating committee awarded the premium to M. Le Blanc, a pharmacien, who submitted details of a process which he had already in operation. This was in the year 1794, and the process was one of such merit, that it served not only the purpose of its day, but is now in use and is likely to be for many generations.

A word in passing of M. Le Blanc. The premium which his invention gained he spent in improvements upon his working plant; this soon exhausted his resources, and as his works were not conveniently situated for supplies, he could not compete with others more favourably located. Thus he failed commercially, and his works passed into the hands of the Government. Le Blanc deserved well of his country in his day. Life fame should have been his; but he was permitted to end his days in an almshouse, and a pauper funeral was his reward. Many pharmacists have been èminent men of science, but few of them have done so much benefit to their fellow-men as Le Blanc has done by his alkali process.

Starting with common salt, as required by the French Commission, Le Blanc converted this into carbonate of soda by a method involving at least three distinct reactions or, more properly, stages. These I shall describe in their rotation.

First Stage or Salt-Cake Process.—Common salt is acted upon by sulphuric acid, sulphate of soda ("salt-cake") and hydrochloric acid being produced. In Le Blanc's time and for many years thereafter, this operation was performed in an ordinary reverberatory furnace, but owing to the utter destruction of vegetation for many miles around alkali works, it was found expedient to adopt means for the condensation of the hydrochloric acid gas. The discovery of the bleaching properties of chlorine pointed to the utilization of hydrochloric acid as a means for its production; this helped to hasten on the universal condensation of the acid, and finally, the Alkali Act enforced the condensation of 95 per cent. of the noxious vapours of alkali works. All salt-cake furnaces are now, therefore, built in connection with towers for the condensation of the acid vapours discharged from them. These towers are constructed of Yorkshire flags, filled with coke or flint, down which water trickles, thus dissolving the gas as it ascends, the acid liquors being drawn off at the bottom of the towers. The salt-cake furnaces consist of two portions (diagram shown), first an iron pan, in shape like an evaporating dish, the common diameter of which is about 9 feet, and the thickness of the metal from 3 inches to 7 inches in the centre. This is securely built into brickwork. Beneath it there is an ordinary coal furnace as the source of heat. The pan has a strong iron cover, through which a funnel passes for the exit of hydrochloric acid. There are also two doors, one to admit the charge, the other to withdraw it to the second portion of the furnace called the "roaster." This is merely the hearth of an ordinary reverberatory furnace. Into the pan 10 cwt. of common salt and 80 gallons of sulphuric acid, sp. gr. 1·450, temp. 120° F., are introduced; the heat of the fire underneath ensures a decomposition, which may be fairly represented thus:—

$$NaCl + H_2SO_4 = NaHSO_4 + HCl.$$

In about an hour this change is effected, a third of the common salt being unacted upon. To complete the decomposition the charge is withdrawn to the roaster, when the strong heat present ensures the decomposition of the whole of the common salt, thus:—

$$NaHSO_4 + NaCl = Na_2SO_4 + HCl.$$

The salt cake which is thus produced contains 96 per cent. Na_2SO_4.

Many processes have been proposed for facilitating the production of salt-cake, and for conducting the process more economically. Beneficial modifications of the working plant are very numerous, but in the alteration of the method of production the only process which has been successful or is likely to supersede the old one is that proposed and carried out by Hargreaves. In this process bricks of common salt (artificially prepared) are exposed to the action of sulphurous acid, air and steam, at a temperature of 800° F. The following reaction takes place:—

$$2NaCl + SO_2 + O + H_2O = Na_2SO_4 + 2HCl.$$

The sulphurous acid for this purpose is conveyed direct from pyrites burners, so that it is at a high temperature, and this, combined with the heat of chemical action, economizes fuel greatly; indeed, the inventor anticipates such modifications on his salt-cake chambers as shall entirely do away with the use of fuel. This economy, together with the saving of soda nitre (used in sulphuric acid manufacture) and the use of rock salt, form very weighty arguments in favour of Hargreaves's process.

Second Stage or "Balling" Process.—In this salt-cake is fused with coal and limestone in a reverberatory furnace. The furnace is built of brick, lined with fire-brick, and, owing to the intense heat to which it is exposed, is securely bound with iron rods. From the sketch you will observe that it has two hearths, one a brick layer higher than the other; this is the "preparatory hearth;" the lower one nearest the fire is the "decomposing hearth;" communication with each is had by means of side openings, which are closed by strong iron doors having a vertical sliding movement. The construction of the furnace enables two charges to be wrought simultaneously, the weight of each charge being 5 cwts. (The composition of the mixture is:—Salt-cake, 10 parts; limestone, 10 parts; small coal, 7½ parts.) The charge is introduced and spread evenly over the preparatory hearth, and when it has become heated, it is pushed along to the "decomposing hearth," a fresh charge taking its place. In the decomposing hearth it is left undisturbed until surface fusion and formation of roundish clots take place; it is now ready to be carefully turned over so as to expose fresh surfaces, and when it becomes uniformly fused it is mixed dexterously and continuously, so that every portion of the mass may be exposed to the decomposing heat. While this is being done jets of inflammable gas are emitted, and when these fade it is time to withdraw the charge. The process lasts about two hours, and requires the constant attention of skilled workmen.

Improvements on the Process.—Many schemes have been proposed to substitute mechanical for manual labour, and as far back as 1848 Pattinson invented a furnace with mechanical stirrers; these proved more expensive than skilled workmen. In 1853 Elliott and Russel invented a revolving furnace, which, though not at first successful, has become so manageable and effectual in practice as to replace hand-furnaces to a great extent.

I may merely say of these furnaces that they are cylindrical in form, and revolve on large hollow axles which permit of the admission and exit of flame from the coal furnace in connection with them. The revolver is made of malleable iron plates, lined with fire-clay, and of a size sufficient to admit a charge of 5 tons being wrought. The motor of the revolver is a steam engine, capable of producing from one revolution in five minutes to five or more in one minute. The revolutions are slow at the beginning of the process and increase towards the end, about two and a half hours serving to complete the operation. The total substitution of revolving for hand furnaces is merely a question of time, the saving of labour and the advantage of working large quantities of material being fully recognized by the manufacturers.

The fused mass obtained during this stage is termed "black ash," and is a very complex mixture. The principal reactions occurring during its formation are—

First. The reaction between coal and salt-cake:—

$$Na_2SO_4 + C_4 = Na_2S + 4CO.$$

Second. The reaction between sodium sulphide and limestone:—

$$Na_2S + CaCO_3 = Na_2CO_3 + CaS.$$

It is possible that the limestone may be reduced to oxide of lime by the strong heat of the furnace, but the presence of carbon monoxide and air ensures a decomposition as represented. The following are the principal compounds present, together with the bodies present in the dried residue obtained from a solution of "black ash" (the consideration of which I shall return to):—

Black ash.	Per cent.	Solution residue. ("*Soda ash.*")	Per cent.
Na_2CO_3	36·88	Na_2CO_3	67·89
Na_2SO_4	0·39	$NaHO$	14·24
$NaCl$	2·53	Na_2SO_4*	4·57
$Na_2Si_4O_9$, $Na_2Al_2O_4$	1·87	Na_2S	0·55
		$NaCl$	3·50
CaS	28·68		
CaO	9·27		
$CaCO_3$	3·31		

Iron and cyanogen compounds are also present in minute quantity, and their presence is a source of great annoyance to the manufacturer, since they impart a yellow colour to the *soda ash.* It is believed that the cyanides are formed at the high temperature existing in the balling furnaces, the nitrogen necessary being principally atmospheric (Mactear).

Hand-furnace "black ash" does not (as a rule) contain so much cyanides as the black ash from revolvers. Mactear obviates the formation in a great part by working with only the theoretical quantity of limestone, adding 5 per cent. of quicklime towards the end of the process. The addition of sulphate of soda towards the end of the process is also recommended, and has proved efficacious, and the same result has been obtained by using a sulphate of any of the alkaline earths.

Third Stage.—It is now the object of the manufacturer to dissolve out the soluble constituents of the "black ash." This requires to be very carefully gone about, for although the lime compounds may practically be considered insoluble, yet that decomposition does take place is evident on comparison of the foregoing tables. In the second table ("soda ash") we find that caustic soda and sodium sulphide have come into existence, and that the percentage of sulphate of soda has very much increased. *These changes are the effect of the water of lixiviation.* Opinion seems to favour the following as the most probable decompositions which occur. In the first place the CaO (quicklime) present is slaked, and this reacts with a portion of the sodic carbonate thus:—

$$CaO + H_2O + Na_2CO_3 = 2NaHO + CaCO_3.$$

The caustic soda thus formed takes up about 15 per cent. of the available soda. The next reaction is one which is even less desirable than the foregoing, calcium sulphide and sodic carbonate undergoing decomposition:—

$$CaS + Na_2CO_3 = Na_2S + CaCO_3.$$

Another 5 per cent. of the available soda is thus changed into an undesirable compound, fully nine-tenths of which is oxidized to higher salts (sulphates, etc.). The investigations of Kolb have shown that these reactions are most energetic with the maximum of water, time and temperature. Taking advantage of this knowledge the manufacturer—with the object of obtaining a solution having a large percentage of sodic carbonate—uses the most expeditious means for lixiviating the black ash. In early days, I may remark, barrels served as plant for this purpose, but this method is both too expensive and slow for this age. The plant now used most commonly consists of a series of vats, provided with perforated false bottoms, and communicating with each other by means of an arrangement of taps and plugs, thus permitting of the liquor from one vat to be run into another as desired, or allowing circulation of the liquors (as a result of their different densities). The system was invented by Mr. Shanks, and is extremely well adapted to the purpose. Whenever the black ash is sufficiently cool to handle it is broken up into manageable pieces and the tanks filled with it; water being run in dissolves as much as it will, and is then withdrawn to settlers. When the ash has become exhausted it is removed from the tanks and set aside as waste. I shall say a few words about this later on. While the liquors are settling they get a preliminary

* Includes sulphites and lower sulphur salts.

surface heat, previous to evaporation; aluminates and silicates here separate, as well as part of the iron and lime sulphides. As it is necessary to oxidize the impurities in the liquors this is done either before or after evaporation. In the former case, the liquors are allowed to trickle down towers of a similar construction to hydrochloric acid towers, in which they meet a stream of air and carbonic acid as they descend, thus oxidizing and carbonating at the same time. By this process the metallic sulphides are reduced to oxides, and alumina and caustic soda are formed from the sodic aluminate.

Evaporation.—To utilize the waste heat of the balling furnaces evaporating pans are built in connection with them, and in such a manner as to enable the flame to pass over the surface of the liquors, or (in other cases) the heat is applied directly to the bottom of the pans. If the liquors have not been oxidized before evaporation it is the practice to mix sawdust with them; this enables drainage to be more readily carried out after evaporation, while the sawdust also acts as the carbonating medium in purifying such residues by roasting. An automatic arrangement keeps the liquors in the pans at a constant level, so that at the end of twenty-four hours a panful of deposit is obtained. This on drying constitutes "soda ash" of commerce, and is the alkali supplied to soap boilers.

Carbonating Process.—The ash being of a yellow colour, and containing much hydrate and sulphate, it is roasted in a reverberatory furnace with an equal bulk of sawdust or equivalent of small coal; much of the hydrate and sulphate are by this means converted into carbonate, and the resulting ash after lixiviation and evaporation is known as "white ash."

Soda crystals are obtained by dissolving white ash in boiling water to saturation nearly, and filtering through calico. The solution is then allowed to settle, a little lime or bleaching powder being added to clarify it. It is then transferred to the crystallizing vats, in which blocks of wood or bars of iron form crystallizing nodes. The mother-liquors from this process yield a weak white ash on evaporation.

Caustic Soda.—This is either prepared direct from the carbonate according to the B.P. process, or the mother-liquors got from the primary evaporation pans are utilized for its preparation. These liquors are of a red colour owing to impurities, such as ferrocyanide of sodium and a red compound (a double cyanide of iron and soda). The process is too long a one to describe at this stage. I may merely say that the sulphides are oxidized with air and superheated steam: ferrocyanides are decomposed by soda nitre, ammonia being evolved and graphite deposited in the pans. Any carbonate of soda present is hydrated by slaked lime. During evaporation it is necessary to withdraw any crystals which may separate; this process is termed "fishing," and is very often performed in the primary evaporation, thus saving much material.

So far I have described the principal features of the Le Blanc process. Much interesting matter has been left out, but sufficient has been given to show you that the process is an ingenious though an indirect one; one drawback to it is the loss of soda which it entails (13 per cent.) and the amount of waste material produced. Considering these drawbacks, the immense amount of labour, plant and fuel required for the process, it is not surprising that other processes have been proposed from time to time. Hitherto, only one of these has been at all successful, namely, the *ammonia soda process.* This was invented by Dyer and Hemming in 1830, and is based upon the double decomposition taking place between carbonate of ammonia and common salt. In practice it was found expedient to use ammonia gas (NH_3) and carbonic acid, which in the presence of water gave the following reaction:—

$$NaCl + H_2O + NH_3 + CO_2 = NaHCO_3 + NH_4Cl.$$

The advantages of any method of manufacture based upon this reaction would, amongst others, be:—

1. A direct product free from impurities.
2. Freedom from noxious vapours.
3. Less waste products.

The process as wrought by the inventors was not a success, the loss of ammonia and wear and tear of apparatus more than compensating for any benefit to be derived from it. During the past ten or fifteen years, more attention has been paid to it, and the improvements made upon working plant enable the process to be conducted without loss pecuniarily. Late improvements have been kept secret, so that I can only give a summary of the methods which were at one time in use. In one of these methods a revolving cylinder for the solution of salt (1 in 3) was used, which cylinder was divided into compartments, each one of which at a certain level was brought into communication with one of the apertures of the perforated axle, through which ammonia and carbonic acid gas were forced. The revolving nature of the vessel ensured thorough mixing, and full provision was made for collecting waste ammonia. By a later method the solution of salt is placed in tanks into which ammonia gas is introduced. The temperature of the mixture rises during this process, and it is necessary to cool it before proceeding further. Then it is withdrawn to cylinders about 30 feet in height and nearly the same in diameter; these are provided at the bottom with suitable apertures for the admission of carbonic acid, which is forced in under a pressure of from one to two atmospheres.

The manufacturer works with a small quantity of water, so that the mother-liquor may contain as little bicarbonate of soda as possible. To free the soda from any adherent chloride of ammonium it is washed with water and a weak solution of bicarbonate of soda. It is reduced to carbonate by roasting, the evolved carbonic acid being again used. There is no doubt about the purity of the resulting salt: it contains 99 per cent. of real carbonate, the 1 per cent. of impurity including water. A better salt for pharmaceutical purposes could not, therefore, be desired, although for some manufactures it is not so well adapted as ordinary alkali.

Our Society's reporters on the Paris Exhibition speak favourably of the new process and its progress on the continent. Much of this progress is due to Messrs. Solvay and Co., who have made many improvements, and turn out annually nearly 30,000 tons of alkali by the ammonia process. One matter which barred the progress of the process for many years was the loss entailed in recovering the ammonia. This was done by heating the chloride with lime, double decomposition taking place.

$$2NH_4Cl + CaO = 2NH_3 + CaCl_2 + H_2O.$$

There being no use for the chloride of calcium it had to be turned away as waste. Weldon patented the use of magnesia instead of lime, and the subsequent decomposition of the magnesic chloride with superheated steam thus:—

$$MgCl_2 + H_2O = MgO + 2HCl.$$

This invention has given a great stimulus to the ammonia process. The recovered magnesia is used again and again, the hydrochloric acid being condensed in the ordinary manner. Apart from all advantages, however, it is well to remember that 5 per cent. of the total ammonia used is lost during each operation. Ammonia is an expensive article and its production is limited. In Great Britain at present the annual production of ammonia is 9000 tons. So that the progress of the ammonia process in our country will only be possible with increased supplies of ammonia at or below present prices. Should the price of ammonia increase much, then it will not be safe to enter on the ammonia soda process as a monetary speculation.

Recovery of Sulphur from Tank Waste.—Time will only permit me to say a few words on this subject. For every ton of alkali produced there is $1\frac{1}{2}$ ton of waste; this contains all the sulphur derived from the sulphuric acid. It is a nuisance in alkali districts, sulphuretted hydrogen being given off from the waste heaps. To recover the sulphur the most successful method is to treat solution of the oxidized waste with hydrochloric acid; sulphuretted hydrogen is evolved, part of which is burnt into sulphurous acid, which again acts upon the remainder of the sulphuretted hydrogen, thus:—

$$2SH_2 + SO_2 = H_2O + S_3.$$

Upon this principle Mr. Ludwig Mond and Mr. Mactear, of St. Rollox Works, Glasgow, have both devised processes, and it is satisfactory to know that both of them recover a good percentage of sulphur, while they are a success commercially.

The paper was fully illustrated by diagrams of working plant and sheets of equations, showing the decompositions occurring during the various stages; also specimens illustrating the production of common salt from rock salt. Specimens showing the sequence of manufacture of alkali by the Le Blanc process with bye-products and recovered material, and specimens of. B.P. alkali were also exhibited. The production of alkali by the ammonia process was experimentally illustrated.

On the motion of the Chairman, seconded by Mr. Crowden, the thanks of the meeting were heartily accorded to Mr. MacEwan for his paper.

A discussion followed the reading of the paper, in which Messrs. Adamson, Crowden, Boa, Hill, and Turnbull took part.

Several queries when then submitted and answered.

Before the meeting adjourned the President announced that the next meeting would be held on December 6, when a debate will take place on the question, "Does a Necessity Exist for Further Legislative Restriction as to the Sale of Poisons?" The affirmative will be taken by Mr. C. F. Henry, and the negative by Mr. W. S. Adamson.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The first meeting of the session was held at the Mechanics' Institute, on Monday evening, November 27, the President, Mr. R. Fitzhugh, F.C.S., in the chair.

The meeting was fairly attended by both members and associates.

The President opened a discussion on the present state of the Association, with respect to the great want of interest and general apathy shown by the non-attendance of members and associates at the monthly meetings and classes, and remarked that unless more personal interest was shown in it, it would eventually collapse.

An animated discussion followed, in which most of the members and associates took part, all urging that the work should be continued, and eventually a proposition was carried that the usual social meeting be held next month, and the future prospects of the Association be further discussed at it.

During the evening Mr. M. Handford was admitted as a member and Mr. Greaves as an associate.

A vote of thanks to the President concluded the meeting.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Tuesday evening, November 28, a lecture was given in connection with the above Association, at 4, Halford Street, by Mr. J. Garrett, on "Mercury."

After treating of the heads of the subject, Mr. Garrett went on to speak of the different reactions of mercury, drawing special attention to the change which takes place when a piece of white paper, smeared with the red iodide, is held before the fire, consequent it is supposed upon the conversion of the rhomboidal crystals of the red iodide into octohedra with a square base. Other interesting features of the subject were touched upon, and an instructive lecture was at length brought to a close.

Mr. E. Brice proposed and Mr. Broof seconded a vote of thanks, which was accorded to the lecturer.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

A meeting of the London Committee of this Association was held at the Inns of Court Hotel, High Holborn, London, W.C., on November 24, at 8 p.m. The President in the chair.

The appointment of local secretaries of the Association in London having been discussed, it was moved by Mr. Long, seconded by Mr. Urwick, and unanimously resolved:—"That the appointment of Local Secretaries in the Metropolitan districts be left in the hands of a subcommittee consisting of Messrs. Andrews, Long and Urwick, with power to add to their number."

It was decided to add the name of Mr. C. B. Allen, of Kilburn, to the London Committee.

The desirability of holding a meeting of the London members of the trade was then considered. On the motion of Mr. Andrews, seconded by Mr. Urwick, it was resolved:—"That the Secretary be instructed to convene a general meeting of the members of the trade resident in London to discuss matters of trade interest; the meeting to be held at the Arbitration Rooms of the Inns of Courts Hotel, Lincoln's Inn Fields, on Wednesday, December 13, 1882, at 8 p.m., prompt."

It was decided that a circular convening the meeting should be sent to the whole of the London trade seven days prior to the meeting and that the agenda should be as follows:—

"1. To consider desirable amendments in the Pharmacy Act, 1868.

"2. To take into consideration the advisability of holding periodical meetings of the members of the Association resident in London.

"3. To discuss generally matters affecting trade interests."

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A Conversazione, in connectionwith this Association, was held at St. James Hall, on Wednesday, November 22, and was well attended by the members and their friends, and also by many of the leading pharmacists of London and the provinces. The excellent programme, which included both vocal and instrumental music, was extremely well rendered, and met with the hearty approval of the audience. In addition to this, through the kindness of the Council of the Pharmaceutical Society, an interesting collection of specimens was lent from the Museum, also a collection of rare chemicals was exhibited by Messrs. Hopkin and Williams. Messrs. Beck and Co. exhibited electrical apparatus, including a powerful plate electric machine, vacuum tubes, etc. Electric bells and telephones were exhibited by Messrs. Mayfield and Co., and also by Mr. W. H. Kerr. Messrs. Swift and Sons again exhibited some of their well-known microscopes.

From the feelings of pleasure expressed by visitors during the evening, the efforts of the Council seemed to be thoroughly appreciated, and a most enjoyable evening was spent.

Parliamentary and Law Proceedings.

Death through an Overdose of Chloral.

On Tuesday, Mr. W. Carter, coroner, held an inquest at the "Alma" Inn, Lower Addiscombe Road, upon th body of Mrs. Eliza Ann Walmsley, aged 48, the wife o Mr. John Walmsley, a commercial traveller.

Mr. Walmsley was the first witness. He said that on Saturday last at about 7 a.m. he went into the deceased's bedroom and saw her lying in bed on he left side apparently asleep, and there was a pocket-handkerchief over the upper part of her face. He spoke to her but she did not reply, and he then told his son, who had slept with his mother, to get up, after which witness placed a pillow against deceased's back for the purpose of keeping her warm, this being his habit. After witness had had his breakfast he went upstairs again for the purpose of wishing deceased good-bye prior to going to business. Deceased was then lying in the same position, and witness pulled the clothes down a little way, whereupon he discovered that his wife was dead. Witness immediately fetched Dr. Thompson who examined the body and pronounced life to be extinct. Witness had last seen his wife alive at 10 o'clock on Friday night, he not having returned home from business until 9. She was then in the bedroom seated in a chair by a small fire, and she seemed to be in her usual state of health.

Dr. Thompson deposed to being called to Mr. Walmsley's house, and finding the deceased lying in bed dead. The witness's opinion was that deceased must have then been dead for some hours. The left side of the face was in a congested condition. There was no distortion of the features, but they were perfectly placid. Witness could detect no marks of violence. A white medicine bottle was found under the body, and it contained about 3 drachms of liquid, which witness tasted and found to be hydrate of chloral. Witness concluded that deceased had taken this poisonous medicine which produced suffocation. Nothing was found to lead it to be supposed that deceased contemplated committing suicide. Witness had attended deceased for the last twelve months. She suffered from extreme nervous debility, caused by habits of intemperance. Deceased was at times very hysterical, and had bordered upon an attack of *delirium tremens.* Witness was of opinion that deceased took an overdose of chloral. The ordinary number of grains of chloral to be taken by an adult ranged from 10 to 13 grains, but it was clear to witness that the bottle found in the bed had contained at least 100 grains, and he was of opinion that deceased, having found that the ordinary quantities taken by her for several years past to quiet her nerves did not have the desired effect, had gone to different chemists and obtained small quantities, which she had put together in one bottle and taken as a dose, which caused sudden stoppage of the heart's action.

A Juryman asked whether chemists were justified in selling such a medicine as chloral to any persons who asked for it.

Dr. Thompson said there was no quantity specified on the prescription, and a chemist would have to use his own discretion. The question raised by the juror was a very important one, and one which, no doubt, would be ere long inquired into by a Royal Commission.

The Jury, after brief consultation, returned a verdict of "Death through misadventure."

Mr. Walmsley asked the Coroner to kindly add to his deposition his protest against chemists selling drugs of the description of chloral in the wholesale way it had evidently been supplied to his wife. With regard to this particular dose it seemed deceased sent her little boy for it, and he had not the least difficulty in obtaining it.

The Coroner said he was sorry, but under the peculiar circumstances of this case he did not see how he could comply with his request.—*From a Local Paper.*

Attempt to Poison with Iodine Liniment.

On Thursday, November 23, Elizabeth Taylor, aged 13 years, was brought before Messrs. Coleridge and Toller, Ottery St. Mary magistrates, charged on remand with administering poison to Norman Skinner, a child 13 months of age.

On Wednesday week Taylor fetched the child from her bedroom in the morning, and about ten minutes afterwards she came back exclaiming, "I've been giving baby some liquorice." Mrs. Skinner then noticed something brown running from the child's mouth, and on closer inspection she saw it was iodine. Upon asking Taylor what she thought would become of her, she replied, "I shall not be hung, as my father will pay some money." The girl then ran into a front room, took a vase from the mantelpiece, and threw its contents into the grate, wiping out the vase with her apron.

Sarah Jane Sanford said that Elizabeth Taylor was her fellow servant, and they slept in the same room. The bottle containing iodine, now produced, was hers (witness's). She had been using it for a swollen knee. On the Wednesday she found that some of the stuff was gone, and the label had been moved further down. She saw dark marks on the child's clothes.

Dr. Pullin, of Sidmouth, said that he saw the child and noticed that its chin and clothes were discoloured with a brown colour. The lips were as if burnt, and the inside of the mouth was also brown. The prisoner and Mrs. Skinner were present. He told the girl she ought to say what she had given the child. He asked this so that he might know how to treat the case. Taylor then said, "I first gave him benzoline and then some stuff that Jane uses for her knee." Mrs. Skinner then fetched the bottle produced, and the prisoner said, "Yes, that's the stuff." On the bottle was a red label marked "poison." He asked her how she gave it to the child, and she replied, "Out of that," pointing to a vase on the mantelpiece. Iodine was a poison; its action was scalding, and thirty drops given to a child would prove fatal. He did not think the child had swallowed any. The spots on the child's dress and girl's apron now produced were caused by iodine. On his asking the girl if she knew what "poison" meant she replied in the affirmative.

Prisoner reserved her defence, and was committed to take her trial at the ensuing Quarter Sessions at Exeter. —*Western Weekly News.*

Poisoning by Carbolic Acid.

The Plymouth Borough Coroner (Mr. T. C. Brian) on Monday, November 20, investigated the circumstances attending the death of Lawrence Charles de Vries Hall, aged 4 years, son of Captain Hall, late of the Royal Mail Steamship service.

Emily Roose, under nurse, stated that on the previous afternoon the deceased went from the dining-room into one of the spare bedrooms. She heard him scream, and she immediately ran upstairs, and found him standing foaming at the mouth. Mr. Budd, surgeon, was sent for, but before he arrived Captain Hall concluded from the smell that the deceased had taken carbolic acid. Witness on again going to the spare bedroom found a 12oz. bottle containing carbolic acid on the washing stand. The acid was kept as a disinfectant, and was last used about two months ago on the occasion of a death occurring in the house. On Sunday evening the child appeared to be much better, but on Monday morning he grew worse, and died about eleven o'clock.

Mr. George Budd stated that he found the deceased in a state of extreme collapse. The odour of carbolic acid was very strong, and in fact anyone standing three yards from the child could smell it. He administered about a quart of olive oil, as well as a quantity of ipecacuanha wine, to induce vomiting. The child vomited very freely, and witness thought all the acid had been removed. The child's face presented a better colour; but from the first he (the doctor) had no hopes. If he had been in attendance even immediately after the child had taken the poison the result would have been the same, for the acid was so strong. It was his opinion that a blue bottle with a red label, though the orthodox pattern for poison bottles, was too attractive for children.

The Jury returned a verdict of "Death from accidental poisoning," adding that in their opinion there was no blame due to any person.—*Western Weekly News.*

Obituary.

Notice has been received of the death of the following:—

On the 10th of November, Mr. John Tombs, Chemist and Druggist, Burlington Street, Liverpool. Aged 60 years.

On the 20th of November, Mr. John Taylor, Chemist and Druggist, of 14, Clarence Road, Leytonstone, E., formerly in business in Wakefield for many years. Mr. Taylor was a Member of the Pharmaceutical Society from 1853 to 1876, and for several years held the post of Local Secretary at Wakefield.

On the 27th of November, Mr. John Stone, Pharmaceutical Chemist, Fore Street, Exeter. Aged 85 years. Mr. Stone had been a Member of the Pharmaceutical Society since 1853.

Notes and Queries.

[744]. Potash Powders.—I frequently make "potash water" by adding to the ordinary charge of bicarbonate of soda and tartaric acid, ℈iij pot. bicarb. for Oij and ℈iv for Oiij size.—W. Lee.

[744]. Potash Powders.—If "Pulvis" would procure a circular sent out with Fevre's seltzogenes, he will find a good deal of information, and the following appears to be an answer to his query. "To make potash water add to the lower globe 4 scruples of bicarbonate of potash for 3 pint size," that will be to the upper globe in Briet's gazogene. I think "374" must have misunderstood the query when he says, "Substitute pot. bicarb. for sodæ bicarb. in ordinary gazogene charges." What is the use of that when all that gets into the finished water from the charges is the evolved gas?—J. H.

[745]. Boracic Lint.—W. L. P. will find in Squire's 'Companion,' 13th edition, p. 7, under Acid. Boracic., the following:—"Lint, dipped in a boiling saturated solution (of boracic acid) and dried, is used as an antiseptic dressing for wounds and ulcers."—J. H.

Correspondence.

The Proposed Pharmacy Curriculum.

Sir,—Although the present date may seem a late one for a contribution to the discussion of a subject prominently brought forward some months back, yet the importance of that subject will, I trust, render excusable my request for a space in your Journal for the insertion of this letter, my tardiness in writing arising from my inability to do so before, since Professor Attfield's pamphlet and the *Pharmaceutical Journals* containing the proposed innovations were received by me, some in Australia, some in New Zealand, and my desire to give fair and unbiassed thought to the subject before venturing to express an opinion was the reason of my not inditing an epistle from those antipodal lands.

Before offering any criticisms or suggestions concerning the proposed innovations, I would like to state that, in the main, I am thoroughly at one with the projectors of a pharmaceutical curriculum; the more perfect harmonizing of pharmaceutical education to examination is in my opinion desirable, I would even add, under the present state of affairs, necessary. But if a curriculum is to be established, it should certainly be a compulsory and not a permissive one. The recognition of a permissive curriculum by the Boards of Examiners would be an act of injustice, in that it would give an unfair advantage to those schools which would be officially recognized for the purpose; it would be almost enticing students to those schools by the offer of a power, viz., a schedule detailing that they had passed through a curriculum, which would act as a lever in assisting them through their examinations. Such a plan would mean the establishment, not of a permissive curriculum, but of a morally compulsory one on a basis the fairness of which would certainly be questionable. If a system inimical to true pharmaceutical education does exist, then no half measures should be employed in dealing with it. The recognition of permissive curricula would either attract the majority of or all students to the schools recognized for the purpose, in which case a compulsory system might have been established at once, or the system inimical to true education would still flourish, in which case a compulsory system would have to be adopted. I infer—perhaps wrongly—from Professor Attfield's arguments, that he reasoned to himself that the recognition of permissive curricula by the examiners would bring about a gradual and lingering death of the system he deprecates, by wounding it in an unguarded quarter, and so placing it *hors de combat*. But such an action would be an ungenerous one; in instituting reforms, common fairness and feeling for others should always be considered.

I certainly agree with Professor Attfield, that the recognition of compulsory curricula is to be desired for the furtherance of true pharmaceutical education; if the pharmaceutical body, as a whole, is of the same mind, I, for one, cannot see the impracticability of carrying out such a step.

In connection with the adoption of a compulsory curriculum, it is important that due weight should be given to the opinions of the teachers concerning the actual work done by the students whilst under their guidance, otherwise the system will be labouring under the same ban as that with which the English medical educational system is afflicted; for that system provides that a student must attend a certain number of lectures, demonstrations, etc., but does not require to know that he has benefited by such attendance or taken advantage of his opportunities, previous to presenting himself for examination. The consequence is that many a student goes up for examination in a far worse condition than if he had not passed through a compulsory curriculum at all, for the attendance at the requisite number of lectures, demontrations, etc., will probably have imbued him with the false idea that he is, of necessity, ready for the examination. I have spoken with many of the lecturers and teachers at the medical schools, concerning their compulsory curriculum, and they all agreed in deploring it in its present condition, maintaining that unless weight is given to a teacher's opinion of a student's fitness for presenting himself for examination, the mere attendance at a certain number of lectures, etc., is useless, nay, even detrimental. It is true that at most of the medical schools the teachers, from time to time, examine their pupils, so as to gauge their knowledge, and will, if they find them deficient, refuse them their schedules, without which they cannot present themselves for examination. Such refusal, however, is not, I believe, legal, provided the student has simply attended the requisite number of lectures, etc. I, therefore, most strongly urge that in the event of a compulsory pharmaceutical curriculum becoming established, due power be given to the teacher to ensure thoroughness of work in his pupils, and so prevent the frittering away of a certain length of time, which by the unthinking medical student is often regarded as a purgatory to be endured previous to the examination. In the present state of pharmaceutical education, it would be utterly out of the question to think of delegating to pharmaceutical teachers the additional duty of acting as public examiners, even supposing the present paucity of eminent teachers did not render such a scheme impossible, but I must certainly dissent from Professor Attfield's statement, on p. 88 of his pamphlet, "that with regard to the question of education and examination being carried on by one and the same man, or body of men, the general impression is that certain weaknesses of human nature render such a course undesirable," for how is it that the plan works so admirably in connection with the various medical examining bodies, where, as a rule, the examiners are selected from the professors and lecturers actually engaged in teaching at the different medical schools?—the logical inference being employed, that the man engaged in teaching is the man best fitted to examine. At such examinations a teacher does not examine his own pupils, that task being delegated to the other examiners, and as is well known, such a system works perfectly, an accusation of unfair bias on the part of any of the examiners never having been made.

The late President of the Pharmaceutical Society, in discussing the proposed curriculum at the April Council Meeting, said, "He believed a large portion of the change had been made with a view to abolish what was termed cram, but he thought it was to a great extent a bogus, and that there was a great deal more noise about it than it really deserved." That cram does exist to some extent cannot be denied, but I also think that to a great extent it is a phantasm, existing in the minds of those who so fiercely denounce it. Special, conscientious, and thorough preparation for examination has no association whatever with cramming, for it is the same kind of teaching that is employed, in the scientific subjects at least, at all the recognized medical schools. Moreover, special preparation for examination by tutors who to some extent know from experience the areas to be covered in connection with the different subjects is the necessary outcome of the want of a comprehensive syllabus defining the range of the examinations. Deploring, as I do, the absence of such a guide, both to the teacher and the student, for the syllabus at present issued in connection with the Major and Minor examinations is all but useless, I should welcome some such a syllabus as that detailed in the Report of the Special Committee appointed to consider the inter-relation of pharmaceutical education and examination, allied with, if necessary, a compulsory attendance at lectures and laboratory work, since it would greatly lighten the burden of the teacher, rendering his work much more satisfactory both to himself and to his pupils.

I emphatically and honestly deny that preparation for examination necessarily consists, as Professor Attfield asserts, in the tutor getting hold of the examination questions and wrapping their answers up in a course. To teachers who endeavour to conscientiously prepare their pupils for examination such an assertion is ungenerous.

In my opinion nothing has contributed more to the fostering and development of preparation, and also of cramming, in connection with the pharmaceutical examinations, than the absence of a comprehensive syllabus indicating the range and limits of the various subjects. In the absence of such a guide a teacher is compelled, even against his inclination, to watch the examinations in order to gain an idea of the areas covered by the different subjects, the boundaries to which are to a great extent left to the will and fancy of the examiners. In making this statement—that the examiners possess the power of fixing or extending at their will the limits of the various subjects,—a statement which I believe no one who gives serious thought to the matter will contravene,—I wish to record that no disrepect nor impliance of want of faith is intended, either towards the examiners as a body or to any of them personally; that they endeavour to perform their duties conscientiously I am confident, my feeling is only that of commiseration for them that their duties are rendered so onerous, so tormenting and so perplexing, by the absence of a sufficiently comprehensive syllabus, indicating the range of the different subjects in which they examine. The absence of such a syllabus not only puzzles the teacher as to the exact nature and area of the ground over which his teaching must be spread, but is the cause of the frequent cavilling heard amongst candidates as to the right of such and such a question being asked, remarks equally unpleasant for both examiners and teachers to hear. Why have the pharmaceutical examinations been rendered conspicuous by the absence of a syllabus fitted to guide examiners, teachers and students? In connection with other examinations to which no compulsory system of education is attached, a comprehensive syllabus is issued, definitely indicating the range and limits of the subjects of the examination.

Of the recommendations suggested by the Special Committee appointed to consider the inter-relation of pharmaceutical education and examination, I only now wish to make a few remarks concerning "recommendation 4." That the examination should be divided is much to be desired, but the division proposed in recommendation 4 is, in my opinion, a most unfortunate one. I perfectly agree with Mr. Carteighe's remarks at the April Council meeting, "that it is quite practicable for the first part to consist of prescriptions, practical dispensing, and pharmacy, and then for the candidate to go in for five months' study and come up at the end for the three scientific subjects," and I go further in thinking that such a division of the examination would be the only harmonious one that could be effected. It seems to me a perfect anomaly that a man should attend lectures, etc., on scientific subjects for five months, and then be compelled to wait six months before he could present himself for examination in those subjects. At the same Council meeting Mr. Symes said, "that the Committee found it was only following the practice of other bodies to give a young man his scientific training somewhat before they gave him his technical training." If the members of the Committee had in their minds at the time the system of medical education, I can only reply that though the deduction is correct, the application is both untenable and illogical. It is true that in the medical system of education the scientific training does precede the technical, but the medical student has not passed through a long period of technical training such as that undergone by the pharmaceutical student during his apprenticeship; the medical student commences his scientific training with no technical knowledge whatever. Moreover, as soon as the medical student has received his scientific training, he can go up for examination in the scientific subjects, and as soon as he has received his technical training, he is examined in the technical subjects. If, therefore, the medical system of education is to be taken as a guide, it would be but logical to say that when a pharmaceutical student has received his technical training, that is, when his apprenticeship is finished, he should be examined in the technical subjects, and that his examination in the scientific subjects should immediately follow his scientific training, without the unparalleled institution of an unseemly gap of six months between his scientific training and his examination in the scientific subjects.

173, *Marylebone Road, N.W.* A. P. Luff.

Singleton's Ointment.

Sir,—Having at last an opportunity, I will endeavour to answer the letters respecting citrine ointment which have appeared in the Journal during the past three weeks.

The points at issue seem to be:—

1st. What is the composition of Singleton's eye salve? and

2nd. Has that ointment always been prepared from the same formula?

Before answering these questions, I should like to refer incidentally to two minor subjects Mr. Henry Brown mentions. If he will be kind enough to refer to the old London Pharmacopœia, he will find the ung. basilicon and all the ointments of which I gave the formula in my paper are called by the name ung. citrinum; and also if he will carefully read the title of my paper he will probably see that it is 'The History of Citrine Ointment,' not 'The History of Eye Ointments in general, and Plato's in particular.'

Having myself examined Singleton's ointment, I can decidedly state that it is an ointment of HgO, without a trace of As_2S_2 or As_2S_3, although I am ready to yield the point of yellow or red oxide to Mr. Tanner.

In respect to the second point, I think it is very easy to argue, as Mr. Saul has done, on the assumed infallibility of Dr. Paris and others, but I ask, does Mr. Saul think it likely that Dr. Paris analysed, or even prepared, one-half of the preparations mentioned in 'Pharmacologia?' Indeed, I think it very probable that some of the formulæ may have been written on the authority of others, as almost every author of such a book would do more or less.

Again, the very fact of Christison and others, looking upon it as citrine ointment, shows clearly, either that they often jumped at conclusions without any sound foundation, or, if they did examine "eye salve," that it was mercurial.

For my own part, I do not see how the old composition can be arrived at with any degree of certainty; but I ask, would the proprietor of "Singleton's Golden Eye Salve" have altered the composition, considering what a large sale his preparation had gained? Again, arsenious sulphide in the proportion of 2 or 3 grs. to 1 ounce (as used for the eyes) would not give sufficient colour for it to be mistaken for citrine ointment, unless some further colouring matter were added.

R. A. Cripps.

Sir,—The paper on "Singleton's Ointment," to which Mr. Tanner probably refers, was read by Mr. W. Jardine, at a meeting of the Glasgow Chemists' Association. in February, 1867, and was printed in the *Pharmaceutical Journal*, [2], vol. viii., p. 591, and shows very clearly that whatever Singleton's ointment may have been originally, it is now an ointment of red oxide of mercury.

Manchester. W. Wilkinson.

Sir,—I think Mr. J. E. Saul may be congratulated on having made out a pretty strong case in favour of his theory that Singleton's golden ointment, as originally prepared, was an ointment composed of yellow sulphide of arsenic; at least this is the conclusion one must almost inevitably come to in the face of such testimony as he brings forward in his letter on p. 140. It is inconceivable certainly that an eminent authority, as Dr. Paris undoubtably was, should make such a definite statement as to its composition, on mere conjecture and without having seen the ointment in question. But what shall we say of Dr. Christison ('Dispensatory,' 1st ed., p. 531), who, in speaking of citrine ointment, says it was introduced for the purpose of "imitating as exactly as possible a nostrum well known by the name of the golden eye ointment?" Now if the golden ointment of that period were really an ointment of arsenious sulphide, surely there would have been no difficulty in determining that fact and framing the formula accordingly; we must, therefore, either look upon the efforts of the compiler at imitating it as futile, or suppose that this Proteus had again changed its shape. It would be an interesting, but perhaps difficult task to trace out when it first differentiated and subsequently became what we now find it.

Mr. Saul must pardon me for reminding him that the object of my letter to the Journal was not so much to show what golden ointment was, as what it is, and he will find that the latter portion of my letter indicates an explanation of the discrepancies which have arisen as to its composition. Cooley, in 1855, appears to have been the first to show that it is composed of red oxide of mercury and not arsenious sulphide as generally supposed. In 1877, Mr. R. J. Downs, in a paper read before the Irish Pharmaceutical Society, and published in abstract in the *Chemist and Druggist*, of April 14, 1877, p. 138, gives the result of his examination of a pot of Singleton's golden ointment, which establishes its almost perfect identity with the ung. hydrarg. oxid. rub. of the B.P.

Mr. Cripps will, I am sure, pardon me for taking up the cudgels on his behalf, but before concluding I should like to point out that both your correspondents, Mr. Henry Brown and Mr. Saul, have, unintentionally perhaps, misquoted him. Mr. Cripps nowhere says "Singleton's eye salve was an ointment of yellow oxide of mercury" (Mr. Brown); nor, again, "was the same at the time to which Mr. Cripps referred in his paper" (Mr. Saul). What he did say was that citrine ointment was not satisfactory as an imitation of golden ointment, this latter "being an ointment of yellow oxide of mercury." The difference in meaning is sufficiently apparent.

Tottenham High Cross. Alfred E. Tanner.

The composition of this preparation has also been the subject of some correspondence in the *Lancet*, to which journal Mr. Napier, of Guildford, has forwarded the following "original receipt," which he says was obtained about forty years since from the occupier of the house in Fleet Street, nearly opposite St. Dunstan's Church, where Singleton lived:—

℞ Hydrargyri, ℥ss.; acid. nitric., ʒvss.; butyri (without salt), ℥vj.; oleum olivæ, ℥iv. Hydrargyrum in acido primum liquus; dum liquorum adhuc calentum, butyro et oleo simul liquefactes: misce.—N.B. This is half diluted.

Mr. Napier says, "It requires care in making and to be well stirred until cool, when it will come out of a brilliant golden colour. To make the ointment full strength the butter and oil must be reduced one-half."

[*$_*$* We think that sufficient space has now been accorded to the discussion of this subject, and as it is not probable that any greater certainty will be attained as to the original composition of the ointment the controversy may well be dropped.—Ed. Ph. J.]

Impure Ammonium Bromide.

Sir,—A somewhat curious case of poisoning having come under my notice a few months since, it has occurred to me that a short account of it might be of interest to your readers and also be a warning to pharmacists of the necessity of assuring themselves of the purity of the chemicals they purchase.

A prescription (written by a physican known to me) consisting of ammon. bromid. and sal volatile in ordinary doses, was dispensed at a continental pharmacy. The first dose, instead of producing the usual effects, caused violent sickness, the vomit being of a peculiar red colour, accompanied by all the symptoms of irritant poisoning. A portion of the mixture was brought to me by the doctor in question, who went over to investigate the matter. Upon making an examination of the mixture, I found, in addition to ammon. bromid. in solution, there was an insoluble precipitate, amounting to about 1 grain per fluid ounce of the mixture, which, upon analysis, I proved to be carbonate of cadmium. This result seemed so improbable, that a further portion of the mixture was taken by the physician to a well-known analyst, who confirmed my report.

Subsequent inquiry has brought to light the following facts:—That the principal fault lay with the manufacturers, who have since acknowledged that they found the whole batch of ammon. bromid., of which that used by the continental pharmacist was a part, had through the carelessness of their workmen become contaminated with a cadmium salt of which they were large makers.

I have since learnt that cases of poisoning by cadmium are rare. In several books that I consulted, I could find nothing about its physiological effects. I am told the colour of the vomit is highly characteristic.

1, *Southwick Street, Hyde Park.* Edw. G. Hogg.

A Point in Ethics.

Sir,—On page 379 you quote from the *Standard* a report in which the Assistant Secretary to the Chemists and Druggists' Trade Association is represented to have said that he "was obliged to tell an untruth in order to detect the defendant." I have looked in vain in the succeeding numbers of the Journal for any contradiction or explanation of this curiously bald statement. That some satisfactory account of the matter will be forthcoming is, I take it, beyond doubt; for the suggestion implied, that when the interests of the Association conflict with truth, it is truth that must yield, is too monstrous to entertain. Without judging this case, it may not be out of place to affirm that a good cause cannot be served by untruth. Of that I am sure the officers of the Trade Association are as fully convinced as I am.

Ryde. Henry H. Pollard.

Conway.—For a method of preparing zinc bromide see *Pharm. Journ.*, [3], vol. x., p. 244.

Constant Reader.—Pharmacy Acts regulating the practice of pharmacy are in force in Victoria, New South Wales and Queensland; but we believe that all three examining boards (that in Queensland is a medical board) receive the certificates of the Pharmaceutical Society of Great Britain in lieu of a fresh examination.

H. Andrews.—Johnson's 'How Crops Grow,' edited by Professor Church and Professor Dyer.

Associate.—Hager's 'Handbuch der pharmaceutischen Praxis.'

H. H. Pollard.—Probably Professor Barff's process, which consists essentially in producing a coat of magnetic oxide on the iron (see *Pharm. Journ.*, [3], vii., p. 702).

Communications, Letters, etc., have been received from Messrs. Abbot, Bruce, Cantrell and Cockrell, Hayward, Tyler and Co., Spondalium, John, Y. L., and S. G.

THE CRYSTALLINE CONSTITUENT OF JAFFERABAD ALOES.*

BY W. A. SHENSTONE.

It will be remembered that at the Evening Meeting of the Society held in March, 1881, Mr. Holmes brought forward a specimen of aloes known in the Bombay market as Jafferabad aloes, which he had received from Dr. Dymock. Shortly afterwards I proposed to Mr. Holmes that an examination of its crystalline constituent would perhaps be interesting, and he very kindly obtained a supply of the drug for me, which I received during the first half of the present year.

I found in a preliminary examination of the substance that although the method employed for obtaining aloin from Barbados aloes was not without result when applied to the Jafferabad aloes, yet that a better result could be obtained by Histed's method.

Accordingly about 1½ pound of the powdered aloes was treated with enough proof spirit to make a thin paste, and after standing for a few hours was enveloped in folds of stout calico and submitted to powerful pressure, by which means I found that a yield of about 28 per cent. of crude aloin could be obtained.

This crude aloin was purified by twice crystallizing from water, then by crystallizing several times from dilute spirit and finally by crystallizing twice or thrice from rectified spirit. Portions of the crops of crystals thus obtained were burnt with the following results:—

I. ·1104 gram of aloin which had been once crystallized from rectified spirit and dried *in vacuo* over sulphuric acid gave ·2438 gram of CO_2 and ·0561 gram of H_2O.

II. ·1380 gram of aloin which had been twice crystallized from rectified spirit and dried *in vacuo* over sulphuric acid gave ·3042 gram of CO_2 and ·0696 gram of H_2O.

Corresponding to—

	Carbon.	Hydrogen.	Oxygen.
I. . . .	60·22	5·64	34·14
II. . . .	60·11	5·60	34·29

The aloin was therefore evidently in a pure state. 1·2375 gram of pure air-dried aloin dried over sulphuric acid in a vacuum lost ·1987 gram of water, corresponding to 16·0 per cent.

When bromine water was added in excess to an aqueous solution of the aloin a copious yellow precipitate fell. This was collected after having been in contact with excess of bromine water for an hour, washed, dried and crystallized three times from spirit. The brominated aloin was in beautiful yellow crystals, which were rather soluble in cold alcohol, and were somewhat more stable than the aloin itself. It retained only a trace of water when dried in a vacuum over sulphuric acid, which was given off on heating to 100° C. to 110° C. ·2526 gram of the perfectly dry substance gave ·2539 gram of silver bromide, corresponding to 42·75 per cent. of bromine.

In 1875 Dr. Tilden proposed, as the result of the consideration of a number of analyses of aloins and their derivatives made by himself and others, that the aloins obtained from Barbados and Zanzibar aloes might be considered isomeric bodies, with the empirical formula $C_{16}H_{18}O_7$, which also agrees closely with the results of his analyses of nataloin. This formula requires 59·62 per cent. of carbon and 5·59 per cent. of hydrogen. Its tribromo derivative requires 42·93 per cent. of bromine.

It will be seen that of the numbers obtained in my analyses those for the hydrogen and bromine agree very closely with these, and that the proportion of carbon, though a little high, also agrees fairly well.

The water of crystallization found, 16 per cent., is rather more than the amount which would correspond to three molecules, *i.e.*, 14·3 per cent. The difficulty of getting air-dried aloin of constant composition, however, is so great that the result is not of much value.

Dr. Tilden found that air-dried zanaloin when dried over sulphuric acid in a vacuum gave off about 14 per cent. of water.

In addition to the above work the following comparative observations were made; in making them some of my aloin from Jafferabad aloes and a portion of Dr. Tilden's zanaloin, which he kindly gave me for the purpose, were employed.

There is no distinguishable difference in the crystalline form of the two aloins.

No. 1*a*.

No. 1*b*.

No. 2.

In the above engravings, which are from photographs and, therefore, absolutely trustworthy,† 1*a* and 1*b* are of the aloin of Jafferabad aloes,‡ and 2 is of zanaloin of Dr. Tilden's preparation. Two photographs were taken of my aloin, as with the available slide it was not possible to get good pictures of both the large and small crystals at once.

Neither of them gives any change of colour in the cold when moistened with ordinary strong nitric acid; both of them are reddened by fuming nitric acid. And the Jafferabad aloin, by prolonged treat-

* Read at an Evening Meeting of the Pharmaceutical Society, December 6, 1882.

† These were kindly taken for me from microscopic slides by Mr. Woollet, of Colchester, who, with my brother, has lately taken a good deal of interest in such work.

‡ The magnification in each case is about 180 diameters.

ment with nitric acid, yields chrysammic, aloetic, picric, and oxalic acids, as zanaloin and barbaloin do.

Jafferabad aloin, when treated with potassium chlorate in a hydrochloric acid solution, yields a chloro-body resembling that given by zanaloin, and when heated with acetic anhydride gives an acetyl compound similar to acetyl-zanaloin.

Both of them, when treated with strong sulphuric acid and potassium bichromate, give a violet coloration closely resembling that given by strychnia, but quickly fading to *green*.

These results seem to leave no doubt that the aloin of Jafferabad aloes is identical with that from Zanzibar aloes, though I should state that the colour of the former is distinctly a lighter shade of yellow than that of the latter.

Up to the present time four aloins have been examined somewhat minutely, viz., those known as barbaloin, zanaloin, nataloin, and that which is the subject of the present communication. In addition socaloin has been partly examined and is believed to be identical with zanaloin.

As the adoption of a new name for every fresh variety of aloin examined is likely to be a source of some inconvenience, and as there is an obvious advantage in adopting a nomenclature which will group together those aloins which are most nearly alike, and also because the aloins seem likely to fall into a few groups, I venture, in concluding this paper, to make the following suggestion, which I think will make a comprehension of the sources and properties of these bodies a little more easy to attain than it is at present.

Since nataloin differs so distinctly from all the rest it will be convenient to retain that name for that substance.

And, since zanaloin, socaloin, and Jafferabad aloin differ so little from barbaloin, they may be conveniently classed together as "barbaloins," distinguishing the aloin of Barbados aloes, which was first discovered, and differs in a few particulars from the others as α-barbaloin, and the later discovered aloins, between which no distinct differences are known, as β-barbaloin. The main points of difference among these bodies could then be tabulated thus:—

1. Nataloin, obtained from Natal aloes, yields only picric and oxalic acids by treatment with nitric acid. Is not reddened, even on heating, by that reagent.

2. Barbaloins, yield chrysammic, aloetic, picric and oxalic acids by treatment with nitric acid.

They may be divided into—

a. α-barbaloin, obtained from Barbados aloes. Is reddened in the cold by ordinary strong nitric acid.

b. β-barbaloin, obtained from Socotrine, Zanzibar, and Jafferabad aloes. Is not coloured by cold nitric acid, but gives an orange red coloration when heated with it, and also gives a coloration in the cold with fuming nitric acid.

The point is not one of great importance, but I think this, or some similar system, might now be conveniently adopted, in place of giving a new name to each aloin even when it is in no way different from others already known.

Clifton College, 1882.

[*The discussion on this paper is printed at p.* 475.]

THE SALE BY PUBLIC AUCTION OF SPURIOUS AND WORTHLESS DRUGS.*

BY E. M. HOLMES,

Curator of the Museum of the Pharmaceutical Society of Great Britain.

Since its incorporation in 1843, the Pharmaceutical Society of Great Britain has taken every opportunity of making as widely known as possible, through the columns of its Journal, all cases of spurious or worthless drugs that have been brought under its notice.

It is much to the credit of the retail trade, that in a large number of cases these falsifications have been detected and pointed out by its members. This statement naturally implies that in such cases the samples have passed undetected through the hands of the wholesale dealers. To assume that this is always the case, however, would be unjust to a considerable number who have, especially of late years, called attention to the very unsatisfactory state of the drug market, and who have on various occasions pointed out the occurrence of adulterations or of very inferior qualities of drugs.

The term "adulterated" is sometimes erroneously applied to crude drugs which do not consist wholly of the article of which they bear the name. Strictly speaking, only those drugs can be said to be adulterated in which there is evidence of some substance being added with fraudulent intention.

In many cases roots, etc., collected by peasants, have other kinds mixed with them, either through the ignorance of the collector, or through carelessness in collecting and drying; or the mixture may occur when the cases containing the drugs are opened at the custom house. I believe, in all wholesale houses of any reputation, these admixtures are removed during the processes of screening, fanning, or picking over, to which crude drugs are subjected before being distributed. The fact of these admixtures not being adulterations is obvious from their occurrence in very small percentage, and from their not bearing a close resemblance to the drug in which they occur.

There is another form of so-called adulteration of drugs of very common occurrence, which consists in the substitution of an unknown drug for the genuine article. This arises in the following way. A merchant abroad sends to the English market, on speculation, a drug which is used in his own country, and which he, in his ignorance of the drug trade, supposes will obtain a remunerative price in this country. The consignee being unable to sell the drug, in consequence of it being unknown, puts it up to auction. At the sales it appears under the name of the drug which it most nearly resembles. In some cases the resemblance is very striking, so that it is quite possible for even a practised eye to be deceived, and the substitution is only discovered when the drug is used in pharmacy. This is notably the case with calisaya bark, cusparia and pareira brava, so much so, indeed, that the description of the last-named drug in the British Pharmacopœia is obviously taken from a mixture of the false and genuine drug.

Those who are acquainted with the wholesale trade are aware of the extent to which different samples of the same drug may vary in size, colour and general appearance, *e.g.*, anise, fennel, cusparia

* Read at an Evening Meeting of the Pharmaceutical Society, December 6, 1882.

bark, liquorice root, aloes, etc., and how easy it is to believe that slight differences merely indicate that the drug comes from a new locality or has been grown in a different climate.

It is very creditable to the members of the wholesale trade that, notwithstanding these difficulties, the substitutions are, in most cases, detected by them before the drugs are sold.

There is, however, a great disadvantage attached to this custom of offering one drug under the name of another in the drug sales. The spurious drugs which often come over in large quantities are purchased at a low price, I believe, by continental dealers known as "mixers," and after being mixed with genuine drugs are sent back to this country with the view of underselling dealers in the legitimate article. Such admixtures are constantly cropping up either in this country or on the continent. This practice cannot fail to exert a baneful influence on the trade, since those who sell the best quality cannot compete with those who sell adulterated drugs.

It would obviously, therefore, be a gain if drugs unknown in this country were not permitted to be sold under the name of those they most resemble, but were obliged to be sold under their real name. To prevent altogether the sale of drugs for which some use might be found would be an act of injustice.

The term "adulterated drugs" may, I think, be limited to those in which there is evidence of an intent to defraud—

1st. By the addition of any substance of less value to increase the weight, such as the addition of sulphate of barium to cochineal and saffron.

2nd. By the admixture of cheaper drugs having a great similarity of appearance, *e.g.*, marshmallow with belladonna root.

3rd. By the addition of a colouring matter to enhance the value, *e.g.*, aniline dye to rose leaves.

4th. By the exhaustion of their active principles before being offered for sale as the genuine article.

Under these headings I wish to direct attention to a few cases of recent occurrence.

1. *Saffron.*—The sample of saffron which I have placed on the table was purchased in London and contains sulphate of barium. To the naked eye it presents the colour and appearance of a fine sample of saffron, but under a hand-lens some threads are seen to be coated with some kind of paste in which occur little holes formed by the bursting of bubbles of air. When stirred in water that liquid becomes immediately coloured and a white powder settles down to the bottom of the vessel. This powder, which is insoluble in nitric acid, having been examined in the laboratory by Mr. W. E. Crow, proved to be sulphate of barium.

2. *Senega.*—In the November number of the *Répertoire de Pharmacie*, M. Charbonnier mentions that in the town of Calvados a number of the pharmaciens have received, from Paris, senega adulterated with white ipecacuanha, *Ionidium Ipecacuanha.* As this root was offered in the London market a year or two ago and disappeared, it has apparently found its way to France and has been used for the purpose above stated. When an adulterated drug is made known in one country, it soon appears in another; hence it behoves the druggist in this country to be on his guard against this adulteration. The rough surface, woody fracture and absence of keel, sweet taste and bright yellow meditullium will serve to distinguish the root of *Ionidium* from senega.

Arnica.—The flowers of *Inula britannica*, which have already been described in the Journal of this Society, as a substitute for arnica, have now been offered in England, and a sample of them is placed upon the table.

3. *Rose Petals.*—Rose petals coloured with rose aniline are still to be met with in this country, although the fraudulent coloration was exposed by Mr. T. E. Greenish in March, 1881.

4. *Jalap.*—The specimen of exhausted jalap root, which has already been alluded to in the Journal as having been deprived of its resin in Paris and offered and sold in London, has been examined, and apparently contains no resin. It behoves the members of the trade, therefore, to examine their jalap powder as to the percentage of the resin it contains and as to the insolubility of the latter in ether or otherwise.

Having recently, while going through the Hanbury collection, observed a curious specimen of jalap, labelled "Peculiar form of Jalap, imported in 1861," 100 grains of it were boiled in alcohol and the tincture poured into water. As in a previous experiment with the specimen presented by Mr. Williams, no trace of resin was precipitated. The jalap had been cut longitudinally in the same way, and had a very similar appearance, except that it looked blacker externally. Internally, it was extremely tough and as difficult to cut as powder of squills when it has caked together, in which point alone it seemed to differ from Mr. Williams's specimen. The root was evidently that of true jalap exhausted of resin. It would appear, therefore, that the practice which is now made known is not new, but was carried on twenty-one years ago.

Ipecacuanha.—The sample of mouldy ipecacuanha mentioned in the *Pharmaceutical Journal* was found to give evidence of the presence of emetine, when the process described in 'Pharmacographia' was adopted. A sample which I received this month, as being undoubtedly the same article after having been washed and dried, when subjected to the same test seemed to contain less alkaloid. This root was much darker in appearance and had a cleaner surface than the ordinary drug. A sample is laid before the meeting for inspection.

It may be of some interest to call attention to the fact that the publication of cases of adulteration of drugs is not sufficient to act as a deterrent. It is true that in some cases, such as senna and pareira brava, the quality has much improved of late years, but these are exceptional cases, and senna mixed with argel leaves is still procurable. A few remarks concerning the adulteration of saffron with mineral matter will show that some more stringent method is required in order to stop the fraud.

Saffron.—In 1869, the *Répertoire de Pharmacie** described an adulterated saffron met with in commerce, which had a very rich colour and fine appearance, the colour having been heightened with about 5 per cent. of a fixed oil, while about 12 per cent. of mineral matter was found in it.

In August, 1870, M. Constantine, of Brest, called attention, in the *Union Pharmaceutique*,† to the adulteration of saffron with 15 per cent. of chalk, stating

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* *Pharm. Journ.*, [2], xi., 231.

† *Pharm. Journ.*, [3], i., 266.

that it had been obtained from a drug house of good repute.

In September, 1870, Mr. D. Hanbury* gave an analysis of some samples of adulterated saffron, containing carbonate of lime to the extent of from 7 to 22 per cent. All the samples containing this adulteration were from Alicante. He remarked that saffron adulterated in this manner is for the most part *undistinguishable to the eye* from the drug in a state of purity.

At the same date Professor Maisch remarked, in the *American Journal of Pharmacy*, upon the occurrence of the same adulteration in the United States.

In February, 1871, Mr. J. Ingham† described a sample of saffron which he had "obtained from a drug firm in London, whose drugs are generally to be relied upon for purity as much as any other," and which had been purchased as *Crocus sativus, opt.*, at 56*s.* per lb., as containing 40 per cent. of the same impurity.

In 1874, J. Mueller,‡ of Breslau, stated that he found 9 per cent. of sulphate of barium in one sample of saffron, and 25 per cent. of carbonate of calcium in another.

In 1879, M. Boutet published in the *Journal de Pharmacie*, vii., p. 669,§ an account of the adulteration of saffron of a similar character, the substances added in this case being 25 per cent. of sulphate of lime and 20 per cent. of glucose.

In the same year Herr Johanson, of Dorpat (*Pharm. Zeit. für Russl.*, October 15), stated that he found a commercial specimen of saffron to contain 39 per cent. of calcium carbonate.

It thus appears that, notwithstanding the publication of the adulteration of saffron with mineral matter in the Journal of this Society and in various continental journals, saffron is still to be met with in commerce, adulterated in the same manner that it was thirteen years ago.

[*The discussion on this paper is printed at p.* 476.]

FURTHER OBSERVATIONS ON ARSENIC.||

BY W. A. H. NAYLOR AND J. O. BRAITHWAITE.

At its last meeting the Society was honoured with a contribution from a distinguished French pharmacien, in which oxalic acid was recommended to be used as a test for arseniates in alkaline salts. It will be remembered that this note of M. Patrouillard was submitted as a rejoinder to an unfavourable criticism we had ventured to offer upon a previous communication which he had published in the *Bulletin No.* 1 *de la Société des Pharmaciens de l'Eure.*

In this paper we understood the author to express the opinion that oxalic acid exercised a reducing action upon arsenic acid. This view being contrary to that held by one of us, we conjointly investigated the subject, the result being that our experiments led us to adopt a conclusion the opposite to that at which he had arrived. A summary of our work on this inquiry was embodied in a paper read before the Conference at Southampton, in August last.

In his rejoinder, M. Patrouillard courteously reminds us that in every place in his memoir where mention is made of arsenic acid, "it is always understood that it is the acid combined with alkalies that is referred to, and that the idea never occurred to him to examine the action of oxalic acid upon uncombined arsenic acid; *à priori* he would have thought that it was the same as upon arseniates."

The point at issue then is clearly this:—Does oxalic acid, when boiled with a solution of arseniate of sodium, exercise a reducing action upon it, either *per se*, or through the intervention of sulphuric acid and sulphuretted hydrogen? To the settlement of this question the following experiments are directed:—

Experiment 1.—1·0 gram of disodic arseniate and ·50 gram of oxalic acid were dissolved in 50 c.c. of water, and boiled for half an hour. When cool the oxalic radical was removed by barium nitrate, filtered, the filtrate decomposed by sodium bicarbonate, and the solution divided into four portions. These were severally examined for arsenite after the manner described in our previous paper; the reagents applied being mercuric oxide, our modified Fehling, iodine and permanganate of potassium. In each case no evidence of a reduction was obtained.

Experiment 2.—This differed only from No. 1 in that oxalate of ammonium was substituted for the free acid. Here also no evidence of a reduction was traceable.

Experiment 3 was identical with No. 1, except that the arseniate was mixed with nine times its weight of sodium nitrate. Search for an arsenite was attended with negative results.

If to the sum of these experiments be added the further fact that a solution of arseniate and oxalic acid on prolonged boiling evolves no carbonic anhydride, we deem the evidence sufficient to warrant the assertion that oxalic acid *per se*, under the conditions now described, exercises no reducing action on disodic arseniate.

Experiment 4 consisted in passing sulphuretted hydrogen through a solution of disodic arseniate containing half its weight of oxalic acid, it having been previously boiled for half an hour. It was observed that no turbidity was produced in the liquid until a steady stream of gas had flowed through it for three minutes; at the end of five minutes little reddish-yellow pellets had formed, and in fifteen minutes a flocculent precipitate had appeared. For the purpose of comparison a second solution was prepared, to which was added sufficient arsenite of sodium so as to contain the equivalent of ·25 per cent. of arsenious oxide. On passing the gas through it a precipitate of tersulphide was produced in a *few seconds.*

Notwithstanding the strikingly convincing character of these experiments it was thought desirable to go a step farther, and to ascertain if the oxalic acid influenced to any extent the composition of the precipitated sulphide.

Experiment 5.—2·0 grams of disodic arseniate and ·5 gram of oxalic acid were dissolved in 50 c.c. of water, and the solution boiled for half an hour. When cool it was strongly acidified with sulphuric acid. Sulphuretted hydrogen was passed through the liquid until no more precipitate fell. The precipitate was collected, thoroughly washed, pressed between bibulous paper and dried in a current of

* *Pharm. Journ.*, [3], i., 241.
† *Pharm. Journ.*, [3], i., 624.
‡ *Archiv der Pharm.*, 1874, Bd. ii., p. 517.
§ *Pharm. Journ.*, [3], x., 422.
|| Read at an Evening Meeting of the Pharmaceutical Society, December 6, 1882.

dry carbonic anhydride first at normal temperature, and subsequently at about 90° C. until the weight was constant. It was then digested repeatedly in carbon bisulphide and filtered. The united filtrates left on evaporation and drying a quantity of sulphur equal to 3·5 per cent. on the dry sulphide. A second experiment, conducted in precisely the same manner, omitting the oxalic acid, gave a quantity of sulphur equivalent to 3·8 per cent. on the dry sulphide. On the assumption that the sulphur resulted from the decomposition of the higher sulphide the two results would represent 13·45 per cent. and 14·60 per cent. of tersulphide of arsenic respectively. As this line of procedure held out no promise of obtaining a reduction which might legitimately be attributed to the oxalic acid, we determined to ascertain what action, if any, took place between the sulphuretted hydrogen and oxalic acid.

Experiment 6 consisted in passing sulphuretted hydrogen through a solution of oxalic acid. At the expiration of one hour, the liquid was filtered. The filtrate on examination was found to contain a small quantity of a substance which, on boiling, reduced silver nitrate solution. The experiment was repeated, but this time the gas was passed through a solution of the acid kept boiling, and the vapour was condensed. The resulting distillate gave proof of the existence of the reducing substance, and in much larger quantity. From the solubility of its barium, calcium and magnesium compounds, from the readiness with which on boiling it converts mercuric chloride in solution into calomel, and reduces silver nitrate to the metallic condition, there can be little doubt that the body in question is formic acid. Here it may be mentioned that Carle and others have detected it as a product of decomposition on passing hydrogen and nitrogen gases through oxalic acid. Parenthetically we may state that sulphuretted hydrogen obtained from native sulphide of antimony was alone used throughout our experiments. It now became a point of interest to know if formic acid would reduce alkaline arseniates. The test was applied by boiling a solution of disodic arseniate with a little of the acid. No carbonic acid gas was given off, and at the end of one hour there was no reduction. The solution was then evaporated on a water-bath to dryness ; still it afforded no evidence of an arsenite.

And now having regard to the whole of our experiments, we conclude that oxalic acid *alone* exercises no reducing action, either on arsenic acid or on disodic arseniate. Further, that the oxalic acid cannot be credited *indirectly* with the reduction which results from the transmission of sulphuretted hydrogen through the solution of arseniate and oxalate previously boiled and acidified with sulphuric acid.

There now remains to us the pleasant duty of acceding to a request, expressed privately by M. Patrouillard, in which we are asked to make the following correction. That in the sentence "l'acide oxalique semble donc agir sur l'acide arsenique aussi bien lorsqu'il est combiné que lorsqu'il est à l'état libre," the words *combiné* and *l'état libre* refer to the oxalic and not to the arsenic acid as interpreted by one of us. The passage then should be so construed as to imply that the oxalic acid, whether free or combined, acts equally well on the arsenic acid.

[*The discussion on this paper is printed at p.* 478.]

MARGARINE MANUFACTURE IN SCOTLAND.*

There are few subjects on which so much popular delusion prevails as in connection with the manufacture of butterine. A large section of the community will purchase almost any kind of mixture so long as it is placed before them in an attractive manner, and labelled pure butter; while they shrink with a feeling almost akin to horror from the artificial substitute, no matter how superior it may be in quality, if it is presented to them under its proper name. The most preposterous stories are circulated about butterine being manufactured from the fat of all conceivable kinds of animals—stories whose only foundation is in the imagination of their originators.

There is only one substance from which butterine, or margarine as it is called in the earlier stage, can be manufactured—that is, pure fresh beef-suet and fat, or what is known in the trade as tallow. The latter name must not be confounded with that applied to the coarser article used in the manufacture of soap and candles. The tallow is principally purchased at auction sales held in Edinburgh, Glasgow, and Aberdeen towards the close of each month, conducted by limited companies. The catalogue contains the names of the principal butchers slaughtering in the local market, with an approximate estimate of the probable quantity each will produce during the month. Each butcher's lot is knocked down separately at a certain price per cwt., and charged at that rate. The tallow is paid for after delivery, generally at the close of each week. An ox will produce, on an average, about 56 lbs. of tallow, and a sheep about 7 lbs. or 8 lbs. The quantities sold for the present month were—at the Glasgow tallow sales, about 140 tons for the month, and the top price realized was 44*s*. 3*d*. per cwt.; Edinburgh Hide, Skin, and Tallow Market Company's sale, about 40 tons, with a top price of 44*s*. 9*d*.; and the Aberdeen Tallow Market Company, about 60 tons, with a top price of 48*s*. 9*d*. The principal manufacturers in Scotland are—Messrs. A. and J. Beveridge, Leith; Messrs. Thomas Dickson and Son, Edinburgh; Messrs. Alexander Ogston and Sons, and Mr. Alexander Lyon, Aberdeen.

The process of manufacture is conducted throughout with the most scrupulous attention to cleanliness, and great care is taken that no stale pieces of tallow are introduced into the margarine, as they at once make their presence known, and taint the article both in taste and smell. When the animals are slaughtered the tallow is hung up in well-ventilated apartments at the slaughter-house for a night, in order to clear off the animal heat and the moisture. Next morning it is taken to the premises of the manufacturer, and spread out upon tables, where all extraneous substances and dirty and stale pieces are carefully cut off the tallow. The selected tallow is then hung up for another night in cool apartments, after which it is cut into small pieces by hand or machinery, and passed through a crushing machine, whence it falls into a large vat. This vat is placed within another vat, and into the intervening space steam is introduced at a gentle temperature. The fat, to which a small quantity of acid has been added to aid in its refinement, is repeatedly stirred, until it has all been exposed to the action of the heat and melted. It is then allowed to settle, after which the oil is drawn off into iron pans, each holding several hundredweights, where it remains for several days, until it has attained a pasty consistency. At this stage the fat still contains its natural quantity of stearine, and is technically known as *premier jus*, or first juice. The fat, having been taken from the pans, is folded up in clean linen cloths and placed in a hydraulic press, in alternate tiers, between iron plates, where it is gradually subjected to enormous pressure. The oil, or oleo-margarine, thus extracted, is drawn off

* From the *Grocer*, Nov. 25, 1882.

into settling pans, where it remains over-night, after which it is placed in casks usually containing about 3 cwts. each. It is then ready for export.

The substance remaining in the cloths is known as "pressed tallow," and after undergoing further pressure and a process of distillation it yields glycerine and stearine. The latter substance is used for the manufacture of a very fine description of candle, which if properly made is able to resist even the heat of tropical climates. Although the greater part of the tallow purchased at the auction sales is that of oxen, and of a character suited to the manufacture of margarine, yet there is always a considerable proportion of refuse and sheep-tallow. The latter contains a much larger proportion of stearine than ox-tallow, and is therefore unsuitable for the manufacture of margarine. It is, however, used along with marrow and the parings from the fat of roasts, in the manufacture of cooking or, as it known in the trade, marrow-fat. It is melted in a large pan placed over a fire, and in consequence the flavour is more agreeable for the purposes for which the fat is used than if it were melted by steam. The oil is strained off, and the remaining crackling, after having been subjected to hydraulic pressure, is made into "greaves," which form admirable food for animals, and are usually sold at about 14*s.* per cwt. Marrow-fat is sold in 1½-cwt. casks, firkins, and half-firkins, at about 50*s.* per cwt., in 56-lb. tins at 51*s.* per cwt, and in 28-lb. tins at 51*s.* 6*d.* per cwt. Oleo-margarine is at present worth about 70*s.* per cwt., and *premier jus* about 10*s.* per cwt. less. The price of both articles is extremely fluctuating, and occasionally falls considerably below the above figure, as two years ago, when oleo-margarine sold at much less than the cost of the raw material. Inferior and refuse tallow received from the slaughter-house, after having been melted in vats by steam, is made into tallow for soap making, and for the composition of "inspector's grease" for the axle-bearings of railway waggons. At present it is worth about 43*s.* 6*d.* per cwt. It is also made up into bars for "cup tallow" for the bearings of steam-engines.

Such is the process of manufacturing margarine generally followed out in Scotland. The manufactured article is exported principally to London, Holland and Belgium. Coming into the butterine manufacturer's hands, the margarine is churned up with sour milk, coloured with annatto, and placed in a tub of pounded ice, where it solidifies. It is then made up in ½-lb., 1-lb. and 2-lb. rolls, covered with muslin, and placed in boxes, or placed solid into tubs or firkins containing from 28 lbs. to 56 lbs. each. The latter class of packages are the more popular in this district. It is extensively sold in Glasgow, and to a considerably less extent in Edinburgh, and appears to give general satisfaction to those who use it. The market price at present ranges from 68*s.* to 92*s.*, and the article is retailed at from 10*d.* to 1*s.* 2*d.* per lb. On the whole, it is as nutritious as the genuine article, but rather deficient in flavour and smell—defects which will no doubt in course of time be remedied. It is, however, to be regretted that shopkeepers do not see their way to offer it to the public under its proper name, a proceeding which would be not only more honest, but which would ultimately tend to the more general adoption of butterine as an article of daily consumption. It is only public prejudice that can hinder its adoption; and this is being rapidly overcome, as is evidenced by the steadily increasing demand, wholesale houses all over the country being forced into selling the article by the demands of their customers. Practically there is little difference between it and fine butter. The one is made from the fat in the cow's milk, the other from the fat on the cow's back, and the chemical constituents are similar.

A NEW AND EXPEDITIOUS METHOD FOR THE DETERMINATION OF THE NITRITES, UNDER DIFFERENT CIRCUMSTANCES.*

BY EDMUND W. DAVY, A.M., M.D., M.R.I.A.,

Professor of Forensic Medicine, Royal College of Surgeons, Ireland, etc.

As the existence of nitrites and nitrates in different natural waters has been regarded (under certain circumstances) as affording evidence of previous sewage contamination, the determination of the presence or absence of such compounds, and their quantitative estimation when present, in the waters employed for domestic purposes, may be a matter of much importance in a hygienic point of view; and though we have some delicate tests for the detection in such of the presence both of nitrites and nitrates, as well as different methods for their conjoint quantitative determination, there is no very simple or expeditious method for the separate estimation of nitrites in waters, which may sometimes be required, if we except that not long since proposed by P. Griess, which method I shall presently describe, and compare with the one I have myself devised, and which I shall now lay before the Academy.

In making lately some experiments on certain nitrites, I observed a reaction, which, as far as I am aware, has not hitherto been described; and this being one of extreme delicacy, I have founded on it a new method not only for the detection of the presence, but likewise for the quantitative determination of the nitrites under different circumstances, but especially in the case of natural waters, for which it is peculiarly suitable. The reaction referred to is that of nitrous acid, or of a soluble nitrite, on the well-known substance, gallic acid; thus when an aqueous solution of that latter acid is brought in contact with a soluble nitrite, the mixture, unless the amount of the latter present be very small, will soon acquire a yellow or yellowish-brown tint, which will increase in depth up to a certain point, after which the colour remains permanent, whilst, at the same time, minute globules of gas make their appearance in the mixture. If, however, the quantity of nitrate present be exceedingly small, it will require several hours, or even some days, to complete the reaction at the ordinary temperature. By the application, however, of heat,† and bringing the mixture to the boiling point, even in the case of the most dilute solutions, the reaction will be completed in a few moments. This development of colour under the circumstances stated is evidently due to the oxidation of the gallic acid, at the expense of the nitrous acid, whereby the compound known under the name of tanno-melanic acid seems to be formed, whilst nitric oxide and carbonic acid gases are evolved. The following equation represents the changes which occur in the reaction:—

Gallic acid.	Nitrous acid.	Tanno-melanic acid.	Carbonic acid.	Nitric oxide.	Water.

$$C_7H_6O_5 + 2HNO_2 = C_6H_4O_3 + CO_2 + 2NO + 2H_2O.$$

These changes, with the development of colour, take place in neutral as well as in acid solutions, but more readily in the latter, and when they are heated, than at the ordinary temperature, as already observed. The colouring principle which is so produced seems to be the same substance that is formed by the gradual oxidation of gallic acid in aqueous solution by exposure to the air; or when this takes place more rapidly, by the solution being rendered alkaline by the addition of one of the alkalies before exposing it to its influence. The colouring matter so formed is unaffected by diluted acids—at least diluted sulphuric, nitric, and hydrochloric

* A paper read before the Royal Irish Academy, April 24, 1882. Reprinted from the 'Proceedings,' [2], vol iii. (Science), No. 9, December, 1882.

† The continual application of heat has the effect of slightly diminishing the depth of colour developed in this reaction.

acids had no apparent effect on it; and the organic acids, acetic, oxalic, and tartaric, even in a concentrated condition, did not seem to produce any change. It is also very permanent, and does not appear to be affected by exposure to air and light, even after being a long time subjected to their influence.

The depth or intensity of the colour produced being in direct proportion to the amount of nitrite reacting on the gallic acid, a ready means is afforded for the quantitative determination of the nitrites. Thus, if a standard solution be prepared, containing a known quantity of nitrite, and if a given amount of water or solution under examination yielded with gallic acid a certain shade or depth of colour, and if the same bulk of the standard solution, or of a mixture of it with distilled water in known proportion, developed the same tint, the former would be considered to contain the same amount of nitrite as the latter, and by thus comparing the tints produced by the waters under examination with those caused by solutions containing known quantities of nitrite, the quantitative estimation of such may be quickly accomplished, just as in Nessler's process (now so much employed by chemists) the determination of ammonia is so readily effected. Indeed, the colour which is developed by the action of the nitrites on gallic acid most closely resembles that produced by ammonia on Nessler's reagent. The process, too, is conducted pretty much in the same way, except that we have a standard solution of an alkaline nitrite, instead of one of ammonia; and the test reagent is one containing gallic acid, instead of Nessler's solution; and finally, that the water or mixture, after the addition of the gallic acid solution, and a few drops of either sulphuric or hydrochloric acid, is heated to boiling in a test-tube and allowed to cool; after which it is placed in a cylindrical flat bottomed glass, to compare more accurately the degree of colour produced by the water under examination with that containing some known quantity of nitrite.

The gallic acid solution which I have employed for the determination of nitrites is a strong or saturated aqueous one, which, if not colourless, can be easily made so by boiling it for a few minutes with animal charcoal, filtering the mixture whilst still warm, and then adding immediately to the filtrate sufficient sulphuric or hydrochloric acid to render it strongly acid, which addition I have found prevents, to a great extent, the tendency of aqueous solutions of gallic acid to become of a yellow or brownish tint on keeping, which well-known property is due, as already observed, to the tendency of that acid to oxidize under such circumstances; but by the addition of the acids stated, I have kept solutions of gallic acid, which were even exposed to the air in open vessels, for over two months without undergoing any change in colour.

As to the standard alkaline nitrite solution, it may be readily prepared by decomposing a hot aqueous solution of silver nitrite with potassium or sodium chloride, and after the subsidence of the silver chloride formed, diluting the solution to the required amount. The one I employed was made, as Dr. Frankland directs, in his 'Water Analysis,' for the preparation of the standard alkaline nitrite solution to be employed in Griess's method for the determination of nitrites, which is prepared as follows:—0·406 gram of pure silver nitrite is dissolved in boiling distilled water, and pure potassium or sodium chloride added, till no more silver chloride is precipitated. The solution is made up to 1 litre, and the silver chloride being allowed to settle, 100 c.c. of the clear solution is made up to 1 litre, of which 1 c.c. is equivalent, as he says, to 0·01 milligram of nitrous anhydride (N_2O_3); and he further adds, that this solution should be kept in closely-stoppered bottles, quite full. A solution at least double this strength will, however, be found more convenient for my test. I may also observe that I have likewise used a standard solution made by taking the commercial potassium nitrite and boiling it along with alcohol, which will dissolve out the potassium nitrite, leaving undissolved the nitrate and other impurities; and this alcoholic solution, on evaporation and drying the residue, will furnish the nitrite suitable for this purpose.

In using this test a convenient quantity of water to employ is 25 c.c., which can be easily heated in a test tube of somewhat larger capacity, along with 1 or 2 c.c. of the gallic solution, and a few drops of sulphuric or hydrochloric acid, and, when the mixture has cooled, transferring it to a flat-bottomed cylindrical glass, where the depth of colour can be more readily determined and compared with that yielded by equal bulks of different mixtures of the standard solution with distilled water. But where the amount of nitrite is very minute, it will perhaps be better to use at least 50 c.c. of the water under examination. I should observe that the nitrates do not produce the reaction described with gallic acid, and, unless they are present in large quantity, do not affect the test; and that it (the reaction with the nitrites) appears to be uninfluenced by the presence of the different saline and earthy salts that occur in natural waters, as well as by the organic matters that may be there occasionally. It might be naturally supposed that soluble salts of iron (which are sometimes present to some extent in certain waters), producing as they do the well-known black or ink-like reaction with gallic acid, would preclude its employment as a means of estimating nitrites, where the former salts were present; but this is not the case; for the iron may be separated by the addition of ammonia and filtration, after which I have found that the filtrate, having been acidified, may be treated with gallic acid, for the estimation of nitrites. It appears, therefore, that none of the substances which would be likely to occur in natural waters interfere with the employment of this test.

As to what may be the exact limits of its indications, I have not yet been able to determine; but I have readily detected, by its use, an amount of nitrite in water equivalent to 1 part of nitrous acid in about 20,000,000 parts of water.

I have made a number of comparative experiments with this test of mine and those hitherto proposed for nitrites, but chiefly with that of P. Griess, already referred to, as Dr. Frankland (who is one of the first chemists of the day) has stated, in his 'Water Analysis,' that it is the only trustworthy means we have for the estimation of nitrites.

This test, I may briefly say, depends on the reaction of nitrous acid on metaphenylene diamine, or meta-diamido-benzol, a derivative of benzol, whereby an orange-coloured compound is produced, by the oxidation of this complex basic substance. This reaction is one of extreme delicacy, and the test is carried out pretty much in the same manner as the well-known Nessler's method for the determination of ammonia; or of mine, just described, for that of nitrites; the depth of colour produced by the test solution, with the water under examination, being compared with that of one containing a known quantity of nitrite; the details, however, of the method will be found fully stated in Dr. Frankland's 'Water Analysis.'

From several comparative experiments I have made with Griess's method and that of my own, I have come to the conclusion that the latter is almost, if not quite, as delicate a test for the nitrites as the former. I have, however, observed this difference between them, that when the proportion of nitrites present was considerable, that then Griess's test gave a more decided reaction, or that the colour produced was of greater intensity than in the case of the gallic acid test; but that when the amount of nitrite was exceedingly minute, that then there was but little or no difference in the delicacy of their indications. In some other respects, however, the test which I have proposed, possesses advantages over that of Griess; thus the metaphenylene diamine is at present a compound very difficult to be procured; so much so that though I applied twice, lately, to one of the best-known firms in London for the manufacture of chemicals, they were unable to procure me a little of that substance; and that which I operated on was kindly given to me by my friend Dr. Tichborne, who procured it direct from Berlin. On the other hand, the reagent used in my test may be got for a few pence at any druggist's shop. Again, Griess's test solution will not keep, as it quickly acquires the same coloration that is produced by the reaction of nitrous acid or a nitrite on it, even when it is kept in closely-stoppered bottles, and therefore requires to be freshly made and titrated almost every time it is employed; whereas the gallic acid solution which I have recommended will, I find, keep for a very considerable time without apparently undergoing any alteration requiring its fresh titration, which is an important advantage. In conclusion, I may add, that whatever may be the comparative merits of the two tests contrasted, I have but little doubt that the one I have proposed will be found to be a useful and expeditious method for both the qualitative and quantitative determination of the nitrites under different circumstances.

SYRUP OF LACTUCARIUM.*

BY FRED. HOHENTHAL.

The chief difficulty in obtaining a syrup of lactucarium of good appearance is the resinous matter present in the lactucarium. In the U.S. Pharmacopœia process this substance is extracted along with the other constituents, but on the evaporation of the alcohol it separates almost wholly, and that with the small part remaining in solution gives the syrup mixed with it an unsightly appearance, although the finished product possesses the virtues of the drug in the fullest degree. There have been remedies proposed for this unsightliness, chief among which are those looking towards a total removal of this obnoxious resinous matter, which, it is claimed, has no medicinal effect, and many methods have been devised to remedy this evil. It was proposed, among others, to extract this resinous matter (caoutchouc) by means of petroleum benzine, and then make the remainder of the drug into syrup. In my experience, thus far, I have found this way to be the best I have yet operated with, although excellent results have been obtained by other processes, prominent among which is that recommended by Professor Balfour, of rubbing the evaporated percolate of lactucarium with carbonate of magnesia and water, filtering, and adding the requisite quantity of sugar, as in the process for syrup of tolu. This is an excellent method, and is used in many laboratories, but is objectionable, inasmuch as alkalies destroy some of the bitter principles of lactucarium.

In the process recommended for the new U.S. Pharmacopœia, a fluid extract is made by depriving the lactucarium of its resinous matter by means of benzine, and extracting the residue with diluted alcohol, and evaporating the percolate to the proper strength, so that 1 minim represents 1 grain of the drug. The extract is then mixed with the proper quantity of syrup, and gives an effective syrup of lactucarium of good appearance.

But the long continued heat necessary to evaporate the percolate down to the proper bulk required for a fluid extract is objected to by many, and I have, therefore, devised a formula intended to do away with as much of the heat as possible, as follows:—

Macerate 1 ounce of lactucarium with 3 or 4 ounces of benzine for twenty-four hours, decant the benzine solution, dry the residue, mix it with an equal bulk of clean dry sand, and exhaust with diluted alcohol to 8 fluid ounces; evaporate this tincture to 6 fluid ounces (instead of to 1 fluid ounce as in the other process), add water enough to regain the measure of 8 fluid ounces, then add sugar 12 troy ounces, and afterwards again water, or preferably glycerine enough to bring the measure to one pint.

By evaporating the percolate from 8 to 6 ounces, and adding water to regain the measure, we do away with so much alcohol, which is often objectionable, and is easily dissipated at a very gentle heat, whereas in the fluid extract method a higher and longer continued heat is necessary to drive off the water. I believe my formula will be found as desirable as any heretofore offered.

* From the 'Eleventh Annual Report of the Alumni Association of the College of Pharmacy of the City of New York,' 1882.

PHOSPHORUS PILLS.*

BY ALONZO ROBBINS.

What is the best formula for extemporaneously preparing phosphorus pills?

In reply to this query, the following formula is presented, and, although I cannot assert it is the "best" formula, it is certainly the most satisfactory that I have ever used:—

Take of Phosphorus	1 grain.
Chloroform	1 fluid drachm.
Balsam of Tolu	30 grains.
Wheat Flour	70 „

Rub the tolu with the flour until it is reduced to a fine powder; put the chloroform into a test tube, add the phosphorus and warm the tube until it is dissolved, pour the solution on the contents of the mortar, rub until a pilular mass is obtained, which divide into one hundred pills.

I found it convenient to have a solution of 6 grains of phosphorus in a fluid ounce of chloroform, of which solution 80 minims would be required in the above formula, each 100th of a grain of phosphorus; for one hundred pills each to contain the 60th of a grain, 134 minims of the solution would be required; and so on for any strength or number of pills.

No powder of any kind is needed in rolling out and dividing the mass. When finished, the pills may be moistened with a strong solution of tolu in ether, and immediately thrown into powdered liquorice root, or other suitable powder, rotated for a few moments, and the excess of powder removed, when they will be ready for delivery. But the additional time and labour required is so small, and the appearance of the product so much more creditable to the skill of the pharmacist, that it is strongly recommended that the pills be gelatin coated, and for this process either of the following formulas answer very well.

The first is a modification of a formula published in the *American Journal of Pharmacy*, 1879, p. 435. It possesses the advantage of being always ready; but the coated pills are rather slow in drying. The second requires to be heated when used, and needs the occasional addition of water; but when a considerable number of pills are to be coated, it is much to be preferred to the other, as the pills can be removed from the needles in a few minutes, and another lot put on and coated.

No. 1:—

Take of Gelatin	℥j.
Acetic Acid	f ℥xx.
Spirit of Nitrous Ether	f ℥xii.
Oil of Gaultheria	♏x.

Dissolve the gelatin in the acetic acid with the aid of a water-bath, then add the other ingredients, and mix. To be used cold.

No. 2:—

Take of Gelatin	℥j.
Sugar	ʒss.
Water	f ℥ij.

Dissolve with the aid of a water-bath, and use while hot, adding a little water occasionally to make up for the loss by evaporation.

* From the 'Proceedings of the Pennsylvania Pharmaceutical Association,' 1882.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 9, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF SPURIOUS AND WORTHLESS DRUGS.

THE report of the discussion which, at the Evening Meeting last Wednesday, followed Mr. HOLMES'S communication on the sale by public auction of spurious and worthless drugs, will be read with interest, and cannot fail to assist the Committee specially charged with the consideration of the subject in drawing up its report. We think it will be recognized that the general tone of the discussion was eminently satisfactory, and that the position taken up by the different speakers was one strictly consistent with the claim of pharmacists to recognition from the public as a body of men who have been specially educated and trained to enable them to deal intelligently in drugs. It will be seen that, in compliance with a suggestion made by the PRESIDENT at the commencement of the discussion, the purely trade aspect of the question was kept in subjection, and the speakers chose for topics rather their experience as to the occurrence of adulterated, inferior and substituted drugs in this country, and the best method of preventing their introduction into the pharmacy.

Mr. HOLMES, in his paper, very properly drew a distinction between cases where a partial or entire substitution of one substance for another is the result of ignorance or mistake and others where there is evidence of sophistication with intent to defraud; but with respect to both these classes he appeared to suggest that there should be some kind of legislative interference on behalf of the retail dealer. He said he considered it would be a gain if drugs unknown in this country were prohibited from being sold, as they sometimes now are, under the name of those they most resemble, on the ground that these spurious drugs are purchased at a low price by continental dealers known as "mixers," by whom they are used for deliberate adulteration of the genuine drug. With respect to drugs adulterated with intent to defraud, Mr. HOLMES called attention to the fact that exposure by publication has not in the past had a sufficiently deterrent effect to make them disappear, and he quoted several recorded sophistications of saffron especially as showing that some more stringent method is required in order to stop the fraud.

It may be said at once, that if this be a correct interpretation of the views of the writer of the paper, they found no support whatever in the discussion. Mr. SCHACHT thought that if exposure were not a complete remedy it was the first step in the only process which commended itself to his mind for the solution of the difficulty. Mr. GREENISH recommended pharmacists to take care of themselves in respect to the drugs which entered their establishments. The VICE-PRESIDENT pointed out that one of the fundamental principles of the Pharmaceutical Society is the condemnation and extermination of drug adulteration, and said that this could be best accomplished as the result of a perfected education, and the dispersion throughout the country of a trained body of pharmacists who would not only decline to receive a spurious article, but would make it unprofitable to a dealer to offer one. Mr. UMNEY justly remarked that already wholesale druggists carry on their business under considerable responsibilities, since retailers have their remedy against them under the Sale of Food and Drugs Act if they supply any article that is not of the nature, substance and quality demanded by the purchaser. Mr. UMNEY claimed that members of the wholesale trade generally are anxious to prevent adulteration, and Professor BENTLEY testified to the skill and care which they exercise to attain this object. In fact, there appeared to be a general agreement that the best means of overcoming the difficulty are to be found in the will and ability of both wholesale and retail dealers to detect and expose substitutions or admixtures of drugs, whether effected intentionally or as the result of ignorance, and that there is nothing to indicate that either class is incompetent or adverse to the task. Even if it were not so, it is not quite evident why the sale of a drug under one name rather than another should have a reformatory effect upon a "mixer," who buys it knowing it is not what it is called and with a deliberate intention of using it for a dishonest purpose.

The time and care that have been devoted to the consideration of the subject will not, however, have been wasted. Every now and then more or less justifiable sensational statements are made with respect to the adulteration of drugs, and these are revivified time after time by every reporter on adulteration in want of material, until the features of each case become quite familiar. Although, therefore, those conversant with the subject know that few of these alleged sophistications would escape the notice of the skilled pharmacist, it will be well that it should go forth that the Pharmaceutical Society is watchful in this respect also of the interests of the public. On this account it appears worth considering whether the Committee which is now engaged upon the subject might not be made a permanent one, to which information respecting substitutions and adulterations might be communicated with a view to their exposure.

IMPORTS OF CHEMICALS INTO JAPAN.

A REPORT by Mr. Consul ENSLIE on the trade of the port of Kanagawa during the year 1881 gives fuller particulars than usual respecting the importation of drugs, chemicals, pharmaceutical preparations and dyes into Japan. So much has this trade developed during recent years that whereas twelve years ago it was carried on by a single firm, during the last three years nearly every mercantile house in Japan has more or less dabbled in it. The result has been that notwithstanding a much increased demand, following upon the successful efforts of the Japanese Government to introduce Western medical and other sciences into the country, the market has been somewhat over-supplied. The trade in chemicals for medicinal purposes is, however, described as having recently undergone considerable modification in consequence of the encouragement given to attempts at home manufacture, so that whereas in former years these goods were imported ready made and put up in convenient packages ready for dispensing, the Japanese are now in a position to prepare many of them themselves. The trade in pharmaceutical extracts, tinctures, scale preparations, etc., has in fact come to an end, only the raw materials being now required, and these are imported in bulk, in many cases direct from the producing countries instead of, as formerly, from England. In addition, German manufacturers are said to enjoy an increasing share of the remaining trade in chemicals used in medicine. Santonin, for instance, one of the most important imports of this kind, amounting to from 120,000 to 180,000 ounces annually, is derived almost entirely from that country. The consumption of quinine is not so large as might be expected, it being replaced by the cheaper cinchona alkaloids, but the principal supply is from Milan. The consumption of morphia has largely increased, and in this case the superiority of the English manufactured article has gained for it almost a monopoly of the market. A large quantity of potassium iodide is used, chiefly of English and French make, whilst potassium bromide is one of the few chemicals principally imported from the United States to the extent of about 25,000 lbs. annually. Tartaric acid, alcohol, bismuth and chloroform are also in steady demand. But the trade in alkalies and heavy chemicals used for manufacturing purposes is far more important than that in medicinal chemicals, and of this English manufacturers have at present the entire control. German manufacturers, on the other hand, monopolize the trade in dyeing materials, one of the principal in demand being aniline violet, which is used in conjunction with logwood for dyeing silk. The Japanese appear, as a rule, to show a preference for goods of English manufacture, but it is evident, from Mr. ENSLIE's report, that in the East, as at home, our countrymen find the Germans to be keen competitors.

PROPOSED INTERNATIONAL PHARMACEUTICAL EXHIBITION IN VIENNA.

A MEETING of representative pharmacists, convoked by the Austrian Pharmaceutical Society, was recently held in Vienna, for the purpose of considering whether it was practicable to have an international pharmaceutical exhibition in that city in the course of next year. The meeting appears to have been well attended, not only by members of pharmaceutical associations having their head quarters in Vienna, but also by representatives from associations in Styria, Austrian Silesia and other provinces. After discussion, an affirmative decision was arrived at, and it was resolved to organize such an exhibition, to be kept open throughout the month of August next. The rooms of the Vienna Horticultural Society are to be rented for the purpose, and a wish was expressed that the principal pharmaceutical bodies in Vienna (the General Austrian Pharmaceutical Association, the Austrian Pharmaceutical Society and the Vienna Pharmacists' Chief Centre) should each select five of its members to act together as an executive committee. The subject came under the consideration of the General Austrian Pharmaceutical Association at its last meeting, when it was decided to support the project and to subscribe one hundred florins towards the expenses. A similar amount had been previously subscribed by the two other bodies mentioned.

COLLEGE OF PRECEPTORS' EXAMINATIONS.

A SHORT time ago we referred to some of the statistics in the official Report on the Oxford and Cambridge Local Examinations. Further evidence of the growing tendency to submit the outcome of middle class education to the judgment of an independent and impartial body is found in the fact that the entries of candidates for the half-yearly examinations conducted under the superintendence of the College of Preceptors, which began on Tuesday last and have been carried on simultaneously in fifty-five local centres, exceeded eight thousand three hundred, making, with those examined at midsummer, a total of nearly thirteen thousand for the present year. We are informed that a supplementary examination for the preliminary literary subjects required by various bodies by whom the certificates of the College are recognized, among which is the Pharmaceutical Society, will be held in March next in London and at four provincial centres,—University College, Liverpool; the Leeds Medical School; Queen's College, Birmingham; and University College, Bristol.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of this Association will be held on Thursday, December 14, when a paper will be read on "Original Investigation in Pharmacy," by Mr. E. M. HOLMES, F.L.S. The chair will be taken at 8 p.m., by the President, Professor ATTFIELD, F.R.S.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, December 6, 1882.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, W. Hills, Radley, Richardson, Robbins, Savage, Schacht, Symes Williams, Woolley and Young.

The minutes of the previous meeting were read and confirmed.

THE LATE MR. ALLCHIN.

The PRESIDENT read a letter from Mrs. Allchin, thanking the Council for the resolution of sympathy passed at the last meeting.

APPOINTMENT OF EXAMINERS FOR 1883.

The Council went into committee to consider nominations, and upon resuming the following pharmaceutical chemists were appointed to act as Examiners for the ensuing year, subject to the approval of the Privy Council:—

England and Wales.

Barnes, James Benjamin, 1, Trevor Terrace, Knightsbridge, S.W.
Benger, Frederick Baden, 7, Exchange Street, Manchester.
Brady, Henry Bowman, Hillfield, Gateshead-on-Tyne.
Corder, Octavius, 31, London Street, Norwich.
Ekin, Charles, 2, Lampton Road, Hounslow.
Fletcher, John, Montpellier Avenue, Cheltenham.
Gale, Samuel, 225, Oxford Street, W.
Greenish, Thomas Edward, 20, New Street, Dorset Square, N.W.
Linford, John Samuel, 5, Gladstone Street, Anlaby Road, Hull.
Plowman, Sidney, 2, Residence, St. Thomas's Hospital, S.E.
Southall, William, 17, Bull Street, Birmingham.
Tanner, Alfred Edward, High Cross, Tottenham.
Taylor, George Spratt, 13, Queen's Terrace, St. John's Wood, N.W.
Thresh, John Clough, 11, Eagle Parade, Buxton.

Scotland.

Ainslie, William, 58, George Street, Edinburgh.
Baildon, Henry Bellyse, 73, Princes Street, Edinburgh.
Clark, William Inglis, 26, South Back Canongate, Edinburgh.
Gibson, Adam, Leven.
Gilmour, William, 11, Elm Row, Edinburgh.
Kinninmont, Alexander, 69, South Portland Street, Glasgow.
Nesbit, John, 162, High Street, Portobello.
Stephenson, John Bertram, 48, North Frederick Street, Edinburgh.

It was resolved—

"That the Board of Examiners for England and Wales shall meet in the months of February, April, June, July, October and December in 1883."

The cordial thanks of the Council were unanimously voted to the Boards of Examiners for their services during the present year.

ELECTIONS.

ASSOCIATE.

The following, having passed the Minor examination, and paid, as an Apprentice or Student, his subscription for the current year, was elected an "Associate" of the Society:—

Norman, William Francis......Towcester.

A former Apprentice or Student was restored to his former status in the Society upon payment of the current year's subscription and a fine.

The name of the following person, who had made the required declaration and paid a fine of one guinea, was restored to the Register of Chemists and Druggists:—

James Gater, 22, Victoria Road, Peckham, London, S.E.

Mr. John Munday was appointed Local Secretary and Superintendent of Written Examinations at Cardiff, in place of Mr. A. B. Hollway, who has resigned in consequence of ill health.

ADDITIONS TO THE REGISTER.

The Registrar reported that—

George Gibbons, Adwy, near Wrexham,
James George Hole, Westbury, Wilts,

having severally made the statutory declarations that they were in business before the passing of the Pharmacy Act, 1868, and these declarations having been supported by duly qualified medical practitioners, their names had been placed on the Register.

REPORTS OF COMMITTEES.

FINANCE.

The report and recommendations of this Committee were received and adopted, and various accounts were ordered to be paid.

BENEVOLENT FUND.

Legacies.

Previous to the reading of the report of this Committee,

The SECRETARY read a letter he had received from the executors of the late Mr. CHARLES JAMES PEARSON, of Swansea, stating that that gentleman had bequeathed £100 free of legacy duty to the Benevolent Fund.

He reported also that he had received a cheque for £100 from the executors of the late Mr. HOWDEN, in payment of the legacy previously referred to.

Donation from the Committee for Reception of the British Pharmaceutical Conference at Southampton.

The SECRETARY further reported that Mr. Chipperfield, Hon. Treasurer to the Local Committee of the British Pharmaceutical Conference at Southampton, had written that there had been a surplus of receipts over expenditure in connection with the recent meeting, and, in accordance with a resolution of the Local Committee, he had forwarded a cheque for £55 16*s*. 7*d*., the amount of the balance, as a donation to the Benevolent Fund.

The thanks of the Council were voted to the Local Committee for their donation.

The report of the Committee included a recommendation of the following grants:—

£15 to a former Member who was also a subscriber to the Fund.

£5 to a pharmaceutical chemist, who has been unfortunate and suffered from illness.

£5 to the widow of a registered chemist and druggist.

£5 to the widow, aged 68, of a registered chemist and druggist.

One case had been deferred for further inquiries, and two applications the Committee had declined to entertain.

The Secretary had submitted a statement with regard to the Isherwood orphans, showing that the fund subscribed for their support was exhausted. A letter had been received from the gentleman with whom the two boys were placed, saying he should be happy to wait on the Committee with the boys in January next.

With regard to Mr. Robbins's special donation the Secretary had reported that only one of the annuitants had subscribed to the Fund, and it had been therefore resolved to recommend that £5 be given to her before Christmas.

The report and recommendations were unanimously adopted.

Mr. Robbins said it was rather astonishing to hear that out of the thirty-six annuitants at present on the list only one had been a subscriber to the Benevolent Fund. He hoped this would not be found to be the case in future years.

LIBRARY, MUSEUM AND LABORATORY.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
October . .	Day . .	592	32	11	23 nearly
	Evening	207	17	5	9

Circulation of books.	Town.	Country.	Total.
No. of entries . . .	199	164	363

Carriage paid, £1 10*s.* 5*d.*

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Index-catalogue of the Library of the Surgeon-General's Office, U.S. Army, vol. 3.
From the Surgeon-General.

Flückiger (F. A.), Die Chinarinden, 1883.

Archiv der Pharmacie, Separat-Abdruck, 1882.
From Professor Flückiger.

The Committee recommended the purchase of the undermentioned books:—

Candolle (Alph. de), Origine des plantes cultivées, 1883.

Davies (T.), The preparation and mounting of microscopic objects, 1881.

Hager (H.), Commentar zur Pharmacopœa Germanica.

Lunge (G.), Treatise on the distillation of coal-tar and ammoniacal liquor, 1882.

— Theoretical and practical treatise on the manufacture of sulphuric acid and alkali, 1879–80. 3 vols.

Pomet (P.), History of drugs, 1748.

Sachs (J.), Text-book of botany, 2nd ed., 1882.

Curator's Report.

The Curator had reported the average attendance in the Museum to have been—

Attendance.		Total.	Highest.	Lowest.	Average.
October. .	Morning	410	25	2	16
	Evening	115	17	0	5

The following donations to the Museum had been received and the Committee recommended that the usual letters of thanks be sent to the respective donors:—

Specimen of *Humulus Lupulus* with monœcious flowers. From Mr. H. O. Huskisson.

An orginal bottle of Persian Rose Water.
From Messrs. Christy and Co.

Specimens of Crude and Pure Chinoline and Tartrate of Chinoline prepared from Cinchonine; Chinoline and Tartrate of Chinoline obtained from Coal-tar.
From Messrs. Hopkin and Willliams.

Specimens of the following Brazilian drugs:—Guaco, Jaquitiba Bark, Cipo Chumbo, Milhomens.
From M. Eugene Collin.

Specimens of Almasça (Brazilian Elemi), Oil of *Carapa guianensis*, Guassatunga Bark.
From Dr. Symes.

Specimen of Winter's Bark.
From Mr. G. B. Francis.

Specimens of Spurious Calumba Root and Bengal Cardamoms.
From Messrs. Burgoyne, Burbridges, Cyriax and Farries.

Specimens of Adonidin, Tannate of Cannabine, Convallarin and Convallamarin.
From Messrs. E. Merck and Co., Darmstadt.

A series of Herbarium specimens of various species of Aconite.
From Professor Maximowicz, St. Petersburg.

A series of packages of Cinchona bark from the Darjeeling Plantations.
From the Indian Government.

Specimens of False Buchu (*Empleurum serrulatum*), of *Barosma ericifolia* and of False Calisaya Bark.
From Messrs. Donald Gray and Son.

Specimen of False Buchu leaves.
From Messrs. Dalton and Young.

Specimen of False Senega root (*Polygala Boykinii*).
From Professor J. Maisch.

A letter of thanks had been received from the Director of the Royal Gardens, Kew, for duplicate specimens of drugs.

The Professors had attended and reported satisfactorily as to their respective classes.

Estimates for printing the Register and Calendar had been considered and were recommended for acceptance.

The Committee recommended that the list of subscribers to the Benevolent Fund be published in the Journal for the last week in February.

It was also recommended that the fire policies on the Society's premises and property be increased to £18,900 in the aggregate.

The Council went into committee to consider some parts of the above report.

On resuming, the report and recommendations of the Committee were received and adopted.

LAW AND PARLIAMENTARY.

The Council went into committee to consider this report. After considerable discussion the Council resumed and the report was received and adopted.

The President reported that, having taken steps to ascertain the views of the department in regard to further legislation, he had had an interview with Mr. Peel and the following correspondence had taken place since that interview:—

"17, Bloomsbury Square,
"*November* 13*th*, 1882.

"C. L. Peel, Esq.,
"Privy Council Office.

"Sir,—With reference to your letter of 29th July last, and the interview between yourself and the President of this Society on the 9th inst., I am instructed to inquire if their Lordships desire that the Council of this Society should prepare and submit to the Privy Council, in the form of a Bill, their views as to the amendment of the law in regard to the sale of poisons.

"I have the honour to be, Sir,
"Your obedient servant
(Signed) "Elias Bremridge,
"*Secretary and Registrar.*"

"Council Office,
"14*th November*, 1882.

"Sir,—I have submitted to the Lord President of the Council your letter of the 13th inst., and I am directed to request that you will inform the Pharmaceutical Society that his Lordship would be glad if that Society would submit their views, in regard to the sale of poisons, for the consideration of the Lords of the Council, in the form of a draft Bill amending the existing law.

"I am, Sir,
"Your obedient servant,
(Signed) "C. L. Peel."

The President announced that the Law and Parliamentary Committee was drafting a Bill, in response to the invitation of the Privy Council.

GENERAL PURPOSES.

The report of this Committee was taken in committee as usual. It included a letter from the Solicitor, stating the progress of cases which had been placed in his hands.

Several cases of alleged infringement of the law had been considered by the Committee, and legal proceedings were recommended in three cases.

The report and recommendations were received and adopted.

Report of the Board of Examiners.

Special Recommendation respecting the Preliminary Examination.

The President said the next business had reference to a recommendation made by the Board of Examiners in England, with regard to the Preliminary examination, which had been sent to the Board in Scotland, and partly, but not altogether, agreed to by the latter body. The recommendation referred to the Latin authors to be used in future, and also to the time over which the examination should extend. It was customary for some members of the London Board of Examiners, with the President, to attend once a year the College of Preceptors, to ask for information and to take counsel together as to whether the examination was doing its work properly, and whether any suggestions could be made as to its amendment. Accordingly, last July, he with other members of the Board attended at the College of Preceptors by appointment, and had a long conversation with the examiners and with the Dean of the College. The conclusion arrived at was that, having regard to the somewhat careless way in which the subject of English was dealt with in many of the papers, it would be wise to separate that subject from Latin and Arithmetic and to give a special and separate time to it; in other words, that the present three hours devoted to the three subjects should be devoted to Latin and Arithmetic only, and that after an interval of an hour there should be another hour and a half set aside for English. It was found that, in many cases, there was a disposition on the part of the candidates to use a large portion of the time for Arithmetic, and when they came to the English they had not the opportunity to show to what extent they could come up to the requirements of the examiners. The next consideration was with regard to the Latin author. The first book of Cæsar had been used ever since there was any Preliminary examination at all, and it was recognized that it was a book still read in a very large number of schools; but it was also recognized that there were a certain number of other schools in which Virgil practically took its place, and the examiners readily assented to a suggestion which had often been made that Virgil should be added to the subjects, and that the candidate should have the option of taking a paragraph from Cæsar or Virgil at will. Of course, the object was not to get a knowledge of any particular author's Latin, but an indication that the candidate had such a knowledge of Latin as that he might be able to conduct his business satisfactorily. If the examinations were restricted to one author, candidates were compelled to read that author; and, as was well known, the peculiarities of Cæsar were almost innumerable, so that a very good Latin scholar who had not read Cæsar might find very considerable difficulty in translating a paragraph and answering questions upon it. The Council did not desire to encourage men to prepare special books, but to obtain a general standard of education in Latin and other subjects. The examiners of the College of Preceptors thought, therefore, that Virgil might very well be added, and seeing that the first book of Cæsar had been used for so long they also acceded to the suggestion that the second book of Cæsar might be added. The general conclusion come to was that two books of Cæsar and two books of the Æneid should be the standard books, and that a year's notice should, in each case, be given as to which book of each author should be selected. This suggestion was sent to the Board of Examiners in Scotland, and substantially the members of that Board agreed with their London colleagues, except that they would limit the Latin to the first book of the Æneid and the first book of Cæsar. He must confess he agreed with the London Board that it was desirable that the recommendation should be adopted in full, and he would, therefore move a resolution as follows:—

"That in future the time allowed for the Preliminary examination be four and a half hours; three hours in the morning and one hour and a half in the afternoon, with an interval of one hour between the two portions of the examination.

"That in the morning the three hours be devoted to Arithmetic and Latin, and that in the afternoon the whole time be devoted to English.

"That in Latin the present regulation requiring translation into English of a paragraph from the first book of Cæsar (De Bello Gallico) be extended as follows:—

"Two Latin subjects shall be annually selected in December by the Council from the works of the undermentioned authors, and twelve months' notice shall be given in the *Pharmaceutical Journal* of such selection:—

"*Cæsar.*—One of the first two books of the Gallic War.

"*Virgil.*—One of the first two books of the Æneid.

"That in each examination paper a passage from both of the selected books be given, but that a candidate shall be required to translate one only of such passages.

"That the Latin subjects to be selected for 1884 be:—

"*Cæsar.*—Second book of the Gallic War.

"*Virgil.*—First book of the Æneid."

Mr. Andrews asked if this would not make the examination somewhat more difficult that the Oxford and Cambridge local examinations, which were now accepted as sufficient.

The President said he thought not.

The Vice-President said he had had a good deal to do for the last ten years with the Oxford and Cambridge University examinations, and he could say that this examination, even with the addition of Virgil, would be below that standard in Latin. He had much pleasure in seconding this motion. He thought it was a great boon to have the extension of time. He had superintended the Preliminary examination for some years in Salisbury, and he found that many youths occupied nearly the whole time in the two earlier subjects, and with regard to the English, which was, after all, about as good a test of a liberal education as could be, they had to apologize, because hardly the requisite number of lines were written. He was very glad to hear they were going to get away from Cæsar for a bit; long ago he had suggested that Cornelius Nepos should have a turn. Even if there were a slight increase of stringency in the Preliminary examinations, which there was not, he should heartily approve of it, because he thought it would be a wise and kind act to put such a barrier at the outset that only those could pass it who were likely to succeed in the subsequent examination. But there was no indication of this being so. The matter had been carefully considered by the College of Preceptors, and the intention was rather to vary the extent of the Latin information than to make it more stringent.

Mr. Symes said if the proposal were to increase the stringency of the Preliminary, he should take exception to it. He did not say it was not desirable gradually to increase it somewhat, and he agreed with the Vice-President that at present it was somewhat below the Oxford and Cambridge local examinations, but whilst there was such a large percentage of failures it would not be wise to increase the stringency. The chief point to which he wished to speak was the question of time, and he failed to see how this increase of time was at all necessary. His experience as a superintendent was that the greatest loss of time was at the beginning, and then many candidates spent a great deal of time over the first subject. He believed it would be found that the failures were very few comparatively in Latin. But assuming it was a want of time that caused them to come short in English, the conclusion would follow that the next proportion of failures would be in Arithmetic, and the larger proportion in English. But that was not so; the greatest percentage of failures was in Arithmetic, the second subject, and, therefore, it was not a question of time, but of capability. He admitted that English was often neglected for want of time, owing to too much being spent in the Arithmetic, but he thought the difficulty might be met by giving one hour to each subject. It might in some cases be objectionable to youths who had to come a long distance, to spread the examination over five and a half hours. Of course he assumed that an equal quantity of work would be put into each subject.

Mr. Hampson thought the experience of the officers of the College of Preceptors was very important. They had immense experience in this kind of examination, and they divided the subjects, and gave proper time to each. With regard to including two other books in Latin he did not see any great hardship in it. The first book of Cæsar had become so hackneyed that it was quite time to have a change.

Mr. Borland was glad to find there was a substantial agreement between the two Boards of Examiners with regard to the increased time given to Latin and Arithmetic, but he certainly thought that in the face of coming legislation and with the prospects of an enforced curriculum the Preliminary examinations should not be made any more stringent than at present, and the statistics did not appear to show that there was any great proportion of failures in Latin. He did not object to the introduction of another book in addition to Cæsar, which would to a certain extent be in favour of the candidates. In Scotch schools it was quite customary for the teachers to have a *penchant* for a certain author, and a boy after he had passed through the rudimentary stage was set to translate it, and if he had an aversion to Cæsar he was pushed on to Virgil. If the resolution come to by the Scotch Board were adopted it would give the candidate an opportunity of presenting himself at an earlier period than if he had to go on for another half year at school studying the second book of Cæsar, which might be selected by the Council for the year in which he was to come up. With regard to the Latin examination it should not be overlooked that the Board of Examiners had a double opportunity to examine the candidates in Latin, because this was a point in the Minor examination in reading prescriptions, and it had been noticed by Dr. Greenhow that many candidates failed in reading Latin prescriptions. During the time when he was examiner in Edinburgh he was often obliged to remit candidates back to their studies from the imperfect knowledge of Latin which they exhibited in reading prescriptions. They could tell what was meant, but could not read the numerals or give the terminations. He, therefore, thought it was rather too much, at the present time, to include two books in each author. There was great difficulty in Scotland generally to find apprentices to enter the business, and if the stringency of the examinations were in any way increased this difficulty would also increase. He had no doubt that the object of the examiners was to bring into the business a class of young men whose parents were in a position to keep them longer at school, but it was very doubtful whether a sufficient number of such youths was forthcoming.

Mr. Williams said he should support the proposition, because he did not see that it was at all objectionable, or that it would practically increase the stringency of the examination. He should only suggest an alteration of the wording of it, because he did not think it was the province of the Council to select the subjects; the examination was submitted to the Board of Examiners, to whom it ought to be left.

The President said it must be done by the Council ultimately, and it was much more convenient for the Council to act in the first place, otherwise there might be a delay of six months.

Mr. Borland said he should move as an amendment, that the recommendation of Board of Examiners in Scotland be adopted. He moved—

> "That the recommendation of the Board of Examiners in England be adopted, excepting in so far that the examination in Latin be confined to the first book Cæsar and first book of Virgil's Æneid."

Mr. Young seconded the amendment. He considered this was a very important matter; there had been frequent complaints made of the number of failures in connection with the Preliminary examination, and it appeared to him very strange in that state of matters that the stringency of the examination should be increased, and that would be the tendency, whatever might be said to the contrary. No doubt it was a good thing that there should be an option to take Virgil instead of Cæsar, but he saw no reason for going beyond the first book of each. One gentleman said the first book had been used so long that it was become quite hackneyed; but it must be remembered that it was a different set of boys who came up each time, and although the teachers might have got tired of picking out the paragraphs, they were quite new to the lads who had to translate them. For all the Latin which was really wanted in connection with the business, one who could translate properly the first book of Cæsar had a very fair knowledge, and it would entail a great deal of extra trouble if he had to make himself proficient in the second book. It took a good time at school to get through the second book of Cæsar, and therefore he thought at present the Council might be satisfied with adding the first book of Virgil, so as to give the youths an option and to increase the time so as to show there was really a desire that they should pass. He did not agree with Mr. Williams's suggestion, for he thought the Council should have the control of the whole matter.

Mr. Andrews thought anything which tended to bring the Preliminary examination on a par with the Oxford and Cambridge local examinations was decidedly desirable, as otherwise the candidates did not all start fair. He thought Mr. Borland and Mr. Young were rather opposed to each other as to one point. If Latin were properly taught, the boy ought to be able to translate the second book of a work as easily as the first. The fact was that now youths learnt the whole of the first book by heart, but did not learn the language properly, so that it was no test at all. If a boy knew Latin he could translate the whole of the Æneid properly as well as the first book. He thought it was a very good suggestion to add Virgil, because boys might be taught Latin very well and yet not be able to translate Cæsar, unless they had specially studied it. He had heard of one case in which a boy knew the first book of Cæsar so well that he translated a passage which was not set.

Mr. Radley suggested that the question of time was of great importance in some parts of the country, and he feared if it was extended as proposed, it might sometimes involve youths being away a night from home, which was rather objectionable.

Mr. Schacht said the scheme as put forward by the English Board contained a great deal with which he strongly sympathized. The enlargement of the scope over which the examination extended from one book of one author to two books of two authors was a decided improvement, nor did he fancy the extension to two books of either author was at all too much; but it did strike him there was a weak point in the recommendation of the English Board which, if removed, might possibly meet the objection raised by the amendment. The weak point in the recommendation was the suggestion that the Council should each year select the Latin subjects. Why should not the examination papers contain a set of questions from each of the authors, giving the candidate the alternative of answering whichever he pleased?

The PRESIDENT said that was intended.

Mr. SCHACHT asked, if that were so, where was the necessity for indicating the book selected. There was no doubt many preceptors trained their pupils in Virgil rather than Cæsar, and those who had been trained in Virgil would have to study Cæsar for a considerable time in order to be able to answer any questions upon it; but those who had been decently trained might be fairly supposed capable of answering questions on either of two books of the author they had studied.

The PRESIDENT said there would be an objection to having four passages on the examination papers. The examiners would have preferred only one.

Mr. SCHACHT said he did not propose that passages from all four books should be set, but that the examiners might choose from either.

The PRESIDENT said that would probably meet the views of the London Board entirely, but was not what Mr. Borland desired.

Mr. YOUNG said the amendment was simply addressed to confining the examination in Latin to the first book in Virgil or Cæsar, the candidate having the option of choosing a passage from one author or the other.

The PRESIDENT thought Mr. Schacht's view was the right one, and that eventually it must be adopted; but it was necessary to proceed gradually, and it had been long the custom in all examinations in which classics formed a part to give the actual book selected.

Mr. BOTTLE supported the amendment because he thought it extremely desirable that the two Boards of Examiners should act in perfect accord; and even if the Scotch Board had agreed with the recommendation of the English Board he should have accepted it with some compunction, because he thought it unwise at the present moment to even appear to increase the stringency of the examination. He also found that the preliminary examination for tho College of Surgeons only contemplated one Latin author.

Mr. SCHACHT remarked that it included Greek also.

The amendment was then put, and there were 7 votes on each side.

The President and one other member of Council did not vote.

The PRESIDENT said under these circumstances the only course for him to pursue was to vote for the minor proposition, although it was not in accordance with his own views. He must therefore declare the amendment carried.

The amendment was then put as a substantive motion and carried.

The following resolution, embodying the recommendations of the Board of Examiners as altered by the above amendment, was then put and carried unanimously:—

"That in future the time allowed for the Preliminary examination be four and a half hours, in two periods of three hours and one hour and a half, with an interval of one hour between the two portions of the examination.

"That the three hours be devoted to Arithmetic and Latin, and the one hour and a half to English.

"That in Latin the present regulation requiring translation into English of a paragraph from the first book of Cæsar (De Dello Gallico) be extended by the addition of Virgil—first book of the Æneid.

"That in each examination paper a passage from both of the authors be given, but that a candidate shall be required to translate one only of such passages.

"That this regulation shall come into force in January, 1884."

Mr. BUTT suggested that the Preliminary examinations in future should be held on Thursday, as it would in many cases be more convenient.

The PRESIDENT said that would have to be decided on a future occasion.

A NEW PHARMACOPŒIA.

Mr. HAMPSON said he noticed in the Journal for November 25, an article in reference to the appearance of the new German and United States Pharmacopœias, in which the Editor casually alluded to a rumour that a new edition of the British Pharmacopœia was in preparation. He was anxious to know if there had been any communication received by the President or the Secretary from the Medical Council with reference to this new edition, and whether in that communication any proposals had been made to include the Society in the preparation of this new pharmacopœia. It appeared to him that it was a most humiliating position for the Society which represented pharmacy to be utterly ignored in this matter.

The PRESIDENT said he could only reply that neither he, as President, nor the Secretary had received any communication from the Medical Council on the subject.

THE WEIGHTS AND MEASURES ACT.

The PRESIDENT read a letter which he had received from Mr. Keyworth, of Hastings, referring to the inspection of chemists' weights and measures.

The Council went into committee to consider the letter. On resuming,

The PRESIDENT said he gathered that it was the opinion of the Council that he should reply to Mr. Keyworth that in the present state of the law it was very important and desirable, wherever the Weights and Measures Act was in force, that every dispensing chemist should see not only that his larger weights and measures were correct and stamped, but that also his smaller weights and measures used in dispensing were also similarly stamped and verified; and that it was not expedient at the present moment to make any attempt on the part of the Society to alter the law on the subject.

EVENING MEETING.

Wednesday, December 6, 1882.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

An Evening Meeting of the Pharmaceutical Society was held on Wednesday last, the 6th inst. The chair was taken at half-past eight.

The minutes of the previous meeting having been read and confirmed, the PRESIDENT requested Mr. Holmes to read a paper on—

THE CRYSTALLINE CONSTITUENTS OF JAFFERABAD ALOES.

BY W. A. SHENSTONE.

The paper is printed on p. 461, and gave rise to the following discussion:—

Professor ATTFIELD said that Mr. Shenstone had obtained negative results, and an investigator never got so much credit for them as he did for discovering something new. At the same time it was quite clear that Mr. Shenstone had done most excellent, admirable and useful work, and he had clearly made out that the aloin obtained from the Jafferabad aloes was allied to barbaloin and not to nataloin, inasmuch as he got the chloro-, bromo- and acetyl derivatives which were obtained from barbaloin and not from nataloin.

The PRESIDENT said that one must always be struck with the tendency of investigations of this sort to show that most of the organic bodies of the same nature which yielded active principles yielded principles which were closely allied, if not identical. When a complete series of investigations should have been made into all the varieties of aloes, such as Dr. Tilden and Mr. Shenstone had already made into the more important varieties, it would be possible probably to come to some definite conclusion with regard to them, which would be of real practical value in pharmacy. Mr. Shenstone was a former distinguished student of the Society and was now teaching chemistry at Clifton College. The members of the Society were grateful to him for continuing to take an interest in materia medica and other matters connected with pharmacy.

The next paper read was—

On the Sale by Public Auction of Spurious and Worthless Drugs.

BY E. M. HOLMES.

The paper is printed at p. 462, and gave rise to the following discussion:—

The President said he would venture to suggest that in the discussion the speakers should avoid going into purely trade matters. He had no doubt that Mr. Holmes's object was to elicit information from the members about their experience in actual pharmaceutical practice, as to the extent of adulteration, and to assist buyers in detecting fraud. The difficulties which were so ably presented in the paper were difficulties which even the most practised eye could not at all times overcome, and there could exist no better proof than that fact of the necessity for there being a trained and educated body of pharmacists. Fortunately there was a very large staff of excellent pharmacists spread all over the country, and he thought that it was to the credit of the Pharmaceutical Society of Great Britain, that it had disposed and encouraged buyers in the sale rooms of the City of London to be as careful as such men could be. He hoped that the discussion would be confined as much as possible to a statement of further instances of detected adulteration. The purely trade side of the question was adapted rather for consideration by a small committee of half-a-dozen men, than for discussion at such a meeting as the present. Perhaps the paper might be taken to be a general comment upon the way in which things were bought in the City. He would ask Mr. Umney, who was in the habit of buying on the east of Temple Bar, to open the discussion.

Mr. Umney said that he felt that the paper was a most important one. It was important for the pharmacist, because he was watched on one side by the medical practitioner, and on the other side by the public, and he sometimes was blamed if the effects of the drugs he sold or dispensed did not answer the expectations of the medical man. He could conceive no better action on the part of a pharmacist than to point out adulteration and to hound it down unflinchingly. He knew that the members of the wholesale trade generally were quite as anxious as the retail pharmacist to prevent adulteration. The responsibility of the wholesale druggist was very great. There was an Act known as "The Sale of Food and Drugs Act," and retail traders had their remedy against the wholesale dealers for supplying them with anything which was not of the nature and character demanded. For officinal drugs and preparations wholesale traders were quite ready to be judged by the standard described under "Characters and Tests" in the British Pharmacopœia. Mr. Holmes had very properly alluded to impurities which could not be well avoided, as in the case of scammony and other drugs which were collected by peasants. Such things came into the market and they were an unavoidable evil. Cheap drugs were generally said to be an abomination, and while this was undoubtedly true of such bodies as saffron and other drugs which were adulterated to make qualities to be sold at lower rates, it was not strictly true that all medicinal substances can be so classed. Take, for instance, ginger, and contrast African or Bengal with fine Jamaica ginger. Both were equally genuine, but their prices varied from, say, £25 to £100 per ton. Pharmacists should not lose sight of these important differences, when, from economical points of view, they were making purchases. Again, saffron might be very fairly genuine as a commercial article and yet not genuine from a botanical point of view. Ten or fifteen per cent. of the stamens might be present in consequence of the drug having been gathered carelessly, but he did think that could be fairly called a gross adulteration. One bad form of drug to which Mr. Holmes had alluded was that known in trade as Alicante saffron. All good houses ignored such an article. They knew that it was loaded either with carbonate of lime or carbonate of baryta or, perhaps, sulphate of baryta made adherent by glycerine or some such body. He had again and again taken samples of saffron exposed on the brokers show-boards and infused them in water and obtained after a few hours a sediment which, upon being treated with hydrochloric acid and the solution examined, gave conclusive evidence of adulteration. No one who had been in the habit of using his other senses besides his eyes could be deceived. He, personally, could generally distinguish loaded saffron by the harsh feel which it presented to the touch. If pharmacists would avoid such drugs, they would very soon cease to exist in the market, because where there were no buyers there would be no sellers. Such drugs were sold to a less extent than they were eight or ten years ago. The Sale of Food and Drugs Act had done wonders both for druggists and for the community in general. As to Ionidium ipecacuanha, or white ipecacuanha, he saw some offered in London about two years ago. It was purchased by continental buyers. He was confident that none of it found its way into British pharmacy. He could not see that there was any reason for using it as an adulterant for senega, for the price of that drug was only 15 or 20 per cent. more than that of this particular ipecacuanha. Perhaps the adulteration arose from ignorance. As to rose petals, the adulteration of that article had been very ably exposed by Mr. T. E. Greenish. He (Mr. Umney) knew of no artifice which was so difficult to detect as one in which the chemist had applied his scientific skill for the purpose of deceit. He had not met with such jalap as that to which Mr. Holmes had alluded. The specimen on the table appeared to have been sliced. Perhaps this had been done for the purpose of better extracting the resinous principle, but the whole of the resin could not have been extracted from the specimen, sliced as it had been.

Mr. Cleaver said that with regard to ipecacuanha and jalap one important consideration was the small number of pharmacists who made their own preparations from those drugs. Excepting those who did make their own preparations, perhaps not one pharmacist in a hundred ever saw a sample of jalap root or of ipecacuanha root in its natural state. He did not suppose that such drugs as Mr. Holmes had exhibited would be used by any manufacturing pharmacist. Still there was no doubt that many preparations failed to come up to the mark, but they were not all of English manufacture. He had met with alcoholic extract of hyoscyamus and alcoholic extract of aconite, which came from the continent, and which were devoid either of hyoscyamine or of aconitine, though the manufacturer vouched for their being genuine. Easton's syrup also might be met with in this country, containing only one-fourth or one-fifth of the proper proportion of quinine. He had that week seen some which contained only about 2 grains of phosphate of quinine in an ounce instead of 8 grains. He had never met with adulterated saffron.

Mr. Urwick, referring to a remark of the preceding speaker, said he believed that there was scarcely a pharmacist in England who did not make his own ipecacuanha wine. As to Easton's syrup, he thought that Mr Cleaver must be in error. He could only account for what Mr. Cleaver had stated by supposing that the preparation had been procured from some co-operative stores.

Dr. Symes said that Mr. Urwick had said what he himself intended to say. He should not think that there was one pharmacist in a hundred who bought ipecacuanha wine and who did not have opportunities of seeing the ipecacuanha in its original condition and of judging of its character.

Mr. CLEAVER said that his remarks did not apply to those who made their own ipecacuanha wine. He should think that there was a very large number who did not do so.

Mr. GREENISH recommended pharmacists generally to take care of themselves in the matter of the drugs which entered their establishments. As to pharmaceutical preparations such as that to which Mr. Cleaver had alluded, if they went into that subject they would occupy many hours with the discussion. It was surprising that there should still be found in the market rose leaves dyed with aniline, since the fraud had been exposed in that room, and the detection of it was so easy and rapid. The adulterated saffron which Mr. Holmes had shown them was charged with a very large quantity of sulphate of barium, and more than he had seen in any previous sample. It had been stated that there was some glucose in connection with it; but from the cursory examination which he (Mr. Greenish) had made of it, he thought that the substance was honey and not glucose, for under the microscope he detected the pollen grains of other flowers than those either of saffron or calendula. He could not understand how it was that the jalap was in that sliced condition, or "slashed" as it was termed. The slicing must have been done when the jalap was quite fresh, and with some object. Judging from the appearance of the jalap under the microscope, he was disposed to think that this sample never had much resin in it; and he did not think that it could be exhausted of its resin by being boiled in alcohol in its present condition. He recommended pharmacists to use the microscope for the detection of the adulteration of drugs. It did not take three minutes to distinguish adulterated saffron.

Professor ATTFIELD said that he did not think that Mr. Holmes made any allusion, in reading his paper, to the use of glucose for the purpose of making the adulterants adhere to the saffron. He thought that if Mr. Crowe had been present he would tell them that he looked for glucose, and that he did not find more sugar in the so-called adulterated saffron than there was in the original article. Possibly gum or glycerine might have been used in this case, but not glucose or honey.

Mr. HOLMES said that Mr. Crowe at first thought that glucose had been used, but on experimenting further he failed to get absolute proof of the fact.

Professor BENTLEY said that he must add his testimony in confirmation of what Mr. Umney had said as to the very careful manner in which drugs were selected by the wholesale druggists before they got distributed among retail pharmacists. Cases of difficulty sometimes occurred, for drugs were bought from sample, but it was surprising how few mistakes were made. Some years ago a wholesale druggist bought in the market a very large quantity of chiretta, which was so perfectly like the official that he was deceived by its appearance. Upon some of it being supplied to a retail pharmacist it was noticed that the infusion was less bitter than usual. The wholesale buyer having been informed of the fact, he immediately sent a specimen to him (Professor Bentley) to be examined. He was himself almost deceived at first sight, but on a more careful inspection he detected certain differences, and ultimately he found that it was not true chiretta at all, but an entire substitution of a drug which in India bears the name of "hill chiretta." In India there were other substances bearing that name, and it was a wonder that the article he had just alluded to had never found its way into the market previously. Since that time it had often appeared, and it was a substance as to which he should recommend particular care. True chiretta had a thin stem and a continuous yellow pith, which was at once evident when the stem was broken. In the spurious article there was scarcely any trace of pith. Another drug which had been sent to him for examination was matico, an article which was first made official when the British Pharmacopœia was first brought out. At that time, there was no such thing as true matico to be got in this country, the whole supply being used up in connection with the civil war in the United States of America. The specimen which was sent to him he found had not been obtained from *Artanthe elongata*, but from *Artanthe adunca*. This was another substance which now occasionally appeared in the market. Almost all the specimens which he obtained of these spurious or adulterated articles were sent to him by wholesale druggists when they were in doubt as to their genuineness. Saffron was a thing which he had had frequently sent to him. It was very easy to be deceived as to this substance upon casual inspection. He did not agree, however, that the presence of stamens in saffron was due to carelessness in gathering; he had no doubt that they were introduced as a systematic adulteration and not through ignorance. He should like to ask Mr. Holmes whether he had tried the specimen of jalap with ether instead of alcohol, if not, the experiment would be well worth trying. The body might contain an active resin, though it might not be the resin of jalap. There was a jalap called woody jalap; and there was the common Tampico jalap, the active resin of which was soluble in ether. It must be borne in mind that the substance now called jalapin was obtained from woody jalap. The old jalapin of Pereira was derived from the true jalap, but this was now called convolvulin.

Mr. POSTANS said that the paper illustrated the practical character of many of the papers which were read at the Evening Meetings. At present no speaker had taken up the opposite side of the question. The President had told them that there were many well-trained pharmacists distributed throughout the country, but they were chiefly the younger men, and if a discussion of this sort was not conducted with great care it would tend to get up a cry of "pure drugs and pure chemicals," more especially among medical men. If he were asked why he should put in that plea, he would refer them to page 246 of 'The Progress of Pharmacy.' It would there be found that a similar discussion arose some years ago, and it tended to become rather a bore than anything else, inasmuch as it created a certain amount of want of confidence in pharmacists generally. The subject was one which ought to be considered very carefully by the Council. The pith of the whole matter seemed to be involved in that part of the paper which said, "to prevent altogether the sale of drugs for which some use might be found, would be an act of injustice." As a Society, they must draw the line somewhere. Would they draw it at best, or would they make the question one of price? As a Society, they would have to decide that very important question.

Mr. SCHACHT said he was anxious that an observation should be made upon the sentiment which seemed to pervade the paper. Mr. Holmes seemed to imply that very little real good would come of the exposure of the wrong-doings of which the paper spoke. He should be sorry that such a statement should pass unchallenged. If exposure were not a complete remedy he would venture to say that it was the first step in the only process which commended itself to his mind for the solution of the difficulty. He could conceive no other legitimate process than thorough exposure and the diffusion of information on the subject, such as would lead pharmacists to decline to buy an inferior or spurious article merely because it was low priced. Although Mr. Holmes hinted at something stronger, he (Mr. Schacht) believed that he was aiming at the impossible, namely, the making of men virtuous by Act of Parliament. The scientific portions of such papers as the present, and the raising of discussions upon them, would be of eminent practical good in bringing about the cessation of the evil which all so much deplored.

Mr. HAMPSON said that Mr. Schacht had almost taken from his lips the words which he had intended to say. He felt sure that if statistics could be obtained it would be found that adulteration had considerably diminished rather than increased; or else the Society would not have done any service by promoting and extending pharmaceutical education. It was perhaps desirable for pharmacists to have their attention called occasionally to the evils which existed, and such an exposure as this paper brought about was most important. Further, he had no hesitation in saying that exposure was the only remedy, especially where scientific men were concerned. They needed no other distinct influences than education and their own palpable self-interest. Considering the peculiar circumstances under which many drugs were collected it was a wonder that there was not more adulteration. When a pharmacist detected an adulteration let him add it to the chamber of horrors which already existed in the Museum of the Society.

Mr. PLOWMAN said that a case of complete substitution of one drug for another had recently come under his notice. A parcel of copalchi bark had been supplied instead of cusparia bark, and there was not a single shred of the latter present. It was only right to add that the wholesale house expressed its sense of obligation to him for pointing out the substitution.

Mr. LONG sympathized with the view expressed by Mr. Postans. He hoped that it would go forth that the adulterations which had been exposed were quite exceptional and were not the rule. The Society had done an immense work, and the present condition of things was very different from that which existed when he attended Dr. Pereira's lectures. The President had said that they ought not to talk about trade questions, such as the price of the drugs, but as pharmacists could not go and gather the drugs for themselves there was, fortunately, a systematized process for supplying them. A gentleman at an examination, when asked where jalap came from, said, "It comes from the wholesale druggist in 2-pound parcels." Pharmacists were supplied by the wholesale druggists, and he was glad to find that these matters were of sufficient interest to them to induce many of them to enter the ranks of the Society. The wholesale druggists were one with the retail pharmacists, and they knew their wants and endeavoured to supply them well. There would be much more difficulty if it was not for the discrimination and care exercised in the wholesale trade. There were many wholesale men now-a-days to whom it would be futile to attempt to sell the rubbishing things which used to be offered. The drug trade was as good in England as in any part of the globe, and better than it was in some places.

Mr. ATKINS thought that the introduction of this matter for discussion had been singularly fortunate. The whole discussion had tended to produce in his mind the conviction that there had been much more smoke than fire. He had a growing belief that there was much less adulteration of drugs than had been represented by medical journals both in England and abroad. If they could exorcise this "bogey" the discussion of the subject would be of great service. He might say, however, that one of the fundamental principles of the Society was the utter condemnation and extermination of adulteration. He knew of no better means of accomplishing that result than a perfected education. It might be asserted generally that, other things being equal, a higher moral sensibility was a collateral result of a more perfected education. He believed that in the dispersion throughout the country of a trained body of men, such as was now being rapidly accomplished by the Society, the end in view was being accomplished in two ways. Not only would the trained pharmacist himself decline to receive an imperfect article or expose it if he had received it, but, if there was a black sheep in the wholesale trade who would be willing to trade upon the ignorance of others, he would be deterred from doing so by the knowledge that his fraud would be exploded.

The PRESIDENT said that he would ask Mr. Holmes to reply to the materia medica aspect of the remarks which had been made. As the speakers had not confined themselves strictly to the scientific side of the question, but had unconsciously departed from the dictum which he had laid down at the commencement of the discussion, he might be allowed to point out that pharmacists were not the only persons who bought drugs, and it would be very wrong, in a moral sense, for them to be hasty in their judgment, or to express any harsh views against wholesale dealers or brokers. It should be borne in mind that the City of London was the drug market of the world, and that there were sold there, in quantities of hundreds of tons, many drugs of which educated pharmacists did not even know the name; and therefore, wholesale druggists might be excused if they were now and then deceived.

Mr. HOLMES, referring first to Mr. Cleaver's remarks, said that he had had some years' experience in the Museum, and he could say, unhesitatingly, that he had never met with a student, who did not know the appearance of ipecacuanha root or true jalap root before he came to the Society. But he had met with many who did not know the appearance of the inferior or Tampico jalap. With reference to the incisions which were made on the specimen of jalap, it appeared to him that they were made after the root had been soaked in water, and that afterwards the root had been exhausted with benzole or petroleum spirit or something of that kind. The outside appearance seemed to indicate that some solvent had been used. With regard to Professor Bentley's remarks on matico, only during the present month he (Mr. Holmes) had seen a specimen of matico mixed with the leaves of *Artanthe adunca*, just as it occurred occasionally in commerce. As to Mr. Schacht's remarks, he (Mr. Holmes) had found that short articles, published occasionally in the Journal, respecting adulteration, did not receive as much attention as was called to the subject when the spurious articles could be seen. He had, therefore, preferred bringing forward the subject at an Evening Meeting. The President had very justly remarked that London was the drug market of the world. That being so they ought to pay some attention to the mode in which adulterations occurred. He thought that wholesale druggists would bear him out in the statement that England had perhaps fewer drug adulterations than any other country in the world. He had been told that the adulterated drugs in the London market did not, as a rule, pass into use in this country, but that the greater proportion of them went either to the continent or to South America, or elsewhere. He might safely say that when they found their way among English pharmacists, it was rather from accident than from intention; but, be that as it might, it was important that the fact should be known, especially in those cases in which the adulteration was difficult to detect.

A paper was then read, entitled—

FURTHER OBSERVATIONS ON ARSENIC.

BY W. A. H. NAYLOR AND J. O. BRAITHWAITE.

The paper is printed on p. 464 and gave rise to the following discutsion:—

The PRESIDENT said that these analytical subjects were of extreme importance both to pharmacists and to chemists generally. The statements of observers with regard to analytical results were frequently copied from manual to manual, so that if an error once crept in, it might be perpetuated for many generations. Personally, he felt very much indebted to the authors for having given them an opportunity of listening to the paper, and for having, in a former paper, discussed the action of oxalic acid upon arsenic acid. They had now somewhat completely, as he thought, dealt with the action of oxalic acid upon alkaline arseniates.

Professor ATTFIELD said, with regard to the general question which the President had just raised, that authors of manuals were the very men who would most thank gentlemen like Mr. Naylor for doing work of the kind described.

The PRESIDENT said that if there was a paucity of discussion on the present paper it must be understood to arise from the very completeness of the investigation, and not from any lack of interest in the subject. The style of work described in the paper was just that which, as President, he liked to see brought forward. It consisted of a series of experiments performed under the most careful conditions, accurately observed and thoroughly and conscientiously worked out. He was happy to say that this was the general character of that work of Mr. Naylor with which he was acquainted, and the same was true, in a minor sense, of Mr. Braithwaite, although he was a comparatively young worker in original research.

Mr. HOLMES called attention to certain specimens which were exhibited on the table. In the first place, there were some very perfect crystals of tartrate of soda prepared by a gentleman in the laboratory, whose father, Mr. Reynolds, of Leeds, was well known wherever pharmacy was known. There were also some new preparations on view, presented by Mr. E. Merck, of Darmstadt, including a sample of adonidin, the active principle obtained from *Adonis vernalis.* This substance was said to have the active properties of digitalin, but not its cumulative action. There was also a sample of tannate of cannabine, the active principle of Indian hemp. There were also two principles obtained from the lily of the valley. One, convallarin, was said to be inactive, and the other, convallamarin, was said to be the most powerful diuretic known. There was also a specimen of a new kind of eucalyptus oil. He believed the great bulk of what had been sold as the oil of *Eucalyptus globulus* was not obtained from that species, but from *Eucalyptus amygdalina.* There was now a great demand for the oil for dissolving india-rubber for making varnishes and other purposes, and the supply from that source was not equal to the demand; hence it was now proposed by Mr. Bosisto to prepare it from the species from which the oil exhibited had been distilled, *Eucalyptus dumosa*, which could be obtained in unlimited quantity. This oil possessed the same solvent properties as that from *E. amygdalina.* There was also a specimen, presented by Mr. Warrick, of the oil of *Eucalyptus globulus*, prepared from the leaves of the plant at Grasse. He had also to call attention to some specimens which consisted of some species of cuprea bark, presented through Dr. Paul, by Mr. Parisot, a gentleman who had recently brought them to this country from Columbia. They came from a new district, from which, probably, much larger quantities would come by-and-by. There was also on the table a specimen of the Dyak arrow poison used in Borneo. He believed that there was some difficulty in obtaining it. The present samples came from Mr. Jamie, of Singapore, who took much interest in the work of the Society. He had sent with the specimens an interesting note, in which it was stated that the poison was prepared, as far as could be learnt, from the leaf of a creeper in Borneo. The leaf was rubbed down in water into a sort of paste, and mixed with a kind of gum. All the tribes did not prepare it in the same way. Many of them used the poison of snakes in connection with this poison. Mr. Jamie stated that the late Rajah Sir James Brooke, when cases of poisoning occurred to his soldiers, used to give them intoxicating liquor until they were drunk, and that treatment generally saved their lives. The same remedy was also used in Mexico as an antidote. Perhaps there was no better antidote for snake poison than alcohol.

The PRESIDENT announced that the next meeting would be held on February 7, 1883.

Provincial Transactions.

BRISTOL PHARMACEUTICAL ASSOCIATION.

A meeting of the pharmacists of Bristol and the neighbourhood was held at the Museum and Library on Friday, November 24, for the purpose of discussing the recent action of the Pharmaceutical Society of Great Britain in respect of certain proposed modifications in the conditions for examination of future candidates for for pharmacy. Mr. Schacht, the President of the local Association, occupied the chair.

The Chairman, in opening the proceedings, explained that the cause which had forced the Council of the Pharmaceutical Society to a consideration of this subject was the continually recurring evidence of the deficiency of proper training with which so many candidates presented themselves for the examinations, and which rendered the conduct of those examinations so difficult and so unsatisfactory to all concerned in them. He begged the meeting to believe that the single idea in the mind of the Council throughout all its inquiries and deliberations had been to devise a scheme which should promote a more general state of efficient qualification amongst those who aspired to the important work of pharmacy; and as a necessary consequence to enable the student to regard the pharmaceutical examinations no longer as a stumbling block in his path, but simply as the stamp of his qualification. It had not aimed at any undue exaltation of the standard of scientific attainment in the pharmacist, but rather that the standard now admitted to be requisite for the proper fulfilment of duty should be more generally achieved and more certainly secured. Many of the details of the proposed scheme were, as they knew, published in the *Pharmaceutical Journal* of April 15th of this year, and the chief points of the scheme as at present matured were:—1st. That one of the recognized examinations in arts be passed by the candidate prior to the commencement of his apprenticeship or pupilage. 2nd. That a period of at least three years be then spent as pupil to a registered pharmacist; after which, the first portion of a technical examination be passed. 3rd. That at least one year more be then spent in further work and laboratory practice. 4th. That during these four years (or more) certain courses of lectures on chemistry, botany, and materia medica, and a practical course of instruction in a chemical laboratory—as defined by the Council, and for convenience called "a curriculum of study"—be attended. 5th. That when all this has been fulfilled, the candidate present himself for the final portion of the qualifying examination. He did not mean to state that every point he had named had, as yet, been fully adopted by the Council, but that such was the direction in which opinion was moving, and he should be glad to hear what was thought of the whole matter by those then present.

Mr. Berry inquired if the Council of the Pharmaceutical Society, in view of its own efforts to enforce a compulsory curriculum, was prepared to offer substantial aid to provincial centres of education.

Mr. Towerzey thought that most probably ample instruction in chemistry and botany could be obtained at the scientific institutions already established in many of the larger provincial towns; but he was afraid the subject of materia medica was nowhere taught out of London as the Council required it to be taught.

Mr. Toone (of Bath) wished to urge a consideration which had long occupied his thoughts. It seemed to him unfortunate that the authorities should so completely lose sight of the student during the three years of his pupilage. He felt inclined to urge that a students' examination be held annually, as a method of keeping alive their interest in scientific knowledge and as an inducement to work.

Mr. Keevil regarded such duties as belonging rather to the master than to any outside authority. He was afraid the contemplated changes would press hardly upon country apprentices, nevertheless he was bound to admit them to be changes in the right direction. It would certainly be a great convenience to all provincial students if the first portion of the pass examination could be held at certain provincial centres as well as in London.

Mr. Isaac supported the idea that the Pharmaceutical Society should assist in providing, if it did not altogether provide, good lecture teaching at a certain number of well-selected centres in the provinces.

Mr. Wretts was of the same opinion, especially in regard to the subject of materia medica, which he thought was little likely to be taught at ordinary science schools or colleges unless subsidised and supervised by the Pharmaceutical Society.

Mr. Towerzey repeated the opinion that the Society ought to endow a certain number of chairs of materia medica throughout the provinces. It appeared to him that unless it was prepared to do something of this sort for the general benefit of pharmacy its plain duty was to discontinue its endowment of the School at Bloomsbury Square.

Mr. White warmly advocated the institution of a "curriculum." He could not admit that its being made compulsory inflicted hardship upon anyone, not even the country apprentice; for it would be strange to call that a hardship which entailed upon its supposed victims nothing but benefit. With regard to the supply of provincial teaching he thought they might fairly expect that to appear when the requisite demand arose.

Mr. Keevil suggested that the work in the practical laboratory might with advantage be distributed over a longer time than laid down in the syllabus; it might be well to say the time should not be less than four months, but he thought that should be the only limiting expression.

Mr. Algernon Warren expressed approval of the changes proposed by the Council, and thought that any possible increase of difficulty they might entail on the country apprentice would be compensated by the arrangement suggested, of dividing the examination into two portions and holding the former at a number of provincial centres.

The Chairman replied generally to the several speakers upon the points raised, and answered a number of questions.

The following resolutions were then proposed, seconded and carried unanimously:—

"1. That this meeting approves the principle of a compulsory curriculum of study for all future candidates for pharmacy."

"2. That this meeting approves the action of the Council of the Pharmaceutical Society of Great Britain in respect of the proposed modifications of the conditions for the examination of future candidates for pharmacy, as far as that action has been made public."

"3. That this meeting is of opinion that it would add greatly to the convenience of examinees if such portions of the examination as can be properly conducted by the written process were held at certain provincial centres as well as in London and Edinburgh."

A vote of thanks to the Chairman concluded the proceedings.

Erratum.—On p. 406, col. ii., line 11 from bottom, as the name of the gentleman appointed Sheriff of Poole, *for* "Mr. T. W. Atkinson" *read* "Mr. T. W. Atkins."

Mr. Rotter.—Your letter, which should have been sent direct to the Editor instead of through the Publishers, was received too late to allow of dealing with it in the present number.

J. K.—(1) See a paper on oleate of bismuth in vol. xi., p. 869. (2) For oleate of zinc see the present volume, before, p. 303. (3) For oleate of mercury see vol. xi., p. 592.

Correspondence.

**** No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

A Proposal as to Lectures.

Sir,—Now that the business of the various societies in London has fairly commenced, is it too much to ask that our professors should entertain the members occasionally with lectures on some popular topic connected with science; or are such discourses left entirely in the hands of the Committees of the Royal Institution and the Society of Arts? Surely it is time that the theatre at Bloomsbury Square and the latent power at number seventeen should be turned to use on behalf of the members in some such manner as that described. This, I believe, would be wise; and I will add still more, that, in my opinion, such reunions would tend greatly to cement together in the kindly feeling of one common brotherhood many who might not otherwise be drawn within the circle of membership. Cowper says:—

> "Knowledge and wisdom, far from being one,
> Have oft times no connexion. Knowledge dwells
> In heads replete with thoughts of other men;
> Wisdom in minds attentive to their own.
> Knowledge is proud, that he has learnt so much;
> Wisdom is humble, that he knows no more."

35, *Baker Street, W.* A. W. Postans.

The Death of Mr. Cyrus Buott.

Sir,—It is my melancholy duty to announce the death of Mr. Cyrus Buott, late Secretary of the United Society of Chemists and Druggists. He was released from his sufferings on November 26, at the ripe age of 82 years.

Both he and his devoted daughter frequently expressed their gratitude for the kindness and generosity of those who contributed to their support during a period of struggle and distress. And Mr. Buott, shortly before he died, earnestly requested that I should give public expression to those feelings. I, too, have to express my gratitude that I have been privileged, by the sympathetic co-operation of many generous friends, to give kindly aid to Mr. Buott. Appended is a final statement of the donations I have received since my last acknowledgment. I need scarcely say that all sums that have been sent have been safely and carefully disbursed.

I most sincerely thank all those who united with me in this benevolent transaction. They with me have experienced the joy of doing a little good.

205, *St. John Street Road, E.C.* Robert Hampson.

	£	s.	d.
Michael Jones, Flint	0	10	0
Professor Attfield	1	1	0
E., Staffordshire	0	5	0
E. J. Upton, Wallingford	0	5	0
C. B. Miller, Blackheath	0	10	0
"Karl Sang," Liverpool	1	0	0
John Hall, Gate House	0	5	0
Robert Hodson Rugg, Superintendent of Grey River Hospital, West Coast, New Zealand	1	0	0
C. A. N., Birmingham	0	5	0
"A sum collected at the Annual Dinner of the Bolton District Association of Chemists and Druggists"	1	4	6
Chapel Town Road, Leeds	0	5	0
J. R. Young, Edinburgh	1	0	0
G. S. Woolley, Manchester	0	10	0
S. B., London	0	10	0
F. A., London	0	2	6
A. Bishop, London	3	3	0
Blain and Dutton, Bolton	0	13	0

T. P. Jones.—By keeping them for a time in a closed space together with some odorous substances, such as are used in the preparation of sachets.

Communications, Letters, etc., have been received from Messrs. Hayward, Abraham, Shenstone, Bell, Spiller, Ward, Law, K. K., E. T. D., D. M. P., 1878, Sinapis, Subacet., Suburban.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

Either of the two pharmacopœias that have been almost simultaneously issued, one for use in Germany and the other in the United States, is of sufficient importance and interest to British pharmacists to justify its being considered separately, and indeed in some aspects they have so little in common that they cannot be treated other than independently. Nevertheless, as there exists just now some desire for the greatest possible approximation to uniformity in the different pharmacopœias, at least in respect to the more potent drugs and preparations, it seems desirable to utilize the opportunity for observing what, if any, progress has been made in this direction in these two works, and whether they present any common ground which is favourable to further advance in connection with the preparation of other works of a similar nature. It is therefore proposed to discuss the principal features of the two pharmacopœias in one series of papers, this plan appearing to be the most convenient for those parts which allow of comparative treatment.

Before proceeding to consider in detail the contents of the new volumes, it will be as well to notice the conditions under which they have been produced, and this will involve a brief historical sketch, not without significance in relation to the very important subject of the supervision of pharmacopœias generally.

The first national United States Pharmacopœia was published in December, 1820. Before that time, as we learn from the Preface of that work, a number of pharmacopœias, and "dispensatories" founded upon them, had been produced in different parts of the Union, and various foreign works of the kind had been imported, some of which had become naturalized by republication in the country. The medical practitioners and druggists had supplied themselves with one or other of these books, and as a consequence the character of medicinal preparations was liable to vary in every state and city in the Union. Moved by this condition of affairs, Dr. Lyman Spalding, in the year 1817, submitted to the New York County Medical Society a project for the formation of a national pharmacopœia based on the authority of all the medical schools and medical societies in the United States. As a first step he proposed that the States and territories should be divided into four districts,—northern, middle, southern and western,—and that in each district a convention should be held, consisting of delegates from all incorporated medical bodies, or, failing the existence of any such in a state, from voluntary associations of physicians and surgeons; the primary business of each convention was to be to form a pharmacopœia, and then to select delegates to attend a general convention in Washington and aid in compiling from the four district pharmacopœias one national work. This plan was in the main adhered to, and the general convention entered upon its task on the 1st of January, 1820, under the presidency of Dr. Samuel L. Mitchell. Only three out of the four districts,—the northern, middle and southern,—appear to have been represented, and only the northern and middle districts submitted pharmacopœias. These, however, were compared, supplemented, and consolidated into one work, which was published at the end of the year. It was written entirely in English; but the nomenclature and all the essential parts were presented also in Latin, on the ground that, as no well-educated physician or apothecary was unacquainted with that tongue, the book might thus be rendered more intelligible to foreigners, and more useful in those districts of the United States where the French and German languages were spoken. From the foregoing it will, therefore, be seen that the United States Pharmacopœia was at its inception under purely *medical* auspices. Moreover it was and has continued to be a volunteer work, not having its origin in any legal enactment and not having any authority beyond what it may derive through the measure of acceptance granted to it by medical practitioners and pharmacists throughout the country, and the reference to it as a standard for the purity of drugs in Adulteration Acts that have been passed in some of the states.

Before adjourning, the Convention, having in view the revision of the work that would become necessary with the lapse of time, instructed its President to take preliminary steps in 1828 for holding a General Convention in Washington in 1830, to consist of three delegates from each of the four divisions, chosen by the medical colleges. Through some misunderstanding of the rather elaborate provisions as to the election, delegates from the northern and middle districts only were duly returned, and these formed the nucleus of a Convention which prepared a revised pharmacopœia that was published in New York in 1830. But the medical interests in the middle district being still unsatisfied, a fresh Convention was called, which authorized the publication of another revised pharmacopœia in Philadelphia in the following year.

The next Pharmacopœia Convention was held in Washington in 1840 and consisted entirely of delegates from incorporated medical societies and colleges. But a communication from the College of Physicians of Philadelphia having been accepted as a proper basis for a revised pharmacopœia, it was referred to a committee consisting of seven members to be worked out, with authority to the committee to request the co-operation of *colleges of pharmacy.* Invitations were accordingly addressed to the Presidents of the Colleges of Pharmacy of Boston, New York and Philadelphia, and these were responded to favourably; indeed the contribution offered by the Philadelphia college was so important that its proper consideration involved a delay in the publication of the new work until 1842. One notable point in which the United States Pharmacopœia of 1849—the first in which the pharmacists of the country took part—differed from its predecessors, was the abandonment of the duplicate descriptions in Latin, as presenting "no sufficient practical advantage to counterbalance the inconvenience of attempting to present ideas in a language which has no appropriate words to express them, and the labour and expense incurred in printing twice as much matter as is necessary to convey the meaning intended." The then recent publication of the French Codex and the Edinburgh Pharmacopœia in the vernacular languages of their respective countries was quoted as giving sanction to this course. Another point was the introduction of the "mode of filtration denominated as *displacement*" as an alternative process in the preparation of some of the vinegars, extracts, infusions and tinctures.

In making arrangements for the Convention in 1850, it was decided that invitations to send delegates should be forwarded to the incorporated colleges of pharmacy at the same time as others were sent to the medical colleges. Consequently, the New York and Philadelphia colleges were represented in the General Convention as well as in the committee entrusted with the work of revision and publication. A similar course was adopted in 1860, when the number of colleges represented was four, whilst the American Pharmaceutical Association contributed some suggestions. In the fifth decennial Convention, held in 1870, the number of colleges of pharmacy represented was further increased to eight.

But on no previous occasion have pharmacists taken so prominent a share in the revision of the United States Pharmacopœia as in the work just completed. No less than twenty-six delegates from eleven incorporated colleges of pharmacy attended the Convention; from these were selected fifteen out of twenty-five members of the committee appointed to carry out the work, the Chairman of the Committee, Dr. Rice, the two Vice-Chairmen, Messrs. Remington and Diehl, the Secretary, Mr. Bedford, and the Treasurer, Mr. Doliber, being all pharmacists. No doubt this pharmaceutical preponderance is attributable to some events that had taken place in the interval between this and the previous Convention. In 1876, Dr. Squibb, considering that the work necessary for the proper revision of a pharmacopœia could not be done by a special Convention, meeting at intervals of ten years, and moreover thinking that body, as hitherto constituted, was not sufficiently representative to be the fit custodian of the interests involved in the preparation of a national pharmacopœia, advocated an entirely new departure. The proposition of Dr. Squibb was that the revision should henceforth be placed under the charge and authority of the American Medical Association, as the representative body of the medical profession in the United States, with the understanding that the Association, whilst maintaining the control, should invite the active co-operation of the American Pharmaceutical Association. The Medical Association however declined to undertake the task, and in consequence the subject subsequently came under the consideration of the American Pharmaceutical Association during its meeting in Toronto, in 1877, when a committee was appointed to consider the advisability and feasibility of the Association arranging to draw up a complete pharmacopœia, which might be submitted to the criticisms of the medical and pharmaceutical professions and proposed to the final committee of revision. The report being in the affirmative a committee was appointed to carry out the work; but it eventually became evident that the original plan, to construct a complete pharmacopœia, was impracticable. A large quantity of valuable material was, however, collected, and this was presented at the meeting of the Pharmaceutical Association in 1879 in the form of a report, which was printed at the expense of different colleges and societies there represented. This report exercised a considerable influence upon the revision which has just been completed, and Dr. Charles Rice, who in his capacity as Chairman of the Committee drew it up, was also chosen to preside over the Committee of Revision appointed by the Convention. It is this report that is occasionally referred to in the succeeding articles.

Turning now to the European work under notice, it may be said that all the inconveniences arising from a multiplicity of pharmacopœias existed in Germany long after a national work had been accomplished in the United States. For as recently as twenty years since there were no less than ten different pharmacopœias, each being an authoritative text book in one or more German-speaking states. Indeed the first edition of the official 'Pharmacopœa Germanica' did not appear until 1872, having been drawn up by a committee acting under the authority of a decree of the Federal Council, issued immediately after the establishment of the German empire. This Pharmacopœia was not, however, original in the full sense of the word; nor was it the intention of the Committee to produce a new work. According to the Latin Preface, the main object of the Committee was to collate the formulæ in the different pharmacopœias existing in Germany, to remodel the 'Pharmacopœa Borussica' and the 'Pharmacopœa Germaniæ,' and to take into account the recognized pharmacopœias of South Germany.

In order to trace the true origin of the 'Pharmacopœa Germanica,' it is necessary to go back to a scheme for replacing the ten existing pharmacopœias by one complete and inclusive work which was worked out by nine pharmacists belonging to North and South Germany and Austria, and laid before the First International Pharmaceutical Congress, held at Brunswick, in 1865. The Congress sanctioned the printing of the scheme as a 'Pharmacopœa Germaniæ,' and the cost was covered by subscriptions. The subject appears to have been afterwards taken up jointly by the Pharmaceutical Association of North Germany and the Pharmaceutical Association of South Germany, under whose auspices alterations and improvements were made and a work was drawn up intended to be used as a national pharmacopœia in the place of the diverse pharmacopœias that were then in use in the different German states. This work was published in 1867, under the title of 'Pharmacopœa Germaniæ: Editio Altera.' It of course had no legal authority, though copies of it were forwarded to the governments of the various states for consideration and formal adoption, if approved of. But the North German Confederation, having by this time taken the place of the more loosely bound Germanic Confederation, the authorities of Mecklenburg-Schwerin called the attention of the Federal Council to the want of an authoritative national pharmacopœia, and that body in December, 1868, resolved that a committee of medical men and pharmacists should be charged with the execution of the work. The committee met in May, 1869, and determined to utilize the 'Pharmacopœa Germaniæ' which had been produced by the two great Pharmaceutical Associations of the country, together with the 'Pharmacopœa Borussica,' and to consult the medical men and pharmacists of repute and authority throughout the North German Confederation, as to the materia medica and preparations to be included. The work of the committee was, however, interrupted by the breaking out of the Franco-German war, and when this was over, the task that had to be confronted was the compilation of a national pharmacopœia for the whole of Germany, instead of for a part of it.

In 1871 a new committee was appointed, consisting of representatives of repute in the different departments of science from all parts of Germany. The work was commenced in September and brought to a close in December of the same year, and under the title of the 'Pharmacopœa Germanica,' by virtue of a resolution of the Federal Council of the Empire, passed in May, 1872, it took the place of the different pharmacopœias in use in the several states of the empire from the first day of November following. It will, therefore, be seen that from the very commencement of its history pharmacists played a very important part in the production of the first authoritative 'Pharmacopœa Germanica.'

But the interests of German pharmacists in the national pharmacopœia did not cease with its official recognition. Six years afterwards, the necessity for revision having become apparent, the German Pharmaceutical Association,—having then become the representative of the two separate associations for North and South Germany,—during its meeting at Coblentz, in 1878, nominated a Committee, of which Dr. Brunnengräber was chosen chairman, to consider suggestions for the improvement of the 'Pharmacopœa Germanica.' In the same year the Federal Council decided that a revised edition of the pharmacopœia should be published in 1882, or ten years after the publication of the original work, and that the task of preparing it should be entrusted to a Commission consisting of twelve physicians, six pharmacologists, six chemists, and six pharmacists, aided by two military doctors and a military pharmacist of superior rank, deputed by the Prussian War Office. About the same time the Imperial Chancellary sent out invitations to the different governments to obtain opinions from persons interested as to deficiencies that had become manifest during the use of the work, and after some negotiations a report drawn up by the Committee appointed by the Pharmaceutical Association was, at the request of the Government, placed at the disposal of the Imperial Sanitary Department. It is the result of the labours of the Commission thus appointed and assisted that has been recently issued under the title of 'Pharmacopœa Germanica: Editio Altera,' and which is to come into force, by Imperial decree, as the official *Arzneibuch* in the German Empire from the first day of January next.

(*To be continued.*)

A NEW METHOD OF MANUFACTURING SODIUM SULPHIDE.*

BY W. WELDON.

The question of how to manufacture sodium sulphide has occupied the attention of industrial chemists from almost the dawn of what we now understand by industrial chemistry down to our own time. Till recently, the object with which this question was studied was that of modifying the Leblanc soda-process in such wise as to avoid the production of the very undesirable residue of that process, and at the same time to permit of the sulphur of the sulphuric acid used in that process being perpetually recovered for use again. All attempts, however, so to modify the Leblanc process that sodium sulphide shall be its intermediate product, instead of "black-ash," have been unsuccessful; and although for nearly a century every successive failure to do that was followed, after a short interval, by fresh efforts to the same end, it is probable that the idea of converting sodium chloride into sodium carbonate by way of the intermediate production of sodium sulphide has now at last been definitively abandoned. On the one hand, the success of what is known as the "ammonia process," and, on the other hand, the probable realization of new methods of dealing with the residue of the Leblanc process for the recovery of sulphur therefrom, together with the discovery, made by myself some years ago, of the unexpected fact that sodium sulphide, pure enough to yield by treatment with CO_2 sodium carbonate uncontaminated with free sulphur, is absolutely infusible by any method which can be applied industrially, would seem to render all further attempts to realize a sodium sulphide soda-process quite out of the question.

Meanwhile, a demand has arisen for sodium sulphide as a substantive product. There is a demand for it for use in connection with tanning, for use in connection with bleaching jute, for use in the manufacture of pigments consisting in part of sulphide of zinc, and for various other purposes; and this demand has led to the realization of the method of producing it industrially by the wet way which I will now proceed to describe. The method in question is due to Mr. Helbig, of the great chemical works of Aussig, in Bohemia, the co-inventor with Dr. Schaffner of the method of recovering sulphur from alkali-waste. It is already in industrial operation at Aussig, and will shortly be in industrial operation in this country also, at the works of Messrs. J. C. Gamble and Son, at St. Helens.

When the residual product of the Leblanc process, known as "alkali-waste," is digested with water under a pressure of about five atmospheres, reaction takes place between some of the water and the greater portion of the calcium sulphide of the alkali-waste, in accordance with the equation:—

$$2\,CaS + 2\,H_2O = CaH_2O_2 + CaH_2S_2.$$

There is thus obtained a solution of calcium sulphydrate, capable of reacting on sodium sulphate, to give calcium sulphate and sodium sulphydrate:—

$$CaH_2S_2 + Na_2SO_4 = CaSO_4 + 2\,NaHS.$$

Up to this point I managed to get myself, some years ago, in some experiments conducted at Mr. Brock's works at Widnes; but I could not see how to get any further. That is to say, having obtained a solution of sodium sulphydrate by heating with water under pressure a mixture of alkali-waste and sodium sulphate, I did not see how to convert the sodium sulphydrate into sodium sulphide. The reaction so constantly in use in laboratories,

$$NaHS + NaHO = H_2O + Na_2S,$$

was of course obvious enough; but I could not see how to apply it except by using previously manufactured caustic soda, and to use previously manufactured caustic soda as a raw material for the production of sodium sulphide for industrial applications was, of course, out of the question. Mr. Helbig, however, does use caustic soda to react upon his sodium sulphydrate; but he does not use previously manufactured caustic soda. He obtains what he calls "a passing formation" of caustic soda in what seems to me a very ingenious and elegant and at the same time a very simple way.

Crude Leblanc soda, or "black-ash," as it is called in this country, consists essentially of a mixture of sodium carbonate and calcium sulphide. We have seen that calcium sulphide, when heated with water under pressure, gives two products, one of which is calcium hydrate; and we know that calcium hydrate can react on sodium carbonate to form calcium carbonate and caustic soda. Mr. Helbig takes advantage of this last mentioned fact by adding a certain quantity of black-ash to the mixture of sodium sulphate and alkali-waste which he digests with water. The reactions which then take place no doubt take place practically simultaneously, but they may be most readily explained by supposing them to take place successively: by supposing, that is to say, that water and calcium sulphide first react on each other, producing calcium hydrate and sulphydrate, that the

* From the *Journal of the Society of Chemical Industry*, November 29, 1882.

calcium sulphide so produced then reacts on sodium sulphate, giving calcium sulphate and sodium sulphydrate, that the calcium hydrate, which is one of the products of the first reaction, then reacts on the sodium carbonate of the black-ash, producing calcium carbonate and caustic soda, and that the caustic soda so produced and the sodium sulphydrate previously formed then react on each other and are both converted into sodium sulphide. The sum of these reactions may be represented by the equation:—

$$2CaS + Na_2SO_4 + Na_2CO_3 = CaCO_3 + CaSO_4 + 2Na_2S.$$

The operation is performed in iron digesters furnished with mechanical agitators—which are kept in motion throughout the operation—and heated by injection of steam. What is drawn off from the digesters when the operation in them is complete is a solution of sodium sulphide holding in suspension various solid matters. These having been separated by filtration, the solution is evaporated till its density has become about 32° Beaumé. During this evaporation any salts other than Na_2S which may have been originally present fall and are fished out. The concentrated solution is then allowed to cool, when it gives crystals of the hydrated salt, $Na_2S,9H_2O$.

Just two points more require to be mentioned. It is obvious that in the process just described the sodium sulphate might be replaced by sodium carbonate—in other words by more black-ash. The reactions in that case would all be the same as those I have enumerated, except that the sodium sulphydrate would be formed by the reaction of sodium carbonate upon calcium sulphydrate. As the value of sodium carbonate in the state of black-ash is not very much greater than that of sodium sulphate, Mr. Helbig at present prefers that all the sodium used in the process should go into it as carbonate; so that he now really uses, not a mixture of sodium sulphate, black-ash, and alkali-waste, but a mixture of black-ash and alkali-waste only. The reason for this preference is that a much lower pressure suffices to bring about the required reactions when using the latter mixture than when using the former.

The other point is curious. Just as the text-books say that sodium sulphide is a readily fusible body, so they say that crystallized sodium sulphide readily absorbs oxygen on exposure to the air; and just as I have found that pure sodium sulphide cannot be fused at all, on the large scale, in closed vessels made of a material on which Na_2S has no chemical action, so Mr. Helbig has found that crystallized sodium sulphide, as produced by his method, absorbs oxygen on exposure to the air only very slowly indeed. The difference between its behaviour in this respect and that of sodium sulphide made in other ways Mr. Helbig attributes to the latter always containing small quantities of caustic soda, whereas his crystals are quite free from caustic soda.

ATOMS AND MOLECULES.*

BY BARNARD S. PROCTOR.

The most important function of the President of a Chemical Society is to stimulate the chemical activity of the members by an action parallel to catalysis.

By his own molecular activity he should bring into play the affinities which are capable of developing new matter, without himself entering into combination with other molecules, in such a way as to deprive them of their individuality.

This function of your leading officer is much more easily exercised when his habitual work is intimately associated, either practically or theoretically, with the daily occupations of the members in general.

Unfortunately this is less the case with me than with any of the gentlemen who have filled this office before me. On this account I shall have to claim a large share of your indulgence and assistance.

Looking back a year, our society has lost two of its most eminent members, one distinguished for his extensive acquaintance with the chemical resources of the district, and the readiness with which he became the exponent and historian of its technology. The other, pursuing the paths of pure science, occupied a position of vantage not practically within the reach of technical chemists. A position which enabled him to meet each of us as an equal on our own ground.

It will be impossible for me to interest you as the former would have done by reviewing the technical changes of the past, and the prospects of the future for chemical manufacturers, or to trace the development of chemical laws, and recount the discoveries of recent years as would have been an easy task to the latter; but as every man's experience, and every man's train of thought has necessarily something of individuality to distinguish it from that of his fellows, and as each may profit to some extent by noting the facts or the fancies of his fellows, I will endeavour to lead you as it were on a holiday excursion, away from the technical department of our studies, where everything turns on the pivot of cost, and away from the purely scientific side, where all is excluded but experimental investigation and mathematical law.

I desire for the present to get beyond the walls of the shop, and the boundaries of the college. I desire to feel the freedom in which the schoolboy rejoices who has escaped from the customary restraint. I wish to be at liberty to say things which may be fanciful or imaginative, but I trust not foolish. Fancy has its duties in philosophy, though not in science. Fancy developes a multitude of half-truths, which by the treatment of science are decomposed, evolving an atom of truth and eliminating an atom of error; so truth is established, which would have lain dormant had not fancy thrown down the gauntlet to science. Our speculations are evolved by the philosophical use of the imagination, from the unsystematized truths which may be regarded as the waste material of science. Professor Mills says:—"The roadway on which chemistry now runs has been elevated by the rubbish of at least two thousand years."* It is my ambition now to scrape together a little heap of such rubbish.

It seems to be the natural desire of a chemist to see with his mind's eye the atoms and molecules, which can no more be seen through the microscope than by the unaided eye. While endeavouring thus to see the constitution of matter, we are told on the one hand that we may relieve ourselves from the idea of matter altogether, and be content with resolving all things into force;† and on the other hand we are told that force, in all its many manifestations, may be resolved into matter and motion. We are told at one time that force cannot act at a distance, that attractions are all resolvable into the effects of impacts of molecules in motion; and at another we are told that the molecules of solid bodies do not touch one another, the space occupied by the actual matter being small compared with the space separating the atoms from one another. We are told that attraction, as hitherto understood, is irrational because it is inconceivable. It is pointed to as an absurdity that force should throw out its boat-hooks, and draw two masses of matter together. To my mind the conception of a repelling force is just as difficult as an attracting, and I am compelled to admit that, where both are inconceivable, there is not much to determine us in rejecting one if we cannot equally do without the other. But we may dismiss them both, repulsion most simply by supposing it to result from the rebounding of atoms in collision; and we get rid of the idea of

* Presidential Address delivered before the Newcastle-upon-Tyne Chemical Society.

* *Phil. Mag.*, January, 1876.

† *E.g.*, Sir W. G. Armstrong, British Association Address, 1863, etc.

attraction by a speculation just one step more complicated, in supposing it to be caused by the collisions of atoms preponderating in one direction, the attracting bodies shielding one another on one side, and so being forced together by the impact of atoms on the opposite sides; but for these speculations to be entertained, we have to assume that atoms can pass through masses with nearly perfect freedom, which does not accord with our usual ideas of matter. To help us in our craving for an explanation of everything, the existence of a luminiferous ether is assumed, and it is endowed with hypothetical properties to suit every difficulty. It is assigned a position intermediate between matter and force. It is supposed to fill all space, and penetrate all bodies. It is supposed to be the basis, the physical basis perhaps we might say, of heat, light, electricity, magnetism, etc. Its movements are supposed to be the cause of polarity and induction. Perhaps they *are*, if the ether has any existence. On the present occasion, as I have stipulated for a full play of the imagination, we will assume the existence of the ether, the existence of matter, of atoms, of molecules, of spaces between them, of repulsions, attractions, polarities, molecular movements, and whatever else the exigencies of the moment demand.

The middle-aged chemist of the present day was taught in his youth that the general properties of matter included ponderability, size, shape. etc. That matter was distinguished from immaterial forces by its ponderability, the forces being spoken of as imponderable agents, though the expressions were often used somewhat indefinitely.

Gmelin ('Handbook,' page 2) speaks of the imponderables as *bodies*. Miller, without making the statement in so many words, evidently assumes that "bodies" or matter must be possessed of weight. ('Elements of Chemistry,' 1865.) In looking over these and other books which I reverenced as unquestionable authorities, quarter of a century ago, I feel tempted to put marginal queries to many paragraphs which point to questionable conclusions.

I propose to take as my starting point two or three of these marked passages—passages which will probably retain their position and authority for many years to come, but which, nevertheless, do not harmonize with more recent experience or modes of thought.

Turning to Miller's 'Elements' (vol. i., page 65), the phenomena of solution are explained as the result of the adhesion of the solvent to the solved, overcoming the cohesion of the latter. This can scarcely be regarded as an explanation, but even if viewed simply as a statement it is far from being satisfactory. If we accept the common meaning of the word adhesion, that is "sticking to," it can scarcely be admitted that a liquid sticking to a solid explains its disintegration. Nor is it much more satisfactory as an explanation, though it may be more correct as a statement, to say that the force which commonly manifests itself as cohesion is overcome by another force which commonly manifests itself as adhesion. Cohesion and adhesion may fairly be regarded as effects or manifestations of some form of force, but in a critical inquiry it is necessary to avoid confusion between a force itself and the phenomena by which that force is made manifest. It is scarcely a philosophical statement to say that a powdered substance dissolves more quickly "from the partial destruction of cohesion." Nor can we very readily admit that there is less adhesion between a crystal of sugar and a saturated syrup than between the same crystal and water, how then can we say that solution of the crystal takes place in consequence of the force of adhesion between it and the water in which it is immersed, and that the crystal remains unacted on by the syrup from the absence of adhesion between a material and its saturated solution?

When a supersaturated solution deposits a crystal, the cohesion is said to overcome the adhesion acting between the solvent and the substance of the crystal, but it can scarcely be admitted that cohesion proper comes into existence till the separation has taken place, though it might be correct to say that the *force which causes cohesion* has caused the separation of the solid from its solvent.

This would naturally lead to the question—"What is the nature of the force which causes cohesion?"

Gmelin ('Handbook,' i., 38) says, "If the insolubility of crystallized alumina arose from its cohesion being greater than its affinity for the acid, it ought not to dissolve in the acid after being ignited with potash, but to separate in consequence of its greater cohesion after the potash has been dissolved in the acid." In such a case as this I should say the cohesion of alumina no longer existed. It had been destroyed by the potash; not that any matter nor any force had been destroyed, but that one effect of a force had been destroyed by the diversion of the force to the production of another effect.

We may suppose the crystalline cohesion of the alumina was the effect of a polarity of its molecules which determined their set in the regular crystalline form; a polarity which is not destroyed by fusion with potash, or by union with acids, but which is satisfied or temporarily neutralized by any of these conditions. The polarity which causes crystallization at one time effects union with acids at another. A confusion arises through regarding cohesion as a force, rather than the effect of a force. Probably cohesion and adhesion differ only in name, the force being the same. We call it cohesion when it causes two molecules of the same nature to join, and adhesion when the effect is the joining of two molecules of different natures. Let us assume that molecules are endowed with polarities, which are the cause of crystallization, cohesion, adhesion, solution, etc.,—polarities which, like magnetism, are satisfied by meeting with equal and opposite polarities. Let us assume that molecules may have several axes of polarity which may differ much or little in intensity; we may speculate that viscosity is caused by a *multipolar* attraction of approximately equal intensities in different axes, and of a strength intermediate between those existing in solid and liquid states. We may suppose that mobility is the result of equality and feebleness of multipolar attractions; that the colloid state is consequent on equality with strength of multipolar force; that a crystalloid has strong and unequal polar forces which determine the arrangement of the molecules in the lines of their strongest polarities. We may suppose, when sulphate of soda or any other salt dissolves in water, that the polarity of its molecules is satisfied by the attraction of so much water as is required to make a saturated solution; and this polarity being satisfied, further water is miscible with it in all proportions. The greater solubility at higher temperatures probably arises from a weakening of the polarities as the effect of heat, an effect which is evident to us in the case of magnetism in iron. The stronger polarities probably diminish in greater degree than the weaker till fusion takes place, when the forces are approximately equal in all directions, and further diminish as temperature rises, till volatilization is effected, when molecular attraction seems to vanish altogether. This all appears reasonable enough in the case of sulphate of soda and water where the proportion between the salt and the solvent is such that we may suppose the molecules engaged on the phenomena are within the sphere of probable attraction; but when we come to such salts as chloride of silver, sulphate of baryta, etc., how can we suppose that one molecule of the salt can come within the sphere of attraction of so many molecules of water as are required for its solution? This has appeared to me a difficulty in all the theories of solution commonly propounded. If 100 molecules of water by their adhesion cannot overcome the cohesion of 2 molecules of sulphate of baryta, how is it likely that 1000 or 10,000 can attack the particle at the same moment?

How can we conceive of 1 molecule of chloride of silver being maintained in solution by its adhesion to 100,000 molecules of water? And the adhesion of 50,000 molecules of water is insufficient to restrain it from union with some other molecule of chloride of silver which may be adhering to 50,000 contiguous molecules of water?

Hydrogen dissolves in 50 volumes of water, or by weight, 1 in 12,500, or by atoms, 1 in 1400; probably this is much the same as saying that the molecules find freer space for their movements between the molecules of fluid water, than between those of the atmosphere of gaseous hydrogen from which the solution is taking place. The active movements in the hydrogen atmosphere tend to throw out molecules into any space freer than the atmosphere, and will so throw hydrogen into the water till the water is as crowded with hydrogen molecules as the hydrogen atmosphere itself, and then it is probable that interchanges will take place, but the number of molecules thrown into the water will be just equal to those thrown back from the water into the hydrogen atmosphere, and so there will be maintained a definite relationship between the proportion of hydrogen "absorbed" or "dissolved" by the water, and the temperature and pressure of the hydrogen atmosphere in contact with it. This doctrine is so nearly the common one in reference to gas and water that my statement is like an oft-told tale. But if we apply the same idea to the solution of chloride of silver it affords us at least some material for thought and speculation. The quantity of chloride of silver in its saturated solution in water is less than the quantity of air in an equal space of an ordinary air-pump vacuum, but more than in the high vacua used for radiometers or Swan lamps.

A cubic inch of air, attenuated to the thousandth of an atmosphere contains $\frac{3}{10000}$ of a grain of N and O. A cubic inch of saturated solution of chloride of silver contains about $\frac{2}{100000}$ of a grain of Ag Cl. But the highest authorities tell us that even in the most perfect vacua attainable, the molecules are crowded almost inconceivably closely together and in numbers quite beyond our powers of thought. The limit of solubility seems more probably determined by the relation of the molecular motions of the Ag Cl to this state of crowding than to any adhesion between the salt and its solvent, using the word adhesion in its customary sense. The flight of molecules of Ag Cl through the water would give them mean free paths of appreciable length before coming into contact with others, or within influence of their polarities and movements.

The movements of the Ag Cl in relation to those of the water may be compared to the movements of a comet in relation to a planetary system. The comet comes in and obeys the central commanding force and is temporarily part of the system, but is whirled away again into space, so the mass Ag Cl, by a temporary influence of the water, throws off an atom which, passing through a cometic orbit, having too distant a harmony with the aqueous sun to be retained in its system, passes into the aqueous space till it comes under the influence of a molecule or a mass of its own nature, with which it unites and passes out of solution.

The effect of heat is no doubt to weaken the molecular polarities, thus facilitating the disintegration of solids, but at the same time weakening the polar attraction between the solid and the solvent. The increased or decreased solubility with a rise of temperature will depend upon whether the polar attractions among the molecules of the solid diminish more or less rapidly, in proportion to the increased temperature, than the polar attractions between the solid and the solvent. Of course we expect the molecular movements of one drop of water to be just the same as of another, and we know they unite instantly and perfectly. The molecular construction of oil of turpentine or other essential oil we believe to be very different, and probably their molecular movements are inharmonious with those of water, resulting in the small degree of solubility between them, while the complicated and heavy molecules of the volatile oils having sluggish movement dissolve freely among one another.

To be continued.)

COTTON SEED OIL: SOME OF ITS USES IN PHARMACY, AND ITS DETECTION WHEN MIXED WITH OLIVE OIL.*

BY S. S. BRADFORD, PH.G.

Having had occasion during the last six years to manufacture lead plaster in considerable quantities, it occurred to me that cotton seed oil might be used instead of olive oil, at less expense, and with as good results. The making of this plaster with cotton seed oil has been questioned, as according to some authorities the product is not of good consistence, and is apt to be soft, sticky, and dark coloured, but in my experience such is not the case. If the U. S. P. process is followed in making this plaster, substituting for the olive oil cotton seed oil, and instead of ½ pint of boiling water 1½ pint are added, the product obtained will be equally as good as that from olive oil. My results with this oil in making lead plaster led me to try it in making the different liniments of the Pharmacopœia, with the following results:—

Linimentum Ammoniæ.—This liniment, made with cotton seed oil, is of much better consistency than when made with olive oil. It is not so thick, will pour easily out of the bottle, and if the ammonia used is of proper strength will make a perfect liniment.

Linimentum Calcis.—Cottonseed oil is not at all adapted to making this liniment. It does not readily saponify, separates quickly, and it is almost impossible to unite when separated.

Linimentum Camphoræ.—Cotton seed oil is far superior to olive oil in making this liniment, it being a much better solvent of camphor. It has not that disagreeable odour so commonly found in the liniment.

Linimentum Chloroformi.—Cotton seed oil being very soluble in chloroform, the liniment made with it leaves nothing to be desired.

Linimentum Plumbi Subacetatis.—When liq. plumbi subacet. is mixed with cotton seed oil and allowed to stand for some time the oil assumes a reddish colour similar to that of freshly-made tincture of myrrh. When the liquor is mixed with olive oil, if the oil be pure no such change takes place. Noticing this change, it occurred to me that this would be a simple and easy way to detect cotton seed oil when mixed with olive oil. This change usually takes place after standing from twelve to twenty-four hours. It is easily detected in mixtures containing 5 per cent. or even less of the oil, and I am convinced, after making numerous experiments with different oils, that it is peculiar to cotton seed oil.

CATTLE CONDIMENT.

"In the preparation of cattle food the main object is to make the food palatable. The animal is more contented, it eats with a contented relish, and a greater thriftiness is the result. I am not a believer in the condimental value of these foods, for I believe that in our grasses we have all the condimental elements required. But should my correspondent desire to make his own cattle food, here is a common formula:—Locust bean, 6 cwts.; Indian corn, 9 cwts.; best linseed cake, 3 cwts.; powdered turmeric, 40 lbs.; sulphur, 40 lbs.; saltpetre, 20 lbs.; liquorice, 27 lbs.; ginger, 3 lbs.; aniseed, 4 lbs.; coriander, 10 lbs.; gentian, 10 lbs.; cream of tartar, 2 lbs.; carbonate of soda, 6 lbs.; levigated antimony, 6 lbs.; common salt, 30 lbs.; Peruvian bark, 14 lbs.; fenugreek, 22 lbs. This will make as good a cattle spice or food as any that can be bought. But my own opinion is that food can be made very palatable by simply mixing with it a small proportion of locust bean meal and a little salt; and locust bean meal can be purchased at about £8 10s. a ton just now, so that it is not very expensive."—*Correspondent of the Morning Post.*

* From the *American Journal of Pharmacy,* October, 1882.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 16, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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THE JUBILEE OF M. DUMAS.

THE French Academy of Sciences was last week the scene of a graceful and well-deserved compliment to one of the ablest of living chemists, in the presentation to M. DUMAS of a medal which had been struck specially to commemorate the fiftieth anniversary of his election as one of its members. Science is too cosmopolitan to limit the faculty of admiration for such a career as that of M. DUMAS to one country, and therefore, notwithstanding his countryman's arrogant boast that chemistry is a French science, there is not an English chemist who would grudge to join in according to the veteran scientist a full meed of honour, in the same catholic spirit as permeated his own panegyric a few years ago of our great countryman, FARADAY. But beyond a share in this general sympathy, the readers of this Journal may claim to have a special interest in M. DUMAS, arising from the fact that he is one of the band of famous men who began their scientific career in the pharmacy.

Born in the year 1800, M. DUMAS, shortly after the battle of Waterloo was fought, became an apprentice to a pharmacist in his native town of Alais, in the department of the Gard. Not satisfied, however, with his prospects there, he in 1816 travelled on foot to Geneva, where he attended lectures on botany by the elder DE CANDOLLE, on physics by PICTET, and on chemistry by DE LA RIVE. He, moreover, had the good fortune to secure there the superintendence of a large laboratory, which had previously been used for courses of practical chemistry, but then belonged to the pharmacy of M. LE ROYER. We learn from the eloquent biography from the pen of Dr. HOFMANN, which, about three years since, was published in *Nature,* that his fellow pharmaceutical students, who frequently united in botanical excursions during the summer, started the idea of winter meetings for scientific studies, and it was proposed that as young DUMAS had a laboratory at his disposal he should give them a course of experimental chemistry. Much patience and ingenuity were required before the apparatus absolutely necessary was constructed; but all difficulties were overcome, and thus early he made his *début* in the professorial career, which he afterwards followed with so much success in Paris at the Athenæum, the Polytechnic School, the Sorbonne, the School of Medicine and the College of France. It was, however, in connection with work strictly pharmaceutical that the name of DUMAS first appeared in scientific literature, and mention of the subject will assist in conveying some idea—though still a very vague one—of the enormous strides that have been made in scientific pharmacy since that time. DUMAS was eighteen years of age when he detected the presence of iodine in carbonized sponge, and in consequence Dr. COINDET, at whose request the examination had been made, announced iodine as a specific against goitre. This led to further inquiries as to the most convenient mode of administration, and DUMAS suggested the trial of a tincture of iodine, potassium iodide and iodized potassium iodide. But only about six years had elapsed since COURTOIS had first separated iodine from the waste liquor in the manufacture of soda ash from seaweed, and still more recently had it been recognized as an elementary body by GAY-LUSSAC; the iodides were then unknown to trade, and iodine was the only commercial article available. The discovery of Dr. COINDET, however, originated a great demand for iodine preparations, and for many years their manufacture proved a source of wealth and reputation to the pharmacy of LE ROYER. After this, DUMAS' association with pharmacy was not so close, although nearly fifty years subsequently he presided over the Commission entrusted with the revision of the French pharmacopœia. But he now joined PREVOST in those physiological investigations which for a time diverted his attention from more purely chemical studies, though they brought to him a reputation that eventually led to his migration to Paris, where chemistry again resumed its sway.

We must be content with having thus briefly sketched DUMAS' early work whilst engaged in a pharmacy; it would be impossible in these columns even to mention his multitudinous subsequent investigations. In the words of the President of the Academy, M. JAMIN, he went to Paris with no other wealth than a brave heart, a resolutely fixed programme, the will to carry it out, and confidence in himself, but still unconscious of the future that awaited him. To-day, with the progress of time, his dreams have been realized, his hopes surpassed, and he has attained the highest pinnacle of honour that a scientific man can hope to attain. Like FRANKLIN, he might say, "If I had to recommence life, I could not ask for more!" Looking back upon the brilliant services to science which M. DUMAS has rendered since he first took his seat in the Academy half a century ago, it is not difficult to understand the feeling which impelled M. JAMIN, who had himself sat under the famous teacher he addressed, to say: "The pupil cannot "assume, without irreverence, the right to praise or "to criticize; face to face with his master, he has "only the duty of respect."

DEFECTIVE WEIGHTS AND MEASURES.

We regret that circumstances appear to us to make it desirable that we should once more direct the attention of chemists and druggists to the imperative necessity, if they wish to avoid annoyance and loss, that they should satisfy themselves as to the weights and measures used by them coming within the requirements of the law, and that they should exercise care in the purchase of new ones. But we think that a sufficient justification will be found in a statement of the results of a week's inspection in one of our cities, which has been placed at our disposal by a correspondent whose good faith and capability of forming a correct judgment are beyond challenge. The shops visited were twenty-four in number; in only four instances were all the weights and measures found correct, and in sixteen cases summonses were issued and convictions followed. Altogether 1207 weights and 127 measures were examined. Of the weights 128 were found too light, 97 were too heavy, and 59 were illegal only in being unstamped. Of the measures 31 were found incorrect. There were also 54 scales tested and 17 proved untrue. The nature and extent of the default may be seen from the following table, setting out the amount of error in the weights seized in two cases in which convictions were obtained:—

First Case. Denomination of Weight.	Error.	*Second Case.* Denomination of Weight.	Error.
6 grains	$\frac{9}{10}$ gr. light.	6 grains	$\frac{9}{10}$ gr. light.
5 grains	$\frac{2}{10}$ gr. light.	5 grains	$\frac{4}{10}$ gr. light.
4 grains	1 gr. light.	4 grains	$\frac{4}{10}$ gr. light.
2 drachms	$1\frac{1}{2}$ gr. heavy.	3 grains	$\frac{7}{10}$ gr. light.
2 scruples	$\frac{3}{10}$ gr. heavy.	1 grain	$\frac{3}{10}$ gr. light.
1 scruple	$\frac{3}{10}$ gr. heavy.	2 drachms	$\frac{5}{10}$ gr. heavy.
$\frac{1}{2}$ scruple	$\frac{6}{10}$ gr. heavy.	1 drachm	$\frac{4}{10}$ gr. heavy.
		$\frac{1}{2}$ drachm	$\frac{5}{10}$ gr. light.
		1 scruple	$\frac{6}{10}$ gr. heavy.
		$\frac{1}{2}$ scruple	$\frac{3}{10}$ gr. heavy.

THE PARIS SCHOOL OF PHARMACY.

It may interest some of our readers to learn that an excellent full page engraving of the new buildings of the Ecole Supérieure de Pharmacie, which have recently been erected in Paris at the expense of the French nation, was published in *The Builder* for November 25. The view is taken from the rear of the buildings, near the junction of the Rue Michelet and the Rue d'Assas, and consequently it does not show the principal façade in the Avenue de l'Observatoire; but this is more than compensated for by the greater extent to which the details of the different buildings are disclosed. Looking across the ample botanical garden, with its hot house accommodation, the eye rests on two handsome horseshoe shaped buildings, each containing an amphitheatre capable of accommodating an audience of six hundred persons. These lecture theatres are connected by vestibules and galleries with the main building, portions of the back of which are seen, and in which are situated the examination hall, the residences of the officials, the professors' laboratories, the museums, reading rooms, library, etc. On the left hand of the picture, running back from these, and with an outlook towards the north over the Rue l'Abbé de l'Epée, is a long three-storied wing, devoted to practical work, the ground floor containing the chemical laboratories for the first year's students, the second floor those for the second year's students, whilst in the upper floor micrographic work is carried on by the more advanced pupils.

PHARMACEUTICAL INSTRUCTION IN DUBLIN UNIVERSITY.

It may be useful to some of our readers to learn that in the Experimental Science School, Trinity College, University of Dublin, there are now courses of instruction, specially arranged for pharmaceutical students to meet the requirements of the Pharmaceutical Society of Ireland, which may be attended by persons otherwise unconnected with the College. The lectures are delivered twice a week, Tuesdays and Thursdays, the course extending from November 1st to March 31st, and on an additional day in each week illustrative experiments are conducted in the Laboratory. The necessary three months' practical course in the Laboratory may be commenced on the 1st of January or the 1st of April, and is under the joint supervision of the University Professor of Chemistry (Professor J. Emerson Reynolds), and the King's Professor of Materia Medica (Dr. W. G. Smith). It comprises instruction in the qualitative testing and volumetric analyses of the Pharmacopœia and in the examination of drugs for pharmaceutical purposes. Pharmaceutical students are also allowed to attend the summer course of lectures delivered in the Medical School by the Professor of Materia Medica and Pharmacy.

DEATH OF MR. S. U. JONES.

Our readers will read with regret the announcement made at the meeting of the Chemists and Druggists' Trade Association, on Wednesday evening, of the death of Mr. Samuel U. Jones, of Leamington, who took an active part in the formation of that society and was unanimously elected its first President. Mr. Jones was also an esteemed member of the Pharmaceutical Society, which he served during many years as Local Secretary.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association will be held on Wednesday next, December 20, at the new rooms, 53, Conduit Street, W., when a paper will be read on "Plant Names," by Mr. C. E. Stuart.

Mr. Robert Gibson, Pharmaceutical Chemist, of the Carlton Medicated Lozenge Works, Hulme, has been elected without opposition Alderman for St. George's Ward, Manchester.

Chemists and Druggists' Trade Association of Great Britain.

MEETING IN LONDON.

A general meeting of the members of the trade resident in London, convened by the Executive of the Chemists and Druggists' Trade Association, was held on Wednesday last, at the Inns of Court Hotel, for the purpose of considering what amendments are desirable in the Pharmacy Act, 1868, the desirability of holding periodical meetings, and to discuss matters generally of trade interest. Mr. Robert Hampson, President of the Trade Association, occupied the chair.

The Chairman, after expressing regret for the absence of Mr. Urwick, who had gone to Leamington to attend the funeral of Mr. Jones, the first President of the Association, said the London Committee of the trade had for some time thought that it would be a good thing to have a meeting of the members of the Association to take into consideration trade questions, and the result was that the members had been asked to attend that evening. There was no organization, except the Pharmaceutical Society, in London, which could call the members of the trade together, and it seemed to be a fit thing that they should meet occasionally to discuss trade matters. London was so vast that it was almost impossible to get that spirit of union which places such as Manchester and the like found it possible to do. Unless there was some burning or political question, it was very difficult to get many members together in London; but he hoped that in course of time chemists would find it to their interest to meet as other bodies of men would when anything of importance was in possession of their minds, and that they would meet to discuss their own interests, and that larger meetings would be assembled than they had that evening. There was one special subject mentioned upon the agenda which made it almost imperative that the chemists of the metropolis should meet together, and that was the prospect—it might be a remote prospect, though he was disposed to think it was not quite remote—of having an amended Pharmacy Bill. But that question was ripening. Some time ago a Draft Bill was sent to the Government Office for consideration, but no social or home legislation had lately had any chance whatever, though it was to be hoped now that Parliament had consented to organize itself as it were as a body capable of doing political work, that it would be able to enter upon a period of practical legislation, and that the question of pharmacy would receive proper attention at its hands. If chemists and druggists went before Parliament for a Bill, it was essential that they should know what they wanted, and that they should agree upon certain main points which they thought it desirable to have in the Bill. It was most essential that they should not indulge in Utopian proposals or vague grumblings, but they should be prepared with a Bill suited to public wants as well as their own wants. He was quite sure that it would be of no use asking for anything that was incompatible with the public interest. Their interest after all was the public interest; they had no right to special legislation except in the public interest; but he was firmly convinced that the legislation they already had, or which the State had inflicted upon them, had been of public benefit, and that if they proceeded upon the lines of qualification and education they would obtain what they required. The first thing to be done in any new Bill was to repair the great breach which had lately been made at Westminster, and by that expression he referred, of course, to the decision of the House of Lords. It was no use giving them any Bill without that breach was repaired. It was possible that the decision of the House of Lords was technically right and that the framers of the Pharmacy Act might not have contemplated limited liability companies carrying on the business of chemists and druggists. The law might be good, but certainly no justice had been obtained at Westminster. The decision was contrary to the spirit of the old Act, and certainly no Bill would be acceptable to the chemists or compatible with public interests unless that breach was repaired. Was it an advantage to the public that pharmacy should receive the countenance of the State at all and was it desirable that chemists should be thoroughly qualified? Of course every one was agreed upon that. But then came the question whether it was desirable that pharmacy should receive any further recognition from the State. They would all agree that certain things required alteration, and they could only hope that when the time arrived they would at any rate amend the Bill in all the main points. He maintained that if pharmacy was not worth following, owing to the business being diminished and rendered worthless, the public would suffer along with the chemists. It was not simply their own loss, but the public loss and the loss which medical men must sustain. The interests of chemists were bound up with those of the medical faculty, and anything which injured them injured the medical profession, and therefore that profession ought to unite with the chemists in obtaining what was considered right. He also considered that an Englishman was quite as good as an Irishman, but by the provisions of the Irish Pharmacy Act, pharmaceutical chemists alone had the right of dispensing prescriptions. In all Colonial Bills there was a similar clause, and he maintained that an English pharmacist ought to have the same right. What were they educated for? Not simply to have attached to their names some useless title. What would a mariner think if, after receiving an excellent education in navigation and all that applied to the safe care of a vessel, he was never allowed to enter a ship and sail a voyage? The thing was utterly absurd. Take the case of a student in music; if he were constantly engaged in rehearsals and never allowed to sing in public his qualifications would be of no use at all. The education of a chemist was utterly useless unless he was able to exercise it in true pharmacy. They heard a good deal of talk about imposing a curriculum upon students, but it was all perfectly useless, unless they could make use of their sharpened qualities. There would be no lack of zeal in the students if they found during their apprenticeship that pharmacy was a thing really required; but of course students received a damper directly they found that dispensing was an unimportant and minor thing. He thoroughly agreed with the imposition of a curriculum, as it would bring about the establishment of educational centres. Then again, they must bear in mind that unless they had the pharmacy of the country and the sale of drugs in their hands, in consequence of the very quick vanishing of miscellaneous trade owing to the terrible competition which prevailed, there would be nothing left to them. They must stick to their proper calling, viz., pharmacy, and endeavour as much as possible to obtain a fair recognition of it. The next question for consideration was that of patent medicines containing poisons, and he hoped that in any future Bill there would be a provision that these medicines should only be sold by pharmacists. The wholesale patent medicine vendors ought not to utter any protest about this. At one time these gentlemen only sold to chemists, but now they did not care to whom they sold, though he thought that chemists being independent people might be able to take care of themselves in this matter. The most important thing after all, after knowing what they wanted, was to become thoroughly organized either by that Association or the Pharmaceutical Society, so that when the time came to urge upon the Legislature their claims, they might be able to carry through a Bill. If they did not know what they wanted, they would have no chance of carrying any Bill, but if they did know what they wanted, and their wants were reasonable and they were zealous in representing their views, he had no hesitation in saying that they would carry a satisfactory Bill.

Mr. Holmes moved the first resolution as follows:—

"As it is likely practical legislation will be possible in the next session of Parliament, this meeting expresses an earnest hope that a Bill may then be passed to amend the Pharmacy Act, 1868."

He thought everyone would rejoice in seeing that the Privy Council had at last requested the Pharmaceutical Society to send in a Draft Bill for an improved Pharmacy Act. After the remarks which had been made by the Chairman it was hardly necessary for him to state in what respects the Pharmacy Act required amendment, but his own opinion was that the sale of patent medicines require special attention. In the neighbourhood of Pimlico, where he resided, he suffered from competition not only from co-operative stores, but from oilmen and grocers, who sold patent medicines at the price which he (Mr. Holmes) had to pay for them to the wholesale house. There was no Act of Parliament to prevent chlorodyne or solution of chloral being sold by an uneducated person, and he thought that as a chemist was obliged to pass a certified examination before he could sell poisons, that the same law should apply to the sale of patent medicines. With regard to dispensing by co-operative stores, that was, in his opinion, a very iniquitous thing, because the Act of Parliament provided that no person could keep an open shop unless he was qualified by having passed the requisite examination, or was on the register. A chemist and druggist could not take into partnership any person not upon the register, therefore it followed that it was unlawful for certain persons to enter into partnership for the sale of patent medicines by merely employing a qualified assistant. If co-operative stores could be put upon the same basis as chemists and druggists an amendment might be made in the Pharmacy Act.

Mr. Woolings, in seconding the motion, said he thought that registered chemists and druggists, as well as pharmaceutical chemists, should be exempt from serving on juries.

Mr. Nicholls wished to be informed of the salient points upon which they desired to have some alteration in the Act.

The Chairman said the second resolution covered that ground.

The motion was then put and carried unanimously.

Mr. Long moved the second resolution as follows:—

"That whilst leaving with confidence to the Executive Committee of the Chemists and Druggists' Trade Association the consideration and careful watching of any Pharmacy Bill brought into Parliament, this meeting is of opinion that unless it contains the following or equivalent provisions it will not be consistent with the public safety nor adequate to the just claims of pharmacy and of legally qualified registered persons practising the same: (1) To insure that all persons, without any distinction whatsoever, keeping open shop for the dispensing of medicine and the sale and dispensing of poisons should be legally qualified and registered; (2). That patent medicines containing scheduled poisons should be sold only under the same or similar restrictions as are already applied to the sale of other poisons enumerated in the schedule of the Pharmacy Act."

As reference had been made to the decision given by the House of Lords with regard to what constituted qualification, he might perhaps be permitted to point out that the Act itself said that it was expedient for the safety of the public that all persons who sold medicines should be qualified. That was a proposition which no sane person would attempt to dispute, and he could not see that there was any difficulty about the subject at all. With all due deference to the decision of the House of Lords, it was not, to his mind, English law. There was no reason whatever why a corporate body should not be composed of qualified people. Of course, it would be perfectly impossible to have a dozen people up, unless they were going to catechise them as a class; but they could take each individual separately and examine him, and if he was not competent to pass the examination then he was not qualified to carry on business according to the Act, because the Act most decidedly gave a definite status and conferred certain rights and privileges on chemists and druggists, and it was not customary in England to abolish rights and privileges without compensating those who possessed those rights. The law did not say that the servant qualified the master; in everything legal, medical and pharmaceutical, it was necessary for the master to be qualified, and the sense of that was evident, as the directing mind ought to be able to know what was right and what was wrong. A manager might be a very good man, but unless he was able to direct and decide, the thing was perfectly futile. He did not think there would be any difficulty about the first proviso of the resolution. The Pharmaceutical Society had been established for more than forty years, and there was now no one in business who had not had the opportunity of joining, either by free admission or examination, and it was evident that a large amount of skilled technical knowledge was necessary to conduct the business of a chemist. Cutting out of the Pharmacopœia the common family requisites, such as carbonate of soda, arrowroot and essence of lemon, he thought that all drugs of curative or active properties should only be sold by the men who had qualified themselves to know their properties and could dispense them with safety to the public. The act of dispensing did not merely mean mixing together a doctor's prescriptions, but giving a certain amount of advice, and therefore their aim and object should be, the Pharmacopœia for the pharmacist. There was no difficulty in defining who should sell, and what they should sell. Pharmacists ought to be the only makers of patent medicines; he knew they were only the makers of respectable patent medicines; because the makers now were so anxious to procure a large sale that, like traitors in the camp, they did not care whether they sold to friends or enemies. It would not be at all difficult for chemists to keep their preparations to their own profession, and it would be better for them if they did. With regard to the powerful patent medicines the resolution was absolutely necessary, because it was perfect nonsense to expect a man to go through the education required of a pharmacist and then to allow an incompetent man to sell side by side with him the same articles.

Mr. Nicholls, in seconding the motion, said there was scarcely a patent medicine which did not contain poison, and therefore the sale of these articles should be relegated solely to pharmacists. He was sure nobody would be better pleased if this could be brought about than the medical faculty. As a matter of fact it was necessary to give a certain amount of advice upon the sale of any patent medicine, and it was not to be expected that a person in a grocer's shop could tell a customer as to how the medicine should be administered to a child. He was strongly of opinion that most of the homœopathic medicines were dangerous in the hands of shopkeepers, and that these medicines should be included in the category of patent medicines.

The Chairman pointed out that at the present time homœopathic medicines containing an appreciable amount of poison were within the Act, and it was illegal for an unregistered person to sell them.

Mr. Horncastle thought it was very important that chemists should be united before going to Parliament for any Bill, and such meetings as the present were likely to go a long way towards accomplishing that object. It had been suggested that chemists should take out a licence, but he thought they were sufficiently saddled at the present time. Pharmaceutical legislation hitherto had done a great deal for the public, much more for the public than the trade, and now the time had arrived when chemists might very well come forward and ask for something for themselves, but in doing so they should try to draw a distinct line between chemists and druggists and the ordinary trade. He saw no difficulty in restricting the sale of compounds mentioned in the Pharmacopœia to chemists and druggists, though the case was entirely different as regards simples and trade chemicals. The sale of all patent medicines ought to be confined exclusively to them, and the only way to secure the interest of the public was the one which would secure the interest of the trade. Many could remember the time when the first Pharmacy Act was brought forward, and how it was mutilated and crippled by the division in the trade, and, therefore, he hoped there would be no personal bickerings when the next Bill was brought forward.

Mr. Wightman Cooper thought the last speaker had enunciated the feeling of pharmaceutical chemists, though he was not so sure that he had expressed the opinion of chemists and druggists. A glance at the poison schedule to the Bill of 1868 would show that the gentlemen who legislated for the trade at that time knew nothing about the matter, or if they did, they had sadly neglected their duties. They should have included some two hundred or three hundred things called drugs, and so have made it worth the while of many persons to pay attention to the trade. At the present time the schedule was so cramped that anyone was able to open shop, and to set the chemist at defiance. He was glad to think that there was a sensible feeling at last that chemists should combine for their mutual benefit, but he was afraid it was now too late. Free trade was very good in many things, but there could be no free trade in a restrictive business, and he was sorry that the leaders of pharmacy had made the mistake of restricting without giving sufficient compensation. Now if they had found out their mistake he hoped they would be able to rectify it.

Mr. Lawrence asked whether the views expressed at that meeting would be brought before the Pharmaceutical Society.

The Chairman said it was competent for the meeting to do so. The last speaker seemed to imagine a great mistake had been made because the earlier movers in pharmaceutical politics did not include drugs in the schedule, but the Privy Council would not accept such an enlarged schedule. To have done so would have been to destroy the use of the word "poison" altogether. As a pharmaceutical chemist he did not take any share of the blame which had been attached to that small body, and the meeting should remember that the chemists and druggists outnumbered the pharmaceutical chemists, and if they had chosen, when they had the opportunity, to join the Society they might have manipulated it as they wished. The folly entirely rested with them for not having taken advantage of their opportunity. Inasmuch as they did not join the Society the subject of legislation had been left in the hands of a small number who had done a great deal of good for the trade.

Mr. Cooper asked whether the meeting had been called by the Chemists and Druggists' Association of Birmingham, or by the Pharmaceutical Society.

The Chairman replied by the Chemists and Druggists' Association of Great Britain.

Mr. Cooper thought the motion did not go far enough, because it did not state sufficiently the alterations required. They had had many additions to the poison schedule, and certain tinkerings with the Pharmacy Act, and the time had now arrived for them to act, once for all, and to say that everything which came under the word "drug" should be included in the schedule. If that were done, the public would know what drugs were. As an amendment to the second provisio, he begged to move—

"That every article which could be enumerated as a drug should be included in the new Pharmacy Act, and sold only by chemists."

Mr. Henchley seconded the amendment.

Mr. Nicholls hoped that the amendment would be withdrawn, because if they went for too much they would not get anything.

Mr. Reid asked whether the motion which had been put forward could be amended or enlarged by the Committee, which would be afterwards appointed.

The Chairman said, Certainly. He might point out that application had been made to the Privy Council to add mineral acids to the schedule, and he did put it to the meeting, whether it was expedient to try and include all drugs in the schedule. To his mind it was not only inexpedient, but unwise, because he was sure that no Government would grant such a thing.

Mr. Allen thought that if they went to Parliament for anything unreasonable they would fail altogether, and therefore he hoped Mr. Cooper would not press his amendment.

Mr. Barnard was of opinion that it would be absurd to ask Parliament to give them an Act embodying everything which could be classed under the name of "Drugs."

Mr. Cooper said the time had now arrived when they should make a stand as to whether they should live or die, and therefore he could not withdraw his amendment.

The amendment upon being put to the meeting was lost by a large majority.

The motion was then put and carried.

Mr. Allen moved the next resolution as follows:—

"That it is advisable to hold periodical meetings of the members of the Association resident in London, and that the London Committee be requested to make the necessary arrangements for the same."

The reason for this resolution was that the London members did not possess the opportunity of meeting together to discuss trade questions in a purely commercial or trade manner. He was old enough to remember the agitation prior to 1868, when certain gentlemen were always ready to come forward to discuss questions relating to their business, and the result of their meeting was the establishment of the Pharmaceutical Society, which had done so much for the trade. There were many subjects which could be discussed at these meetings, for instance, the copying of prescriptions, for which chemists were not paid, the long hours of business, and the sale of patent medicine.

Mr. W. Cooper, in seconding the motion, said he thought it would be a great advantage to hold sectional meetings in London.

Mr. Andrews agreed that one meeting would not be sufficient for the whole of London, but if they commenced with one meeting, it would not be long before many district associations sprang up.

The motion was put and carried unanimously.

On the proposition of Mr. Long, a cordial vote of thanks was passed to Mr. Hampson for presiding, and the meeting separated.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of the Society was held on Wednesday, the 6th instant, in the College of Physicians, Kildare Street, Dublin. The President, Dr. Charles Tichborne, in the chair.

The other members of the Council present were the Vice-President, Dr. Aquilla Smith; Dr. Montgomery, Dr. Collins, Mr. Brunker, Mr. Allen, Mr. Hayes and Mr. Hodgson.

Mr. Hugh Fennell, the Registrar, read the minutes of the last meeting, which were confirmed.

A letter was read from Mr. John Patrick Henry, L.P.S.I., of Belfast, in which the writer complained of some remarks made in reference to him by Dr. Dill, Coroner of Belfast, at a recent inquest. Mr. Henry stated that in reference to the case to which the inquest related he had done more than the law required, and yet the coroner said that he had "evidently looked on the matter as a business transaction and sold laudanum without caring whether the man poisoned himself or not." Mr. Henry referred to an editorial article which had appeared in the *Pharmaceutical Journal* of October 28, 1882, on the subject, and asked whether or not the Society would protect its licentiates from such language as that used by the coroner.

Dr. Montgomery moved that the letter be marked "read." There was nothing in it that they could take notice of.

The President said no doubt the coroner did make a slip and his law was not very good; but the subject had been already thoroughly ventilated in the newspapers and he did not see that the Society could do anything in the matter.

The motion of Dr. Montgomery was agreed to.

A letter was read from Mr. James H. Haslett, of Belfast, inquiring whether candidates who passed their Preliminary examination before November 1, 1882, would be exempt from the operation of the new rule passed on that day, which fixes the time to be spent in learning practical pharmacy at four years.

The President read the rule as follows:—"That all candidates for the licence shall be required to produce a certificate signed by a pharmaceutical chemist or apothecary keeping open shop, stating that he has served a *bonâ fide* engagement with him as either apprentice or assistant, in his sole employment, for a term of four years. To come into force on January 1, 1884."

Mr. Hodgson said that, according to that rule, before the writer of the letter could come up for his Major examination he certainly would have to serve four years. But the rule would not be law without the consent of the Privy Council; and any member of the Council of the Society going before the Privy Council and objecting to the rule could upset it. He was not clear that he himself would not do so, for he had the strongest objection to the rule. He believed it was contrary to the principle of the Pharmacy Act, and at variance with the opinion of their late lamented President, Sir Dominic Corrigan, who always objected to apprenticeship, and maintained that it was enough for a man to show by examination that he knew his business.

The President said the question of apprenticeship was not raised by the letter. The real point was as to time. The rule made it four years instead of two. He certainly thought the rule would prevent the writer from coming up for his Major examination on two years' study or service. But the only question now before them was, what reply was to be given to the letter.

Mr. Hayes said the application of the rule would be hard upon men who had passed their Preliminary examination under the old rule.

Mr. Allen said notice might be given of a motion to exempt from the operation of the rule those gentlemen who should pass the Preliminary examination before January of next year.

The President said the best course would be to inform Mr. Haslett that the new rule was under the consideration of the Privy Council.

The Registrar stated that on the previous Saturday he had received a letter from Dr. Kaye, Q.C., Clerk to the Privy Council, enclosing for the approval of the Council of the Society the rule in question amended as follows by the law officers of the Crown:—

> "That every candidate for the licence shall be required to produce a certificate, signed by a pharmaceutical chemist or apothecary keeping open shop, stating that such candidate has served a *bonâ fide* engagement as apprentice or assistant, with and in the sole employment of such pharmaceutical chemist or apothecary, or a firm of which he is a member, for a term of four years. To come into force on January 1, 1884."

The President said the last part of the amended rule would require consideration.

Mr. Hodgson said there were two hundred and eighty-seven young men, every one of whom had passed his Preliminary examination under the impression that when qualified by two years' practical pharmacy he would be able to pass the Major examination. If this rule, which had been adopted in a crude manner, should be enforced, it would be a breach of faith with them.

The President: I think there has been only an oversight that can be easily remedied.

Dr. Montgomery: The Council did not adopt the rule hastily. It was a long time under consideration. The only mistake was that they did not define the time more accurately.

The President: It will meet the case for us to reply to Mr. Haslett that the matter is under consideration, and no final decision has been arrived at.

A letter was received from Mr. J. B. Fisher, making inquiries as to certain legal proceedings.

The Registrar was directed to reply to Mr. Fisher, stating that as he was not a member of the Society, the Council could not continue to correspond with him on the subject.

A letter was received from Mr. Hatchell Whitby in reference to the conference of four members of the Council with four members of the Society, stating that it would be out of his power to undertake to arrange with any of the members of the proposed committee.

The letter was marked "read."

A report of the Law Committee, making a recommendation as to the course of action to be taken with reference to a letter from Mr. Daniel J. McGrath, L.P.S.I., of Carlow, as to the sale of poisons, was adopted.

The Council then adjourned.

Provincial Transactions.

BRIGHTON ASSOCIATION OF PHARMACY.

A meeting was held in the ante-room of the Town Hall, on December 1, when Mr. W. D. Savage read a paper entitled—

Some Thoughts suggested by Professor Attfield's Address to the British Pharmaceutical Conference at Southampton.

The many and important subjects alluded to in the admirable address of Professor Attfield, at the opening of the Conference at Southampton, may fairly claim from us some consideration, and as the subject has been suggested to me as an appropriate one for opening our local session, I readily avail myself of this opportunity of congratulating the Professor on his happy selection and systematic arrangement of subjects. Exhaustive research, careful manufacture, and thorough distribution, or the collection, preparation, and distribution of drugs, embrace a wide field for discussion, and although they have at his hands had great consideration, yet there are some points on which we may, some of us, differ, and it is well on such occasions as the present that we should freely discuss the various subjects brought before us, and ascertain thereby how far our views accord with those of the worthy Professor.

With respect to the first heading "Collection," it is suggested that flower culture, and medicinal plants might with advantage be more extensively cultivated in our own country, and if we might infer from the success which attends the culture of lavender and peppermint—at Mitcham, and other places—it would seem desirable, in the present depressed state of agriculture, that an experiment in this direction should be tried. Of course it would, in the first place, be necessary to know what conditions of soil are suitable; and what counties, in the second place, are best likely to fulfil those conditions; and now that scientific farming is exciting considerable interest, and is in our own country being practically carried out by Professor Jamieson, of Aberdeen, the time seems appropriate for considering this important subject. It is true that our climate is not very favourable for the production of many plants yielding the finer perfumes, but still much might be done to meet climatic difficulties. Look for instance at the obstacles which the farmers in Kent have to encounter in the cultivation of hops, and whilst they have not lately been very successful, times have been when their care and expensive culture has been well rewarded. And under the head of "Collection" might not some of our indigenous plants be made more available that they are at present? Indeed, there does seem a tendency in this direction. We have in "The Month" of the October number of the *Pharmaceutical Journal*, reference to fool's parsley, burdock (*Arctium Lappa*), etc.; and if we go back to the time of John Gerarde, 1633, we there find, in his 'General History of Plants,' a valuable collection of remedies; and again, in 1653, our old friend Dr. Culpepper,—in his 'Complete Herbal' we have a marvellous revelation of remedies associated with astronomy, and what is called the 'Doctrine of Signatures,' implying that nature herself indicated, by unmistakable signs, the appropriate remedies for certain diseases. Thus we are told that turmerick was good for jaundice, and saffron for measles, and these remedies are now very generally used by the poor people in the country; indeed saffron finds many patrons amongst the poor of the cities and towns. Now, however, without believing in the efficacy of plants, either from their colour or from planetary influences, there are no doubt many that would yield satisfactory results. I might enumerate many plants growing on our downs, such as the scabious and the different orchids, that are worthy of investigation; but I have said enough on this subject.

With respect to the preparation of drugs, Professor Attfield gives some excellent advice relative to the importance of doing as much at home in this way as you can. For obvious reasons it is well to be able, from one's own knowledge, to certify as to the quality; at the same time it is the duty of those who take apprentices, to make many things which are more cheaply bought, if for no other purpose than to enable them to know how to do it. But, as the Professor himself says, "Some preparations will doubtless always be better made by one man than by another, or by few persons rather than by many." In the very nature of things this must be so. In most retail establishments, the tendency of the age is to award the preference to certain makers of well-established reputation,—for instance, Howard's Quinine, Morson's preparations, and others I might enumerate. But apart from these special preparations, there are other reasons why many things are better made on a large scale; indeed some of them, such as the mineral acids, acetic and citric acids, can only be made well and profitably in large quantities and on premises specially adapted for them. Then, again, gamboge, scammony, guaiacum and other gum resins cannot, except on a very limited scale be powdered at home. The mercurial preparations, the vegetable powders, and many other articles of a like kind, cannot well be done by an ordinary retail druggist. Leaving out of consideration the advantages which result from a division of labour, the cost of preparation is an important factor not to be lost sight of. The druggist has now a hard fight against competitors, and whilst I am fully convinced that success or non-success in business is largely dependent on the quality of goods which are sold, there are well-known manufacturers whose reputations for years have placed their names above suspicion, and therefore, without hesitating, the retailer orders of them with as much confidence as if all the articles were prepared by himself, although I must say that tinctures, syrups, ointments and such articles as can readily be made in large or small quantities on your own premises should be prepared there. The mere trader, not being a druggist, cannot compete with one who knows his trade, who can tell a good article from a bad one, and if his requirements necessitate his going to the wholesale dealer, his knowledge would teach him where he would be best served. Here the educated druggist has an advantage over the medical man, for it is a well-known fact that as a rule the profession have a very limited knowledge of drugs. A young man probably enters into some arrangement with a medical man, or he becomes a pupil of a provincial hospital; in the former case, if his master sends out his own medicines, his experience of drugs is very limited,—he has some dozen or two bottles which supply all his requirements. How can such a system convey anything like an adequate knowledge of the materia medica of the Pharmacopœia? And if the future medical man begins his career at the hospital he is supposed to learn of the dispenser a knowledge of drugs and dispensing. But what is the fact? Nine-tenths of the dispensers have in their ordinary daily duties more to do in exercising necessary care with quick dispensing, to be able efficiently to teach others, so that, with few exceptions, the knowledge thus acquired can never enter into competition with that of the well-informed druggist, and he has little to fear from competition in this quarter. Another source of evil may, and no doubt does, to a limited extent, now exist, and that is the wholesale houses becoming retailers. As a rule the more respectable houses confine their dealings to the retailer; but there are many small establishments, calling themselves wholesale dealers, that put up ounce bottles of tinctures and other things to supply grocers and small country shopkeepers in wide-spread districts with sparse populations insufficient to maintain a druggist. Such a system has its advantages; but when the population is sufficiently large to maintain what may be called a composite druggist, the employment of grocers and others not specially educated for the trade is an innovation that the legitimate druggist has to contend with. But I cannot entertain the thought, that such second-hand dealers in drugs have any chance of superseding the better-informed dealer, although he may charge a little less for his drugs; and however much we should like to adopt the suggestion of Professor Attfield, and have the sale of drugs confined to the druggist, and mere vendors not being druggists to receive drugs in "unbroken packets supplied by a not-far-distant registered and responsible pharmacist," I very much fear the unrestrained freedom of trade is an insuperable barrier to the adoption of any system for exclusive trading. Indeed, every day more and more illustrates what I have said on more than one occasion before, that no distinctive trade seems to exist; every tradesman poaches on his neighbour, and one of the last of these encroachments is to be seen in the stationer and bookseller's windows. Since taking 20 and 25 per cent. off new books, the provincial book shop exhibits cheap American clocks, watches and jewellery, so that, what with the toy and fancy trade displays of the draper, the multifarious exhibits of the grocer, the druggist is forced to do much that he otherwise would be glad to avoid. In a struggle for existence, pure pharmacy and scientific chemistry will, I fear, be delegated to the few, with the survival of the fittest.

Another and very important subject is now, and has been for some time, exciting considerable interest. I allude to the patent medicine trade. The only probability of practically placing this branch of trade in the hands of the pharmacist, is confined to those articles said to contain poisons; and it becomes a matter of great difficulty to control the sale of such articles as chlorodyne, soothing syrups and powders, aniseed balsam, and others of a like kind, although well known to contain a certain portion of some poisonous substance. They are not, as a rule, when given according to directions, dangerous, and it will, therefore, be a difficult matter to convince the Legislature that the exclusive sale of these articles should be in the hands of the druggist. Government will not forego the large sums which they now receive for stamp duty, nor will they readily make any concession likely to diminish their interest. The counteracting influence suggested is the extension of our own proprietary articles. This course of action may, to a certain extent, succeed, but it can never displace those secret remedies which extensive advertising has impressed on a gullible public for effecting cures of real or imaginary maladies; the conscientious pharmacist would never condescend to recommend his preparations as *infallible* remedies, whilst the anxiety of the invalid often tempts him to forsake his medical adviser and seek alleviation from one or other of these sources—patent medicines or the pharmacist—and it is here that a difficulty arises, for, however much we may be disposed to avoid counter practice, we cannot, in justice to ourselves, do it, a demand is made for a certain remedy advertised, and the druggist supplies it, unless the applicant asks, as is frequently the case, "Can you suggest anything better?" Under the circumstances, surely we should be justified in exercising our judgment in giving something suitable, always taking care as far as possible to confine the practice to simple cases, or as Professor Attfield says, "Any trespassing on the purely medical domain would necessarily sooner or later involve commensurate punishment."

With respect to legislation the Pharmaceutical Society has certain powers conferred upon it; but it has been found in practice, like most parliamentary measures, defective, and the Council of the Society is most anxious to remedy many obvious defects. But when the subject is fairly considered in all its bearings two important problems present themselves—Can the well-being of the pharmacist be made to dovetail with the well-being of the public? Here difficulties present themselves; for whilst the trade coincide with Professor Attfield's views, that not only poisonous articles but the sale of compound drugs should be placed in their hands as being most likely to conduce to the health and welfare of the community, can the Legislature be induced to adopt this view? From the evidence we have already obtained I very much doubt it, and supposing the suggestion of Professor Attfield to schedule such innocuous drugs as might with safety be entrusted for sale to other hands than those of druggists could be carried out, I fear much difficulty would arise in producing such a classification as would satisfy the public and the Legislature. And I do not think that the suggested curriculum, if adopted, would influence the Legislature, and induce them to give us greater privileges. At the same time there is the startling fact that 56 to 58 per cent. of the Preliminary candidates and 50 to 56 per cent. of the Minor failed during last year. Something must be done to remedy the evil, and the excellent paper read in February last before this Association, by Mr. Hornsby, coincides closely with the views expressed by Dr. Greenhow, in his report of the examinations, which states "the very inadequate early education of the large majority of the candidates" causes the failures. It therefore would indicate that the course adopted by the Council of the Pharmaceutical Society is the right one, viz., apprentices to pass the Preliminary before they are apprenticed, or at any rate that the three years of pupilage as a necessary condition shall date from the passing of the Preliminary, and without this the candidate cannot pass the Minor. To ensure the accomplishment of these objects the curriculum, requiring attendance on courses of suitable lectures at certain centres, seems necessary, notwithstanding that the evidence of Dr. Greenhow goes to establish the efficiency of the present examinations by asserting that in his opinion those who pass them are competent to be registered under the Pharmacy Act. Our friend, Mr. Hornsby, has so ably written on the subject of education that I need not refer to it further.

Before I conclude my paper I must advert to the reiterated statements in the Journal, asking what has the Pharmaceutical Society done? I contend that it has done very much to raise an institution which is generally recognized as a power both at home and abroad. Any matter connected with pharmacy of a public character is invariably remitted by the executive of the Government to the Society for its opinion and advice. Should a vacancy occur in any department requiring an efficient dispenser, those holding our diplomas are preferred. The very fact of appointing a worthy representative (Dr. Greenhow) to attend our examinations and report upon them is sufficient evidence of the interest which Government takes in our proceedings; and in order that our statutes may not be a dead letter, every coroner is annually supplied by the Government with a copy of the Register. I only regret that they too often, by their remarks, show a disregard for its contents. These are only some of the results of having an organized well-established institution to fall back upon. What would have been our position had there been no Pharmaceutical Society when legislative measures inimical to our interests were introduced? But there are unfortunately some individuals—like Sydney Smith's lemon-juice squeezers—who expect the Council of the Society to do improbable things, irrespective of Acts of Parliament and the loss of influence which would follow injudicious action. Having travelled somewhat from my text, I may be permitted, before I conclude, to go a little further, and I do so with the conviction that all those connected with or outside the Society will agree with me—that our Benevolent Fund is entitled to the support of *all*. The Committee, in the distribution of this fund, does not stop to ask if the candidate has directly or indirectly contributed anything to it; but in the spirit of true benevolence it aids the most needy, and I do think principals and assistants should readily respond to appeals which are continuously made for increased means.

A discussion ensued, in which Messrs. Padwick, Marshall Leigh and others took part, and a vote of thanks to Mr. Savage closed the meeting.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fourth general meeting of this Association was held at the Royal Institution, on Thursday, November 24.

In the absence of the President, the chair was occupied by the Vice-President, Mr. A. H. Mason.

The minutes of the last meeting were read and confirmed, and the following donations announced:—The *Pharmaceutical Journal* and the *Canadian Pharmaceutical Journal*.

Mr. Conroy brought before the meeting the results of an examination of one of the class of spurious temperance beverages to which reference was made in the last report of the Commissioners of Inland Revenue. He reported that he had found it to contain alcohol equal to 25 per cent. of proof spirit.

A discussion followed, in which Mr. E. Davies, Mr. T. Fell Abraham and Dr. Symes took part.

The following paper was then read:—

Notes upon the Action of Glycerine on some Ferric Salts.

BY F. O. BROWN.

Often having had to dispense prescriptions containing tincture of perchloride of iron, or sometimes solution of perchloride of iron, in which glycerine has usually been ordered, I was led to make the following experiments. I commenced by making two mixtures as follows, viz.:—

No. 1.

℞ Tr. Ferri Perchlor. . . . . . . ℨiss.
Glycerini . . . . ℨvj.
Aquæ Destill. . . . . ad ℥vj.

No. 2.

℞ Liq. Ferri Perchlor. . . . . . . ℨiss.
Glycerini . . . . ℨvj.
Aquæ Destill. . . . . ad ℥vj.

Having dispensed the mixtures, I next proceeded to ascertain whether the preparations of iron I had used were in the ferric or ferrous state. On applying my reagents to a small quantity of each preparations, taken from the ordinary dispensing bottle which I had used in making the mixtures, I found both preparations to be in the ferric state.

The first reagent I applied was ferridcyanide of potassium, which gave a dark-green colour with both the liquor and tincture.

$$Fe_2Cl_6 + K_6Fe_2Cy_{12} = Fe_2Fe_2Cy_{12} + 6KCl.$$

Then to another portion of each, I added a solution of sulphocyanide of potassium, which gave a deep blood-red colour—

$$Fe_2Cl_6 + 6KCyS = Fe_2\ 6CyS + 6KCl.$$

Both mixtures, when first dispensed, were of a pale sherry colour, No. 1 (containing tincture) being slightly darker than No. 2, which I account for by the tincture being slightly darker than the liquor, no doubt owing to the presence of rectified spirit.

At the end of fourteen days, I noticed that both mixtures were paler in colour, but on applying the same reagents which I have mentioned in the previous part of my paper there was still a quantity in the ferric state, although the colour on applying my reagents was not so intense as when the mixtures were first dispensed. Up to this time the mixture had been well corked and in a shaded position. I then placed what was remaining of both mixtures in a window subject to a strong light and left them both loosely corked for fourteen days more, after which I found both mixtures were considerably paler in colour, in fact almost colourless, and on applying my reagents, I found a still greater proportion had been reduced to the ferrous state; in fact there was scarcely any remaining in the ferric.

On applying a solution of sulphocyanide of potassium a slight coloration was visible, owing to the presence of a little ferric. On the addition of ferridcyanide of potassium to another portion, I had a dark-blue precipitate of Turnbull's blue ($Fe_3Fe_2Cy_{12}$), showing the presence of a large quantity of ferrous salt—

$$3FeCl_2 + K_6Fe_2Cy_{12} = Fe_3Fe_2Cy_{12} + 6KCl.$$

Both mixtures showed the same results.

My reason for subjecting the same mixtures to the two experiments is that it is not an unfrequent occurrence that a customer gets a prescription dispensed, and whilst taking the first doses the bottle is kept securely corked and in a shaded place; after taking a few doses the patient feels considerably better and the mixture is put on one side, loosely corked, or perhaps without a cork and exposed to a strong light; after a while not feeling quite so well, the patient decides to try the remaining part of mixture which previously had done a great amount of good, not knowing whether the mixture (although exactly the same to look at) is the same as when first dispensed, or whether it is quite a different preparation.

On looking over the *Pharmaceutical Journal*, for September 23, on page 257, I find Mr. Schacht, in his valuable paper on the action of glycerine on some salts of iron, says "I found it necessary to record as the first memorandum, that the *tincture* of perchloride of iron taken from the ordinary dispensing bottle was no longer what it was when originally mixed, for it gave an emphatic bright green colour with ferricyanide of potassium." If I am not mistaken this reaction shows that the tincture of perchloride of iron *was* what it *was* when originally mixed, as Professor Attfield, in his 'Manual of Chemistry,' says:—"To a ferric solution add solution of ferridcyanide of potassium; no precipitate occurs, but the liquid is darkened to a *greenish* or olive hue, according to the strength."

Some discussion took place upon this paper, and a vote of thanks having been passed to Mr. Brown the proceedings terminated.

REGISTERED CHEMISTS' TRADE ASSOCIATION OF LIVERPOOL.

The members of this Association held their annual supper at the "Bear's Paw," Lord Street, on Thursday, November 30. It was numerously attended by the chemists of Liverpool and suburbs. Dr. Charles Symes occupied the chair, and Mr. A. Redford the vice-chair, in the temporary absence of the Vice-President.

After the usual loyal toasts had been given, the Chairman proposed "The Registered Chemists' Trade Association of Liverpool," and remarked that the Association had existed long enough and had done sufficient useful work to justify them in looking back with some amount of satisfaction at the past, and to encourage the members with bright hopes for the future. They would still welcome a large number of their brethren if they could prevail upon them to join the Association and accord their willing help. The Association was not a mere trades' union organization pledged to support and carry out selfish objects, but was a body willing to take the broad and most comprehensive view of whatever lay within their province. They would soon have to deal with a Pharmacy Act, as it seemed the Government was now fully prepared to support a Bill so long as it was just to the public. That was all the Association wanted, fairness to themselves and justice to the public.

Mr. Hocken, the Hon. Secretary, in responding said that kindred associations had taken the scientific part and this one the trade portion. He stated that during the past year a fifth edition of the 'Price List' had been issued, copies of which he had sent to all parts of the country. At some of the recent meetings, novelties in the trade and new remedies had been placed upon the table, attracting considerable attention and discussion. He also intimated that, during the coming season, it was intended to continue this and to have short papers on trade subjects. He promised that the Committee would do everything in its power to increase the credit and usefulness of the Association, and hoped it would continue to be an advantage to the city.

"The Pharmaceutical Society and the Chemists and Druggists' Trade Association of Great Britain," was proposed by Mr. Dickins and responded to by Mr. Mackinlay.

"The Liverpool Chemists' Association and Kindred Societies," was proposed by Mr. Parkinson, who specially urged the claims of the Benevolent Fund.

Mr. J. Woodcock, as President, responded for the Liverpool and Mr. Nicholson for the kindred societies.

The other toasts were "The Wholesale Trade," by Mr. Warhurst, and "The President" (given with musical honours), by Mr. Wyatt.

LEEDS CHEMISTS' ASSOCIATION

The first meeting of this session was held in the Library, on Monday, November 27, 1882. The President, Mr. G. Taylor, in the chair.

The minutes of the last meeting were read and confirmed, after which the President delivered an address.

After some preliminary remarks, he said: "In considering how I should proceed with my task it seemed to me that my first and foremost duty, and it is a very melancholy one, is to pay my humble tribute of praise to the memory of my much lamented predecessor. In the death of Mr. Stead this Association has lost one of its oldest and staunchest supporters. He was one of its founders, worked for it steadily and persistently, and died its President. His business tact and sage councils contributed largely to keep it afloat when threatened with wreck by the desertions of its members, and by his cheery good humour and buoyant spirits he has often sustained the courage of his fellow-workers amid very dark and gloomy surroundings. The same characteristics which made him so welcome a member of this Association rendered him equally useful in the management of town's affairs. He represented the West Ward in the Municipal Council for a number of years, was a regular attender of its meetings and faithful in the discharge of his duties, and whether sitting in committee or in full Council he was, I believe, equally esteemed by his brother councillors. . . .

"I shall not attempt anything like a *résumé* of phamacy since you listened to the last presidential address, neither shall I attempt to describe to you the many interesting researches of many very clever men, both English and Continental, into the composition and decomposition, combinations and derivatives, characteristics, conversions, and, I know not what else of the vegetable alkaloids, and other abstruse chemical subjects, for I am quite unable to do so, but shall content myself by passing a few remarks upon some of the recent experiments or discoveries described in the Year-Book, having a practical bearing upon our calling. For instance, we are all more or less interested in teething powders, some of us perhaps in their personal administration, but all of us to some extent in their sale. It is pretty generally known that the basis of these powders is calomel, rendered palatable by the admixture of sugar. It is difficult, however, to reconcile the fact stated by a French pharmacist, M. Verne, that a mixture of this kind undergoes no change, and that, therefore, the asserted danger of prescribing calomel with sugar is fictitious, with the opinion of an English chemist, Mr. P. Hoglan, that sugar greatly promotes the conversion of calomel into corrosive sublimate, and is hence more or less dangerous when present in the system with calomel, and that the latter even at the temperature of the human body is an unstable compound. Practically I think the Frenchman is in the right, though probably in theory the Englishman is more correct. However, it is a subject worthy the attention of chemists, especially of those who sell large quantities of these powders, whether some substitute for the sugar cannot be found about the harmlessness of which there can be no doubt.

"M. Tedenat, I see, suggests phosphate of bismuth as a substitute for subnitrate in medicine on account of its stability. Whether this form is the best in all cases to substitute for the bismuth. alb. of the Pharmacopœia, I will not venture to affirm, but that the latter is a very troublesome customer to deal with when prescribed, as we so often find it, along with bicarbonate of potash or soda, I think there can be no doubt."

The President then referred to the various compounds of bismuth used in medicine, the ready way of preparing ferric hydrates suggested by Mr. P. Hodgson, in which, however, the author erred in suggesting the use of a carbonate instead of a caustic salt, the liquor sodæ or potass. of the B.P. being quite as easily obtained in the pharmacy and producing a better preparation as an antidote for arsenic.

"What is liq. opii sed.? or in other words, if a physician prescribes liq. opii sed. what preparation bearing that name should be used? If 'Battley' is mentioned no difficulty arises; but in nine cases out of ten no indication is given of the particular preparation required, and with the great number of different makers it is quite impossible to ensure a similar medicine from a prescription whose owner is continually passing from town to town, and consequently having his prescription dispensed at different establishments. It would be a great advantage to the retail trade if a form for the preparation of the well-known (at least in name) sedative was introduced into the Pharmacopœia under its proper appellation.

"Mr. D. B. Dott's interesting paper on 'The Solubility of the Salts of Morphia' is very instructive, and will repay a careful perusal. I have always found a difficulty in getting the commercial acetate of morphia to dissolve without the addition of a little acetic acid, whilst the bi-meconate I have always regarded as a very soluble and stable salt; further experiments are evidently needed to give more light upon the subject.

"The various pepsines now met with in the trade have a peculiar tarry odour, which I have been unable to account for; this must be due to some peculiar process of manufacture, as some prepared by myself, according to the B.P. process, has not this disagreeable smell, but, on the contrary, quite a savoury fragrance; perhaps it is due to the use of methylated spirit by other makers.

"The best method of coating pills does not appear to me by any means settled as yet, and affords a fair field for the display of original invention amongst chemists. All the modes hitherto adopted seem to be open to some objection. In one, the coating is too thick and increases the size of the pills too much, besides rendering them difficult to get perfectly round; another is too thin, resembling varnish; another not sufficiently soluble, and all cumbersome and tedious in manipulation. What is wanted is a coating that shall be elegant in appearance, readily soluble, thin, and yet durable, and that can be put on as readily as a coating of silver leaf. Some of those introduced into this country from America are certainly specimens of very elegant pharmacy, and some of those turned out on a large scale by our English makers are certainly very pretty; but what we want is something that a man can do in his own pharmacy, behind his own counter, in small quantities and well. How very common it is for medical men to put 'coated' after writing a prescription for pills, just as they used to put in 'argento rotundo.' These remarks have been suggested by M. Ditten's 'new method of coating pills' by rolling them in melted cocoa butter in a plate or flat-bottomed dish, then shaking them in a large proportion of starch powder and allowing them to cool. Coating in this way is said to protect the pills from the action of air and moisture, to prevent the evaporation of volatile ingredients and to give them in some degree the pleasant aroma of chocolate; but whether they would stand the test of a journey across the burning plains of Egypt and through the heart of Central Africa is doubtful.

"Leaving the region of pharmacy I should now like to make a few very brief remarks upon one or two burning questions. And first and foremost comes the question, the great question of co-operation *versus* individual enterprise. To those who are lifted out of the strife either by having already realized a competence or by having inherited a fortune it must be very interesting to watch the struggle and speculate upon the issue of the great battle now waging betwixt these two great forces, but to us, whose means of securing our daily bread hangs on the result, why we are very much in the position of the frogs against whom the boys were throwing stones; it may be sport to them, but it may be death to some of us. If co-operation in trade, call it by what name you will, Co-operative Societies, Mutual Supply Associations, Civil Service Supply Associations, is to succeed, and be pushed to its ultimate issues, I can see nothing else for it but that the small retail dealer, the man with small capital, must in the end be pushed off the face of the earth. In all large towns and centres of population those who live long enough will see some dozen gigantic stores with outlying branches erected and conducted by means of immense capital subscribed by different classes of society, and all the small shopkeepers merged in these colossal concerns as employees. A very miserable prospect. And whether it would be for the well-being of society that this state of things should come about is exceedingly doubtful, for long before Napoleon uttered his famous saying about the English being a nation of shopkeepers, those very shopkeepers were and have continued to be the backbone of England, and if you take out the backbone the whole body politic must come tumbling down.

"But, I said, *if* co-operation succeeds, and that is a very important reservation. The retail dealer, as a rule, cannot compete with these accumulations of capital, cannot write to the makers of all advertised patent medicines for a large parcel of their preparations and enclose a cheque for the amount in such letter. Probably his capital to commence business with is only £500; out of which he may pay £150 for fittings, another £200 or £250 for stock, and the balance left will be none too much to meet current expenses; he may go on for years, perhaps for life, just able to keep his head above water, and in a general way the utmost he can do is, to pay cash for small quantities as he wants them from the wholesale dealers, and then he loses the first-hand buyers' extra discount.

"If, however, the retailer cannot compete in the matter of capital with these concerns, there are other points in which I think he has the advantage. Personal supervision perhaps is the most telling. Wherever you have divided responsibility, as in a board of directors or managers, buyers for this department and buyers for that department, with numbers of employees not under the immediate supervision of a personally interested head, the door is open for any amount of bribery, corruption and waste; and if all be true one hears of co-operative societies they are not exceptions to this rule. Whereas the small dealer has his little store all around him; his one or two helps are immediately under his eye; he saves one person's wages by his own hands, and in some cases is still further assisted by his wife, and perhaps one or two members of his family. Well, then, in the next place he takes his little store, be it drugs, grocery or drapery, with himself as the presiding genius, and drops it down, so to speak, just under the noses of his customers, whilst his colossal opponents must plant themselves in a central position (of course they may and do throw out branches, but these lack the personal supervision element more than the other), and so in this way he catches many a rainy day customer. Then, lastly, there is the incentive to enterprise which every man must feel more or less who knows himself to be his own master, and that the making or the marring of his fortune rests in his own hands.

"These remarks do not apply to large retail establishments of various trades, or even some of the leading men in our own business, excepting so far as they go to prove the success attainable by individual enterprise, for they are quite capable of taking care of themselves and competing with any corporation. In fact I am disposed to think that we retail druggists have more to fear from these pushing private individuals with capital at their backs than we have from associations.

"This brings me to another burning question, the sale of patent medicines containing poisons by unregistered men. Here, gentlemen, I think we have a real and tangible grievance. That a man, simply because he buys a 5*s.* licence and puts a 1½*d.* piece of diverse coloured paper over the top of a bottle or a box, should be allowed to ride right through the spirit of the Pharmacy Act is not only absurd but unjust. It is absurd, because through this loophole in the Act the country is being flooded with poisons under insidious names, from which it was one of the principal alleged reasons for the passing of the Act it was necessary the public should be protected. And it is unjust, in that whilst a chemist before ever he can sell a pennyworth of laudanum or dispense a grain of morphia must now pass a couple of stiff examinations, have his name kept on the register, and be subject to all the pains and penalties attaching to any infringement of the law, his next door neighbour, be he bookseller or barber, can, by the simple proviso before named, sell any quantity of morphia, prussic acid, chloral, chloroform or other poison which any adventurous maker may think fit to put up and christen a patent medicine. I think that any one putting up a proprietary article containing a scheduled poison should be compelled to state on the label the name of such poison, together with the word "poison" and his own name and address, and that the retailing of such proprietary poisons should be confined to the hands of registered chemists, who should in their turn also affix their names and addresses. This would ensure the public being properly forewarned of the nature of the article they were purchasing and restrict the sale of poisons to those who are alone qualified by Act of Parliament.

"I intend bringing this subject before the Committee of this Association shortly, when I hope they may see their way clear towards taking some steps for bringing this question under the notice of the proper authorities, or for getting up an agitation throughout the country against the law as it now stands.

"Before closing I should like to say a very few words to the young men just coming into our calling. Do not slip the days of your apprenticeship as a time for study and observation. Whether a few months' cramming at some of the establishments in London, or even at the Pharmaceutical Society's rooms, be the quickest and easiest way of getting through your examinations or not I will not say; but this I will venture to affirm, that the amount of information required of you at those examinations, if acquired by a steady day by day reading and observation during the term of your apprenticeship, and by availing yourselves of such courses of instruction or lectures during the time within your reach, will be far more likely to stick to you and remain ready at your beck and call in future years, than the same amount thrust into your head at high pressure, for the moment the pressure is removed and your diploma obtained, then off goes your rapidly acquired knowledge, and you are left very much where you were before you went up for examination."

Mr. Reynolds had much pleasure in proposing that the best thanks of the meeting be given to Mr. Taylor for his interesting address. With regard to one of the questions brought forward, namely, What is meant by liq. opii sed.? he might say that in compounding medicines he always used Battley's preparation unless it was otherwise ordered, as this was the first introduced; but there were many medical men who bought cheaper preparations under a similar name, and it would be better if pharmacists had a guide to assist them in solving this and many other problems presented in connection with their business.

Mr. J. Abbott thought the want of solubility in the morph. acet., referred to by the President, was due to the gradual vaporization of the acetic acid, and it was necessary to add a little acetic acid to get a clear solution; with this addition he had been able to dissolve 1 part of the salt in 3 of water.

Mr. E. Yewdall had much pleasure in seconding the motion proposed by Mr. Reynolds. He thought the danger threatened by co-operative societies would soon be a thing of the past. Quite recently a customer at one of these stores had been supplied with saltpetre in place of carbonate of soda, and he felt quite sure that if chemists and druggists paid careful attention to the requirements of customers so as to avoid mistakes, they would be able to maintain their position. He thought, however, they were making a great mistake in taking apprentices for short periods of servitude. Formerly seven years was the time a youth had to serve, and now they took them for four years, thus producing five generations of chemists instead of three in nearly the same time.

Mr. Branson thought that recently prepared and neutral acetate of morphia would dissolve readily in 3 parts of water, but it was so apt to change by keeping, that most commercial specimens contained a basic salt.

Mr. P. Jefferson had pleasure in supporting the motion, and referred to the special advantages offered to the youths of the present day to those which existed fifty years ago.

The resolution was carried with applause, and having been acknowledged by the President, the meeting separated.

HULL CHEMISTS' ASSOCIATION.

The annual meeting of the above Association was held at the Cross Keys Hotel, on Thursday evening, November 23. In the unavoidable absence of the President (Mr. Councillor Myers), the Vice-President, Mr. George Hayles, presided.

The Secretary gave an epitome of the proceedings during the past year, which was accepted as the report.

The balance sheet for the past year, having been audited, was read and approved of.

The following were elected as office bearers for the year ensuing:—President, Mr. Councillor Myers, re-elected; Vice-President, Mr. George Hayles, re-elected; Secretary and Treasurer, Mr. C. B. Bell, re-elected. Committee: Mr. James Oldham, re-elected; Mr. W. H. Hammond, re-elected; Mr. W. Price, re-elected; Mr. T. W. Ellis, elected.

Votes of thanks to the various officers for the valuable services they had rendered during the past year was accorded.

BLACKBURN CHEMISTS' ASSOCIATION.

One of a series of lectures for this season was delivered on Friday evening, December 8, 1882, by Mr. J. G. Tier, on the subject of "Acetone, its Manufacture, History, etc." Mr. Joseph Hindle, President.

There was a good attendance, and votes of thanks were accorded unanimously to the lecturer and chairman.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, December 7, Dr. Gilbert, F.R.S., President, in the chair.

The following certificates were read for the first time:—G. Chandra Basu, W. R. Flett, E. C. Gill, J. Hunter, T. Jenner, W. W. J. Nicol, F. W. Richardson, E. S. Spencer, C. A. Serre.

During the evening a ballot was held and the Scrutators, Messrs. Greenaway and Kingzett, declared the following gentlemen to be duly elected Fellows of the Society:—J. S. Bishop, E. E. Berry, F. W. Branson, R. Blair, T. R. Cowie, R. Carruthers, R. Coulthard, W. J. Chrystal, E. G. Clayton, J. T. Dunn, H. L. Dampier, A. G. Earl, G. Gray, A. G. Howard, W. A. L. Hammersley, J. L. Howe, H. Hotblack, A. E. Johnson, E. Jackson, A. Keen, J. Kilner, J. D. McCarthy, H. C. Newton, S. G. Phillips, R. H. Parker, T. F. Peppe, S. Rideal, G. M. Taylor, T. E. Vasey.

The two following papers were read by the Secretary:—

On the Condensation Products of Oenanthol. By W. H. Perkin, jun.—Much work has been already done on the condensation products of isobutyric, isovaleric and œnanthylic aldehydes, but in many cases only the formulæ of the products obtained have been given. The author therefore undertook the present research to obtain, if possible, some clue as to the constitution of the bodies formed especially from œnanthol. In the first section of the paper the action of alcoholic potash on œnanthol is studied. Dilute potash was used and two acids were found (heptylic acid and an acid, $C_{14}H_{26}O_2$, boiling between 270° and 290°) in combination with the potash. From the oily condensation products two bodies were isolated. The principal one being an aldehyd, $C_{14}H_{26}O$, a colourless oil boiling 277°–279°, the second condensation product is a thick light yellow oil with disagreeable smell and burning taste, boiling at 330°–340°; it was probably an aldehyde having the composition $C_{28}H_{50}O$. The second section of the paper refers to the action of zinc chloride on œnanthol. The reaction is violent. The œnanthol was agitated with water and a very small quantity of zinc chloride used. The principal product is again the body $C_{14}H_{26}O$. The action of acetic anhydride on the aldehyde $C_{14}H_{26}O$ is then examined; it acts simply as a dehydrating agent, $2\,C_{14}H_{26}O = C_{28}H_{50}O + H_2O$. On fusing this substance, $C_{28}H_{50}O$, with caustic potash, heptylic and hexylic acids were formed. Nascent hydrogen converts the body $C_{14}H_{26}O$ into an alcohol, $C_{14}H_{28}O$, boiling at 280°–283°; it is not a saturated body, and by the further action of nascent hydrogen it is converted into another alcohol, $C_{14}H_{30}O$, boiling at 270°–275°. The author then studied the oxidation of the body $C_{14}H_{26}O$, but heptylic and hexylic acids were the chief products. Small quantities of an acid with a high boiling point were produced, which probably had the composition $C_{14}H_{26}O_2$. Alcoholic potash acts upon $C_{14}H_{26}O$, forming heptylic acid and an acid, $C_{14}H_{26}O_2$, boiling at 275°–280°. From a general consideration of the various reactions the author concludes that this body, $C_{14}H_{26}O$, has the constitution—

$$\begin{array}{l} CH_3-(CH_2)_5-CH \\ \qquad\qquad\quad\ \| \\ CH_3-(CH_2)_4-C-COH \end{array}$$

or hexyl pentyl acrylic aldehyd.

On the Condensation Products of Isobutyl-aldehyd. By W. H. Perkin, jun.—A short time since there appeared in the *Berichte* an abstract of a preliminary notice by Fossek, from the *Monatshefte der Chemie*, on the action of an aqueous solution of caustic potash on isobutyl-aldehyde. As the author has for some time been working on these condensation products, he felt himself compelled to publish his results, although at present not quite complete, especially as they are quite different from those obtained by Fossek; the action of alcoholic potash seems to be quite distinct from that of aqueous potash. The author first describes his method of preparing the isobutyl-aldehyde; 50 grams of this substance are first diluted with 100 c.c. of absolute alcohol, and 40 c.c. of 10 per cent. solution of alcoholic potash slowly added, the temperature never being allowed to rise above 30°; after standing twelve hours the mixture is warmed to 50° for a few minutes and then left to cool. The potash solution contained isobutyric acid and a new acid, $C_{12}H_{22}O_3$, boiling at 245°–255°, distilling without decomposition, not solidifying at −10°. Fossek, with aqueous potash, obtained an acid melting at 75°, with composition $C_8H_{16}O_3$. The oily product of the above reaction, after fractionation, gave a distillate boiling between 154° and 157°, having the formula $C_{12}H_{22}O_2$. Much residue of a higher boiling-point was left in the retort. Fossek, by the action of aqueous sodic acetate on isobutyric aldehyde, obtained a body $C_8H_{14}O$. By the action of nascent hydrogen on the aldehyde $C_{12}H_{22}O_2$, an alcohol, $C_{12}H_{24}O_2$, was formed, boiling at 170°–175°; it is a colourless oil, which does not solidify at −10°; it has the same formula as ethyl propylpinakone, but a different boiling point. This alcohol when treated with acetic anhydride gives a diacetate, $C_{16}H_{30}O_4$. A vapour density determination gave numbers about one-half of those required by theory. The higher condensation products of isobutyl aldehyde were next studied by using twice the above-mentioned quantity of alcoholic potash and heating the mixture nearly to the boiling point for ten minutes. Oily products were separated and contained small quantities of the bodies $C_{12}H_{22}O_2$ and $C_{16}H_{30}O_3$, but the principal portion distilled over at 223°–225°, and had the composition $C_{20}H_{38}O_4$; it is apparently an aldehyde; a vapour density determination gave about half the calculated density. By the action of acetic anhydride a mono and a diacetate were formed. After this body, $C_{20}H_{38}O_4$, had been distilled off, a body boiling at 250°–255° was obtained, having the composition $C_{24}H_{44}O_4$. Another body, boiling under 100 m.m. pressure at 227°–229°, had the formula $C_{28}H_{48}O_3$.

Dr. Japp then read a paper—

On a Condensation Product of Phenanthraquinon with Ethylic Aceto-acetate. By F. R. Japp and F. W. Streatfeild.—By heating a mixture of phenanthraquinon and ethylic aceto-acetate with a solution of caustic potash, the authors obtained a condensation product of the formula $C_{20}H_{16}O_4$, crystallizing from benzene in white silky needles fusing at 185°. They ascribe to it the constitution—

$$\begin{array}{l} C_6H_4—C=C\begin{cases} CO—CH_3 \\ COOC_2H_5 \end{cases} \\ \ \ |\qquad\ \ | \\ C_6H_4—CO \end{array}$$

and the name ethylic phenanthroxylene aceto-acetate. By treatment with fuming hydriodic acid in the cold this compound parts with one atom of oxygen, and is converted into ethylic-phenanthroxylene-isocrotonate—

$$\begin{array}{l} C_6H_4—C=C\begin{cases} CH=CH_2 \\ COOC_2H_5 \end{cases} \\ \ \ |\qquad\ \ | \\ C_6H_4—CO \end{array}$$

which is deposited from light petroleum in groups of colourless crystals, fusing at 124°. This compound dissolves in dilute caustic potash on warming, and on acidifying with hydrochloric acid a new acid is precipitated, which by recrystallization from boiling phenol is obtained in short colourless needles, fusing at 295°. This acid is formed from the preceding compound by replacement of the ethyl group by hydrogen, and simultaneous assumption of the elements of water. The formula is therefore $C_{18}H_{14}O_4$. An examination of its salts showed that it was dibasic. The authors assign to it the constitution—

$$\begin{array}{l} C_6H_4—CH=C\begin{cases} CH=CH_2 \\ COOH \end{cases} \\ \ \ | \\ C_6H_4—COOH. \end{array}$$

Both the reduction product and the dibasic acid derived from it yield on destructive sublimation long colourless needles of a new compound, fusing at 213°, which gave on analysis figures agreeing with the formula $C_{14}H_{10}O$. The authors suggest that this compound may be the desoxybenzoïn of phenanthrene $\begin{array}{l} C_6H_4—CH_2 \\ \ \ |\qquad\quad | \\ C_6H_4—CO \end{array}$ but the quantity obtained was insufficient for further investigation.

Dr. Armstrong then gave a short communication—

On the Constitution of Lophin.—This was a criticism of Dr. Japp's paper read at the last meeting. The author claimed that Radziszewski's formula, and especially his own modification of it $\begin{array}{l} Ph—C—N \\ \quad\ \ | \qquad\ \ >CHPh \\ Ph—C—N \end{array}$ was applicable in explanation of the reactions of lophin. He objected to Dr. Japp's use of the argument from analogy, on the ground that the bodies obtained by the action of aldehydes on phenanthraquinone were not analogues of lophin, and, he urged, that since in the great majority of cases in which aldehydes enter into reaction with other bodies, the radicle CHPh of the aldehyde remains intact, the argument from analogy would lead us to prefer the symmetrical rather than the unsymmetrical formula adopted by Dr. Japp. The formation of benzamide and dibenzamide on the oxidation of lophin, it was pointed out, is not difficult to explain, and the production of benzoic acid on heating lophin with hydriodic and hydrochloric acids is probably a consequence of a purely hydrolytic action. Incidentally, Dr. Armstrong objected to Dr. Japp's use of the term "intramolecular change" in cases involving no transposition of atoms.

Dr. Japp briefly replied to the criticisms of Dr. Armstrong, and reiterated his conviction that the formula proposed by him agreed best with the known decompositions, etc., of lophin, and he failed to see how Radziszewski's formula accounted for some of the known reactions of that body.

Mr. S. U. Pickering then read a paper—

On the Constitution of Molecular Compounds: the Molecular Weight of Basic Ferric Sulphate.—Two methods of notation are commonly employed to represent basic compounds. Thus with basic ferric sulphate, $2Fe_2O_3\ SO_3$, or $Fe_2(SO_4)_3\ 5Fe_2O_3$; in this latter an analogy between a basic salt and a hydrated salt is hinted at. If the first formula is correct, the molecular weight is 400; if the latter, m.w. = 1200. The author has, in the present paper, endeavoured to determine the molecular weight of basic ferric sulphate by ascertaining the unit of water removable from a hydrated specimen of it. The author gives details as to the preparation of the sulphate, the hydration of it and the loss of water under different conditions. If the molecular weight be 1200, thirty-three different hydrates are possible; he obtained fourteen hydrates, all of which indicate the number 1200, and he concludes that it is practically a certainty that the molecular weight of basic ferric sulphate is 1200 and its formula $Fe_2(SO_4)_3,5Fe_2O_3$.

Mr. Toms then read a paper on—

The Chemistry of Hay and "Ensilage."—The author has analysed various samples of hay and contrasted them with analyses of "ensilage," *i.e.*, grass buried whilst green in a water-tight pit or "silo," and subjected to pressure. It is well known to chemists that haymaking is not a mere drying of grass, but that a fermentation, during which the grass loses its green colour, also takes place, which developes the well-known perfume of hay. A specimen of good hay, dried, contained:—Fatty matters, 2·17 per cent.; free acetic acid, 1·89; sugar, 3·42; starch, 12·46; gum and mucilage, 27·25. A specimen of brown hay from the same rick as the last, but from a portion of the stack which had heated, contained:—Fatty matters, 4·26; aldehyde, which formed a mirror with ammonio silver nitrate; free acetic acid, 5·38; sugar, 6·94; starch, 3·42; gum and mucilage, 24·77. More than two-thirds of the starch had thus disappeared and apparently had been converted into sugar, etc. Three specimens of ensilage were analysed; one differed very little from ordinary grass. The second was brown and smelt strongly of tobacco; it contained more acetic acid and sugar, but less starch. The third specimen represented fodder, which had been buried eighteen months; it still contained starch sugar, but was not acid and was mouldy.

Mr. O'Sullivan did not think that the author had proved the presence of starch in the hay or ensilage, because other substances, such as gum and mucilage, when boiled with dilute sulphuric acid, furnished cupric oxide-reducing substances.

Dr. Gilbert said during his recent visit to America he had heard a good deal about "ensilage," and the process seemed to be thought much of in that country. The crops, too, of succulent maize, etc., seemed well suited for it. It was essential for a good result to put all the materials as quickly as possible in the "silo," and put on a pressure of 100 to 150 lbs. per square foot almost immediately. He suggested that unless samples of ensilage taken for analysis were kept under pressure during transit the product might be completely changed. The process was very suitable for the preservation of the pulp from the sugar beet.

The Secretary then read a paper on—

Certain Brominated Carbon Compounds obtained in the Manufacture of Bromine. By S. Dyson.—The author has separated from a liquor obtained as a bye-product at the North British Chemical Company's Works, carbon tetrabromide, bromoform and chlorobromoform; these substances were identified by analysis, boiling point and vapour density determinations.

Mr. W. H. Perkin then read a note on—

The Preparation of Diphenylene Ketone Ether.—A quantity of salicylic acid was heated with acetic anhydride, the mixture was boiled and the excess of acetic anhydride distilled off. The residue, consisting chiefly of salicylide, was distilled, and an oily product came over which solidified to a crystalline mass. On purification pale yellow needles were obtained, having the composition $C_{13}H_8O_2$, fusing at 170°. The yield is 30 to 40 per cent. The author's son, Mr. A. G. Perkin, is engaged in a study of the derivatives, etc., of this substance.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held on Wednesday, November 29, when a paper on "Pharmaceutical Politics" was read by Mr. R. Winfrey.

The author divided the subject into three parts:—(1) The preparation and elaboration of drugs; (2) prescribing simple remedies by chemists; (3) the necessity of further pharmaceutical legislation. With regard to the first, he held it as very desirable that all preparations should be made by the chemist himself, but practically this could not be entirely carried out; in many cases things could be bought much better than they could be made on a small scale. On prescribing he could not do better then endorse the remarks of Professor Attfield. He thought that in cases where a druggist was free to sell a patent medicine he should be equally free to sell a remedy of his own. This sale of simple remedies would do much to prevent the sale of patent medicines. At present both those chemists and doctors who hold extreme views play into the hands of the patent medicine makers. With regard to further legislation he did not think it reasonable or even desirable to expect a monopoly in the sale of drugs; the superior knowledge of the chemist, when that could be used, would prevent his suffering from severe competition, and ordinary trading he must be content to conduct on trade principles. The only protection he thought just or desirable was in dispensing, and this he thought would before long be granted.

A long discussion took place, in which Messrs. Wrenn, Parkinson, Kerr, Cooper, Hartridge, Woods, Palmer, Alcock, Phillips, Millhouse, Wyatt and Hadfield took part, after which a hearty vote of thanks to Mr. Winfrey brought the meeting to a close.

Parliamentary and Law Proceedings.

Alleged Defective Sweet Spirit of Nitre.

The following case came before the South Shields bench of county magistrates on November 7:—

John Atkinson, general dealer, Harton Colliery, was summoned and charged by Superintendent Scott with selling to him sweet spirit of nitre, not being of the nature and quality asked for.

Superintendent Scott deposed that he bought three ounces of sweet spirit of nitre of Mr. Atkinson, which for analysis he divided into three parts, one he gave to Mr. Atkinson, one he took to the county analyst, and the other he kept himself. The analyst's report was now before the bench, and stated that its gravity was a little too low, that it was totally wanting in nitrous ether, and therefore of no medicinal value.

Mr. G. R. Duncan defended, and called Mr. Atkinson, who, being sworn, said that he sold the nitre pure, just as he got it of Messrs. Mays and Son.

Mr. Sergent was then sworn, and said that he was a chemist by examination, an assistant of Messrs. Mays and Son, that he in presence of Mr. Mays tested the spirit of nitre, and found its specific gravity ·850. He also tested it for nitrous ether, and found it present.

Mr. Mays was then sworn, and said that he was a pharmaceutical chemist, and had been more than forty years in business. He bought the sweet spirit of nitre of one of the first makers in London, Messrs. Davy, Yates and Routledge, and had always found their preparation good, and as for his firm, they sold it undiluted, as they got it. He had examined the sample left with Mr. Atkinson by Mr. Scott, and found it of gravity ·850, and that it did contain nitrous ether. As to the last, the gentlemen on the bench could judge for themselves, for the sample before them spoke for itself as to that—to anyone whose senses of smell and taste were not impaired. It was the spiritus ætheris nitrici dulcis of the London Pharmacopœia—the sweet spirit of nitre which it was the allowed usage of the trade to sell, as they had done many years before the British Pharmacopœia was written, and which the public liked better than the British Pharmacopœia preparation, which always tasted rather sour, but which last it was the duty of chemists to use in prescriptions.

The scientific evidence being contradictory, Mr. Duncan asked to have Superintendent Scott's sample sent for examination to the Government analysts at Somerset House. This was ordered, and their report, being now before the court, was read, and as it agreed with Mr. Mays's evidence *in toto*, the case was dismissed.—*Shields Daily News.*

BOOKS, PAMPHLETS, ETC., RECEIVED.

Elements of Dental Materia Medica and Therapeutics, with Pharmacopœia. Third Edition. By James Stocken, L.D.S. Assisted by Thomas Gaddes, L.D.S. London: J. and A. Churchill. 1882. From the Publishers.

The Chemists and Druggists' Diary, 1883. London: Office of the Chemist and Druggist. From the Publishers.

Notes on the Detection of Acids (Inorganic and Organic) usually met with in Analysis. By J. William James, Ph.D., F.C.S. London: J. and A. Churchill. 1882. From the Publishers.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Extract of Meat Case.—We have received from Mr. Charles Rotter, Secretary to the Liebig's Extract of Meat Company, a letter in which, at the desire of the Board, he refers us to Liebig's paper in the Annals of Chemistry, for 1847 (vol. lxii., p. 361), stating that Proust had many years before described extract of meat, and recommended the use of it to the French Government. Mr. Rotter appears to be under the impression that we were not aware of this publication, or of the precise nature of Liebig's claims with regard to the extract of meat, and refers to our editorial comments on this subject (before, p. 406) as supporting his assumption. We believe that it is unnecessary in reply to do more than say that those comments merely had relation to the statements brought forward in evidence at the trial, and in so far we fail to perceive that they stand in any need of correction.

J. Richardson is recommended to send his question to one of the Dental Journals.

Sarsæ.—Other things besides the name would have to be taken into account. The question is one for a solicitor.

J. K.—Coffin's Composition Powder is not the subject of a patent. The following recipe, taken from one of Dr. Coffin's works, has already been published in this Journal:—"Bayberry bark, 4 oz.; Pinus Canadensis, 2 oz.; Ginger, 2 oz.; Cayenne, $\frac{1}{4}$ oz.; Cloves, $\frac{1}{4}$ oz.; all finely pulverized and well mixed. Ordinary dose, a tea-spoonful in a cup of hot water, sweetened." Other recipes may be found by referring to the General Index.

Lignum.—We are unable to identify the wood, but might, perhaps, if you could furnish any information as to its history.

M. P. S.—Several recipes for Ung. Rumicis c. Sulph. will be found in the *Pharmaceutical Journals* for Oct. 23 and 30, 1880, pp. 346 and 367.

J. Robertson.—*Amomum angustifolium.* See the Museum Catalogue.

Communications, Letters, etc., have been received from Messrs. Hickling, Palmer, Wells, Richardson, Hill, D. G.

THE PHARMACOPŒIAL EXTRACTS OF ALOES AND THEIR PREPARATION.*

BY ROBERT AITKEN.

The above subject was brought under my notice in the following manner. A short time ago a friend of mine complained that a prescription which had been made up in different towns varied very much in effect. The prescription was for 1 grain pills of extract of aloes, combined with a little capsicum. As the variation evidently lay with the extract of aloes, I procured a sample from a firm who had dispensed the prescription, and was rather surprised to find it contain about 30 per cent. of resin, which no doubt accounted for its weak action. A second sample procured from another firm who had also dispensed the prescription gave about 8 per cent. of resin. These experiments led me into an examination of several samples of extract, and I found that all those tested gave evidence of the presence of resin, some in large proportion, some in small.

To elucidate the matter further, twelve samples of extract (both Socotrine and Barbadoes) were procured from Edinburgh, London and Dublin, and examined with the following results:—

No. 1. Socotrine, gave 20 per cent. of resin.
No. 2. Barbadoes, gave 25 per cent. of resin.
No. 3. Socotrine, gave 25 per cent. of resin.
No. 4. Socotrine, gave 25 per cent. of resin.
No. 5. Socotrine, gave 10 per cent. of resin.
No. 6. Barbadoes, gave 8 per cent. of resin.
No. 7. Socotrine, gave 8 per cent. of resin.
No. 8. Barbadoes, gave a trace of resin.
No. 9. Barbadoes, gave 6 per cent. of resin.
No. 10. Socotrine, gave 8 per cent. of resin.
No. 11. Socotrine, gave 15 per cent. of resin.
No. 12. Barbadoes, gave 20 per cent. of resin.

The method I employed was as follows:—A certain quantity of the extract was weighed out, powdered, and dissolved in boiling distilled water; on allowing it to cool, the resin gradually deposited on the sides and bottom of the mortar; stirring seemed to facilitate the separation. The resin was collected on a weighed filter and well washed with cold distilled water, until the washings were colourless. The filter was then dried and weighed; the difference between the gross weight and the weight of the filter giving the amount of resin present.

In most of the samples which contained a large quantity of resin, the latter separated in a sticky mass; in those which contained least, the resin was suspended in the solution as a fine brown powder, in some instances so fine as to run through a paper filter.

The different varieties of aloes as prepared for the market contain a considerable amount of resin, caused by the heat employed in evaporating the juice; and in order to free the aloes from this and other inert matters the Pharmacopœia orders the preparation of the extracts of Socotrine and Barbadoes aloes. Consequently one would expect these extracts to be perfectly free from resin. The Pharmacopœia recommends two methods of evaporation, either by means of a water-bath or a current of warm air. In order to ascertain whether the first process would yield an extract free from resin, I prepared some extract from Socotrine aloes, and evaporated the liquid by means of a water-bath. I obtained about 50 per cent. of extract, and on testing it found resin even in portions which had not come much in contact with the sides of the porcelain vessel used for evaporation. I then made another sample of extract, but used a current of warm air instead of the water-bath. The result was an extract perfectly free from resin. Some of this last sample was then exposed to an increased heat on the top of a boiler, and, after a short exposure, showed the resin in the form of a fine brown powder, thus showing how prone the drug is to change under the influence of heat.

From these experiments it will be seen that in order to procure the extract free from resin, the second method alone ought to be used, and even that carefully attended to.

The causes of so much difference in the extracts is owing, I consider, to careless preparation, very few evidently choosing to prepare them by the slow process, and those who are in the habit of making large quantities are more likely to adopt the quicker method of the water- or steam-bath, though, as I have shown, such a method would lessen considerably the activity of the extract by the formation of resin.

* Read at a Meeting of the North British Branch of the Pharmaceutical Society, Wednesday, December 13, 1882.

PREPARATION OF SYRUPUS FERRI PHOSPHATIS BY A NEW METHOD.*

BY DANIEL GORRIE.

Of all the pharmacopœial syrups none are so unsatisfactory as those of iron, and the literature which has been written upon them is able and voluminous; it is with considerable diffidence, therefore, that I submit this paper. In syrupus ferri phosphatis there are two sources of dissatisfaction, (1st) in its preparation and (2nd) in its tendency to spoil by keeping. The official method of preparation favours oxidation, while the ferrous phosphate cannot be entirely washed free from impurities which tend to favour subsequent coloration of the syrup. The method which I now bring before you is intended to overcome these objections, and has as its main feature *the constant retention of the iron in solution*, thus saving the trouble of precipitating, washing, draining, drying and redissolving a ferrous compound, which is very prone to oxidation. My formula is based upon the quantities given in the official formula and is as follows:—

Take of—

Granulated sulphate of iron	224 grs.
Syrupy phosphoric acid† (sp. gr. 1·500) 9 drachms, 56 grs. by weight.	
Pure carbonate of baryta	159 grs.
Distilled water	6 ozs. or q.s.
Refined sugar	8 ozs.

Mix the phosphoric acid with three ounces of water and in the mixture dissolve the sulphate of iron with the aid of heat; add the baryta carbonate and, when effervescence has ceased, continue the heat for a few

* Read at a Meeting of the North British Branch of the Pharmaceutical Society, Wednesday, December 13, 1882.

† Acid of this density contains, omitting a fraction, 50 per cent. of phosphoric anhydride and the calculation is based upon this percentage. The additional quantity of acid, 76 grs., required to unite with the Fe, to form $Fe_3P_2O_8$, is also included.

minutes, to allow the precipitate to aggregate, then allow to cool. Filter when cold and wash the precipitate with three ounces of cold distilled water; in the filtrate dissolve the sugar without heat and make up to 12 ozs. if necessary.

I may be allowed to give the rationale of the process:—In the first instance, the baryta carbonate will react with phosphoric acid to form baryta phosphate, carbonic acid and water, thus:—

$$2H_3PO_4 + 3BaCO_3 = Ba_3P_2O_8 + 3CO_2 + 3H_2O.$$

Double decomposition will then take place between the iron sulphate and baryta phosphate, thus:—

$$Ba_3P_2O_8 + 3(FeSO_4 7H_2O) = 3BaSO_4 + Fe_3P_2O_8 + 21H_2O.$$

Although baryta phosphate is insoluble in water it is easily held in solution by the excess of acid present. The sulphate, you are aware, is almost insoluble, 1 part only being soluble in 400,000 of water; and it is concluded that it is not more soluble in cold phosphoric acid, but the solubility is rather more at the boiling point. It will be obvious, therefore, that boiling should be prevented, and that the solution be quite cold before filtration; the total separation of the baryta sulphate is thereby secured. To prove this I have several times made an estimation of the precipitate by heating till it ceased to lose weight and weighing: in all cases the theoretical quantity, 188·05 grs., was found; the working loss scarcely interfered with the estimation. In every case I ascertain by the ordinary tests whether the solution contains either undecomposed ferrous sulphate or baryta phosphate previous to the addition of the sugar. The finished product is beautifully transparent and colourless, and infinitely less liable to oxidation than syrup prepared by the official method.

Since writing the foregoing, Mr. MacEwan has drawn my attention to a discussion on this subject at the Pharmaceutical Conference, held in Glasgow. In this discussion Mr. Borland suggested a method based on the same principle which has guided me in drawing up a formula, namely, the precipitation of the sulphuric instead of the ferrous radicle. Mr. Borland gets this result by dissolving lime phosphate in phosphoric acid, and adding a solution of sulphate of iron; double decomposition ensuing. This method is objectionable in so far that lime phosphate to be soluble requires to be freshly precipitated (thus entailing considerable time), and besides the finished product is contaminated with lime sulphate. The objections against the lime phosphate can be obviated by adopting my method and substituting precipitated chalk for baryta carbonate, 81 grains of the former being equal to 159 grains of the latter. If the precipitated chalk be used it is necessary to allow the solution to stand for twenty-four hours to allow sulphate of lime to separate as far as possible. Again, when the sugar has been dissolved in the solution, more lime sulphate separates, due no doubt to its inferior solubility in a saturated saccharine solution; hence the necessity of a few days' rest for deposition.

I am conscious that objections may be urged against the baryta method, lest baryta phosphate should be held in solution by the free acid present; but it is evident that with pure materials, and careful and intelligent manipulation, the process will commend itself as being simpler, speedier and less objectionable than the official method, or than the very slow method of dissolving iron filings in syrupy phosphoric acid.

PRELIMINARY NOTE ON GELSEMINE AND ITS SALTS.

BY A. W. GERRARD, F.C.S.

Up to the present time, that is thirty years after its isolation by Kollock, no crystalline ordinary compounds of the alkaloid gelsemine have been described, although it has been investigated by several chemists, notably, Professor Sonnenschein and Dr. Wormley.

During the year 1881 I prepared a small quantity of gelsemine, having mainly the characters hitherto ascribed to it, only differing so far that microscopic crystals were noticed. This observation was sufficiently interesting to determine me to further investigate the subject, and I have met with considerable success, having prepared the pure alkaloid and a number of its compounds with acids in the crystalline form.

The pure alkaloid is a colourless substance, having properties in many and important respects, especially its behaviour with acids, different from those hitherto described. The hydrochloride and hydrobromide are the best crystallizing salts, their form being prismatic.

In a future paper, and I trust at the next Evening Meeting of the Pharmaceutical Society, I propose to describe in detail the method of preparation and properties of the above compounds. The main object of the present communication is to reserve the right of such work.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 483.)

LANGUAGE, NOMENCLATURE, ETC.—The text of the new edition of the United States Pharmacopœia is—was as the case in the previous four editions—written in the English language, whilst that of the 'Pharmacopœa Germanica' is entirely in Latin. So strictly is this carried out in the latter work that the German synonyms, which in the first edition were placed under the respective Latin titles, are now remitted to an index at the end of the work. On the other hand, in the United States Pharmacopœia, the titles are given in Latin and in English. It is understood, however, that the adoption of the vernacular tongue in the German work also would have been in accordance with the opinion of the majority of those who carried out its revision, but that in this they were overruled by the Government department, which, indeed, is responsible for the translation into Latin of the original German manuscript presented by the Commission. This decision has given rise to some discontent, and insinuations have not been wanting that it will be necessary to consult the original in some cases in order to understand the newly-coined technical expressions in which the classical philologists have wrapped up the "clear German words." From an international point of view, however, perhaps, even barbarous Latin will, as a rule, be thought preferable to the most crystal German. But, be this as it may, the Imperial Government has thought proper to meet the objectors half-way, and has announced its intention to publish the work in its original German form also, though this is not to be considered the official pharmacopœia.

The *nomenclature* of the United States Pharmacopœia, in respect to the main principles followed, is the same as that of the previous edition; but in some details it has undergone considerable modification, which, whatever may be the effect in furnishing common ground for agreement at some future time, has the present result of making it less like that of the British Pharmacopœia without making it more like that of the German. For the chemical compounds, the unitary method, advocated by Professor Attfield, is retained, and this method, it has been stated on good authority, will be probably adopted in the next edition of the British Pharmacopœia. But it has been deemed advisable to treat the Latin nouns of salts in *-as* and *-is* as of the masculine gender, on the ground that "the alteration to the feminine gender, made in 1860, was based on error;" *e.g.*, "Calcii Carbonas Præcipitat*us*," "Ferri Sulphas Exsiccat*us*," etc. An argument in favour of this alteration, put forward some time since, was based on the supposed necessity that the adjective should agree with the word "*sal*," understood; but this would seem to involve a further alteration, in which the terminations *-as* and *-is* would disappear altogether. The necessity for the alteration may well be doubted, but it only affects a very few names. A much more important alteration has been made in respect to the names of alkaloids, which in the last edition corresponded with those in the British Pharmacopœia, both in Latin and English. In Latin they are now made to terminate in *-ina*, giving rise to quite a new series of terms—morphina, strychnina, quinina, etc.,—an alteration, which, although advocated by Professor Oldberg, in a paper read before the International Pharmaceutical Congress, hardly appears to present advantages that will compensate for the introduction of another element of confusion in alkaloidal names, especially as in prescriptions the patience of prescribers is hardly equal to the task of writing in full the shorter forms at present in use. On the other hand, the abandonment of the termination *-ia* for the English names, in favour of *-ine*,—for instance, strychnine for strychnia, quinine for quinia,—is a step in the right direction; it being the orthography adopted officially and universally in France, whilst it is in accord with the practical tendency in this country. In Germany, also, where the terminations *-inum* in Latin and *-in* in the vernacular,—which in the United States and Great Britain are confined to the names of neutral principles,—are used for both alkaloids and neutral principles, the adoption of the change would involve only a slight alteration, and one that would be convenient and natural if it were thought advisable in that country to draw an orthographical distinction between the two classes. There are also a few other alterations in the Latin terms of minor importance, some of them tending towards uniformity, and others not. "Glycerina" is abandoned in favour of "glycerinum," the form adopted in the British and German Pharmacopœias; "iodum" takes the place of "iodinum;" "sulphidum" of "sulphuretum;" "cambogia" for "gambogia," etc. 'Manganesium" has been curtailed to "manganum," which is the German official form.

In the 'Pharmacopœa Germanica' the chemical nomenclature has been modified so as to bring it into accord with the principle followed in the United States work, the name of the metal instead of its oxide being now used to indicate the basic portion of a salt. But this affords no approximation to the form adopted in this country and the United tates on the one hand or that in France on the other. "Natrum nitricum" has become "natrium nitricum," "magnesia carbonica" has become "magnesium carbonicum," and so on, but the form remains equally unfamiliar to English eyes. One peculiarity of this nomenclature may, indeed, warrant the repetition of a word of caution. The occurrence of the particle *-at-* in the adjective applying to the non-basic radicle does not indicate that that portion of the compound has anything to do with an acid bearing a name ending in *-ic*, but that it belongs to the haloid class. Thus "ferrum iodatum" does not mean iodate of iron, which has been recently recommended for medicinal use, but our old friend "iodide of iron;" the other class being represented by adjectives constructed on the model of "kalium chloricum" for "potassium chlorate." The "liquor kalii bromati" is, therefore, a solution of potassium bromide, whilst "liquor kalii bromici" stands for the solution of potassium bromate.

Turning again to the United States Pharmacopœia, the rule has been followed, as before, with a few exceptions, of using the botanical genus name of a vegetable drug as its official Latin title; alone, when only one part of the plant is official, but when more than one part is official then the respective parts are indicated. Thus, "sambucus," U.S.P., is equivalent to "sambuci flores," B.P., and "sambuci flores," P.G.; "carum," U.S.P., to "carui fructus," B.P., and "fructus carui," P.G., etc. In the 'Pharmacopœa Germanica' the plan is adhered to, of indicating the part at the commencement of the title,—differing in this from the British Pharmacopœia,—so that the cortices, foliæ, herbæ, radices, etc., occur together in groups. It will, therefore, be apparent from the foregoing, although it may be a minor point, that no great advance has been made towards uniformity in nomenclature.

Arrangement.—In respect to arrangement the United States Pharmacopœia has undergone a great change. Hitherto the materia medica has been kept separate from the preparations and the articles in it have been enumerated in two divisions: a "primary list," which included what were considered to be the more important drugs, and a "secondary list," which included less important drugs and others that were yet on their trial. The plan has had its admirers in this country, but it is open to the objection that the object of a Pharmacopœia is to define medicines rather than to indicate their relative value. It has, however, been abandoned and all the articles of materia medica and preparations are now included in one series, arranged alphabetically. The arrangement, therefore, of the three Pharmacopœias is now practically the same, being subject only to variations arising from differences in the nomenclature. In the United States Pharmacopœia, after the description of each of the crude drugs, are also given the names of the preparations in which it forms a constituent of importance, an addition which, although not carried out so fully as in the British Pharmacopœia, obviates an inconvenience that must have been felt by any person who has had to consult former editions of the American work. In the 'Pharmacopœa Germanica' this plan is not followed.

Descriptions, Chemical Formulæ, etc.—Both the United States and the German Pharmacopœias now differ from the British in omitting processes for chemical bodies; except in cases where difference in processes produces different results, they are simply described according to their physical characteristics, and tests are given for their identity and purity. This is done very fully in the United States Pharmacopœia, and a large number of solubilities have been added. Definite chemical compounds are represented in the United States Pharmacopœia according to both the old and the new notations. Atomic and molecular weights are also given; but the atomic weights of the elements, which are given to the first place of decimals and are said to have been "selected with care from what appeared to be the most reliable determinations," represent the results of some of the most recent work: aluminium, 27; antimony, 120; bismuth, 210; cerium, 141, etc. The German Pharmacopœia gives neither chemical formulæ nor atomic weights. Temperature is indicated in both the United States and the German Pharmacopœias in degres Celsius; but in the former the equivalents are also given in every case in degrees Fahrenheit. Specific gravities in both works, where not otherwise expressed, are to be understood as taken at 15° C.

Quantities.—The instruction of the Convention to substitute in the United States Pharmacopœia parts by weight (except in certain cases) for actual weights and measures, which was ignored in working out the previous edition, as being then impracticable, has now been effected, and the work has been in this respect brought into accord with the German one. In doing this, care has been taken to adjust the proportions of the new formulæ so as not to affect materially the strength of the preparations. In the case of the pill masses where the quantities of ingredients ordered are for a definite number of pills, they are given side by side in grains and in grams.

Alterations in the Materia Medica and Preparations.—The alterations due to omissions and introductions are in both works very considerable. Taking first the United States Pharmacopœia, the number of articles omitted is 229, consisting of 78 crude drugs (almost all of vegetable origin), 28 inorganic drugs or chemicals, 106 pharmaceutical preparations and 17 miscellaneous substances. Among the dismissed pharmaceutical preparations, etc., are:—2 waters, 3 cerates, 3 confections, 10 decoctions, 2 plasters, 13 solid extracts, 2 fluid extracts, 5 glycerites, 29 infusions, 4 solutions, 5 oils, 2 juices, 3 pills or pill masses, 9 suppositories, 7 tinctures, 7 ointments and 3 wines. The following list of the articles of materia medica omitted will show that whilst a few dismissals are due to the abandonment of processes of manufacture a much larger number are articles of the indigenous materia medica that have become obsolete:—

Acetum.
— destillatum.
Achillea.
Acidum oxalicum.
— phosphoricum glaciale.
— valerianicum.
Aconitia.
Aconiti folia.
Alcohol amylicum.
Aloe barbadensis.
— capensis.
Angustura.
Antimonii oxysulphuretum.
Apocynum androsæmifolium.
Aralia nudicaulis.
— spinosa.
Argentum.
Asarum.
Asclepias incarnata.
— syriaca.
Avenæ farina.
Barii carbonas.
— chloridum.
Berberis.
Bismuthum.
Cadmii sulphas.
Cadmium.
Caffea.
Canella.
Carota.
Carthamus.
Cassia marilandica.
Castoreum.
Cinchona pallida.
Conii folia.
Coptis.
Cornus circinata.
— sericea.
Cotula.
Creta.
Cupri subacetas.
Cuprum ammoniatum.
Curcuma.
Delphinium.
Digitalinum.
Diospyros.
Dracontium.
Elaterium.
Erigeron.
— canadense.
Euphorbia corollata.
— ipecacuanha.
Fermentum.
Ferri ferrocyanidum.
— subcarbonas.
— sulphuretum.
Frasera.
Gentiana catesbæi.
Geum.
Gillenia.
Granati fructus cortex.
Helianthemum.
Helleborus.
Hepatica.
Heuchera.
Hordeum.
Hyoscyami semen.
Iris florentina.
Juniperis virginianus.
Lini farina.
Liriodendron.
Lycopus.
Maranta.
Marmor.
Monarda.
Mucuna.
Nectandra.
Os.
Ovum.
Panax.
Papaver.
Petroselinum.
Polygala rubella.
Quercus tinctoria.
Ranunculus.
Rubia.
Ruta.
Sabadilla.
Sabbatia.
Sago.
Sesamum.
Simaruba.
Solidago.
Spiræa.
Statice.
Tapioca.
Testa.
Tormentilla.
Triosteum.
Uva passa.
Veratrum album.
Vinum portense.
— xericum.
Viola.
Xanthorrhiza.
Zinci oxidum venale.

The newly added articles comprise 30 crude drugs derived from the vegetable kingdom, 60 inorganic drugs or chemicals, 150 pharmaceutical preparations and 16 miscellaneous substances. Among the new pharmaceutical preparations are:—11 abstracts, 10 solid extracts, 35 fluid extracts, 11 syrups, 22 tinctures and 6 wines. As these preparations will be referred to sufficiently under their respective headings, it will only be necessary, in order to give an idea of the new remedies incorporated in this Pharmacopœia, to give a list of the crude vegetable and inorganic drugs and chemicals that have been added:—

Acidum aceticum glaciale.
— boricum.
— hydrobromicum dilut.
— oleicum.
— phosphoricum.
— salicylicum.
Æther aceticus.
Aluminii hydras.
Ammonii phosphas.
Amyl nitris.
Amylum iodatum.
Antimonii sulphidum pur.
Apomorphinæ hydrochlor.
Argenti iodidum.
— nitras dilutus.
Arnicæ radix.
Auri et sodii chloridum.
Benzinum.
Bismuthi citras.
— et ammonii citras.
Bryonia.
Caffeina.
Calcii bromidum.
Calendula.
Calx sulphurata.
Camphora monobromata.
Carbonei bisulphidum.
Caulophyllum.
Chelidonium.
Chinoidinum.
Chysarobinum.
Cinchonidinæ sulphas.
Cinchonina.
Codeina.
Cupri acetas.
Elaterinum.
Erythroxylon.
Eucalyptus.
Fel bovis.
— inspissatum.

Fel purificatum.
Ferri carbonas saccharatus.
— iodidum saccharatum.
— oxidum hydratum cum magnesia.
— sulphas præcipitatus.
— valerianas.
Frangula.
Glycyrrhizinum ammoniat.
Grindelia.
Guarana.
Hamamelis.
Hyoscyaminæ sulphas.
Illicium.
Lithii benzoas.
— bromidum.
— salicylas.
Magnesia ponderosa.
Magnesii citras granulat.
— sulphis.
Maltum.
Menispermum.
Mucilago cydonii.
Oleatum hydrargyri.
— veratrinæ.
Oleum adipis.
— aurantii cortices.
— aurantii florum.
— coriandri.
— eucalypti.
— gossypii seminis.
— lavandulæ florum.
— myrciæ.
— phosphoratum.
— picis liquidæ.
— santali.
— sinapis volatile.
Opii pulvis.
Opium denarcotisatum.
Pepsinum saccharatum.
Petrolatum
Physostigminæ salicylas.
Picrotoxinum.
Pilocarpinæ hydrochloras.
Pilocarpus.
Piperina.
Pulsatilla.
Quillaia.
Quinidinæ sulphas.
Quinina.
Quininæ bisulphas.
— hydrobromas.
— hydrochloras.
Resina copaibæ.
Rubus idæus.
Salicinum.
Sapo viridis.
Sodii benzoas.
— bisulphis.
— bromidum.
— chloras.
— iodidum.
— pyrophosphas.
— salicylas.
— santoninas.
— sulphocarbolas.
Staphisagria.
Sumbul.
Thuja.
Thymol.
Triticum.
Ustilago.
Viburnum.
Vinum album.
— album fortius.
— rubrum.
Viola tricolor.
Vitellus.
Zinci bromidum.
— iodidum.
— phosphidum.

The net result of the omissions and additions in respect to the number of articles in the United States Pharmacopœia is an increase of 27, the total number of titles in the present edition being 997.

The Pharmacopœa Germanica, on the contrary, has undergone a decrease of about one-third, for whilst 360 articles have been omitted, only 48 new ones have been inserted. Amongst the articles of the materia medica that have been omitted are the following:—

Aconitinum.
Æther petrolei.
Alumina hydrata.
Ammoniumphosphoricum.
Amylum marantæ.
Atropinum.
Aurum foliatum.
Balsamum tolutanum.
Bismuthum valerianicum.
Cadmium sulphuricum.
Carboneum sulphuratum.
Caricæ.
Castoreum sibiricum.
Chininum.
— tannicum.
— valerianicum.
Chinoidinum.
Cinchoninum.
— sulphuricum.
Coccionella.
Colla piscium.
Conchæ præparatæ.
Coniinum.
Cortex fructus juglandis.
— mezerei.
Cuprum aceticum.
— aluminatum.
— subaceticum.
Dextrinum.
Elemi.
Faba calabarica.
Farina hordei præparata.
Fel tauri.
Ferrum chloratum.
— citricum ammoniatum.
— citricum oxidatum.
— oxidatum fuscum.
— phosphoricum.
Flores aurantii.
— chamomillæ romanæ.
— malvæ arboræ.
— millefolii.
— primulæ.
— rhœados.
Folia aurantii.
— laurocerasi.
Folia rosmarini.
— rutæ.
— toxicodendri.
Fructus anisi stellati.
— cannabis.
— ceratoniæ.
— coriandri.
— myrtilli.
— petroselini.
— sabadillæ.
Fungus laricis.
Gelatina.
Herba chenopodii ambrosioides.
— galeopsidis.
— gratiolæ.
— lactucæ.
— linariæ.
— majoranæ.
— millefolii.
— polygalæ.
— pulsatillæ.
— spilanthis.
Hydrargyrum sulphuratum nigrum.
— sulphuratum rubrum.
Kino.
Lignum campechianum.
Macis.
Magnesia lactica.
— usta.
Manganum hyperoxydat.
Manna.
Mastix.
Mel.
Morphinum.
— aceticum.
Natrum pyrophosphoricum.
— santonicum.
— subsulphurosum.
Oleum animale æthereum.
Oleum aurantii corticis.
— bergamottæ.
— chamomillæ æthereum
— majoranæ.
— menthæ crispæ.
— phosphoratum.
— sabinæ.
— succini.
— valerianæ.
Olibanum.
Radix alkanæ.
— arnicæ.
— artemisiæ.
— asari
bardanæ.
— belladonæ.
— carlinæ.
— hellebori viridis.
— pyrethri.
— saponariæ.
— scammoniæ.
— serpentariæ.
Resina draconis.
— guaiaci.
— pini.
— scammoniæ.
Rhizoma caricis.
— chinæ.
— curcumæ.
Sandaraca.
Semen cydoniæ.
— quercus tostum.
— stramonii.
Stipites dulcamaræ.
Strychninum.
Succinum.
Sulfur iodatum.
Zincum ferrocyanatum.
— lacticum.
— oxydatum sulfocarbolic
— valerianicum.

The dismissal of the above substances involves the omission also of a large number of their derivatives, and these are augmented by many antiquated preparations that are now dropped out. Amongst these are:—2 vinegars, 27 waters, 5 cerates, 16 plasters, 27 extracts, 8 liquors, 4 powders, 3 soaps, 4 spirits, 10 syrups, 22 tinctures, 4 troches and 22 ointments.

The additions are as follows:—

Acidum carbolicum liquef.
Acidum formicicum.
— pyrogallicum.
— salicylicum.
Aluminium sulfuricum.
Ammonium bromatum.
Amylium nitrosum.
Apomorphinum hydrochl.
Aqua carbolisata.
Calcium phosphoric. crud.
Charta sinapisata.
Chrysarobinum.
Cortex condurango.
Folia jaborandi.
Gossypium depuratum.
Hydrargyrum cyanatum.
Kalium bichromicum.
Linimentum terebinthinat.
Liquor aluminii acetici.
— corrosivus.
— ferri oxychlorati.
— natrii silicici.
Manganum sulfuricum.
Natrium benzoicum.
Natrium bromatum.
— iodatum.
— salicylicum.
Oleum cantharidatum.
— olivarum commune.
— rapæ.
Paraffinum liquidum.
— solidum.
Pepsinum.
Physostigminum salicylic.
Pilocarpinum hydrochloric.
Plumbum aceticum crud.
Podophyllinum.
Pulv. salicylicus c. talco.
Resina dammar.
Sal carolinum factitium.
Sapo kalinus.
Species lignorum.
Spiritus vini cognac.
Talcum.
Thymolum.
Tinctura veratri.
Unguentum paraffini.

(*To be continued.*)

A PROCESS FOR COATING PILLS WITH GELATINE.*

BY CLAY W. HOLMES.

Much has been written on the preparation of gelatine-coated pills, and various contrivances have been made and offered to pharmacists, protected by patents, and at an exorbitant price, so that few attempt the extemporaneous preparation of coated pills. Like all other manipulations in the laboratory, the coating of pills requires some experience, yet a reasonable amount of practice and patience will enable any pharmacist to devise means by which, at a minimum outlay, he can make a pill equal in appearance to those offered by the large manufacturers. It is the writer's desire to lay out the practical points in such a manner that any one can proceed intelligently, and without difficulty. The first point which presents itself is the pill to be coated. Pills composed entirely of dry powders offer little difficulty. Those containing a large proportion of extracts may occasion trouble. Much depends upon the excipient employed. Simple syrup is the best whenever it will make the mass sufficiently adhesive. In case this fails, confection of rose, or ext. gentian may be employed. Glycerine should never be used. If the mass is too soft, owing to the presence of a large portion of extract, stiffen it with sugar of milk or powdered gum arabic. The mass having been carefully prepared, the pills may be made either oval or spherical. The writer prefers the oval.

In making granules of arsenious acid, strychnia or other active remedies requiring minute doses, add enough sugar of milk to give the desired size, and make the mass with simple syrup. The pill being properly made, the next point is the apparatus for coating. The writer has made use of a round tin cup, about three (3) inches in diameter, in appearance like an ordinary blacking-box cover. The needles used were "No. 1 sharps," ordinary make. A thin layer of paste of plaster of paris and water is poured into each cup, and the needles set in the plaster. Each cup will hold twenty-five (25) needles. Place one in the centre, and around that run two circles—the first, half the distance between the centre and the edge of the cup; this circle to contain eight (8) needles. The outer circle, within one-eighth (1-8) of an inch of the edge; this circle contains sixteen (16) needles. If the distances are properly divided the needles will be far enough apart to hold the largest pill without fear of contact. After the plaster has set make more paste, thin enough to pour, then fill the cup. Let it stand until the plaster is firm, and then the cup is ready for use. The pills are readily stuck on the needles by hand, transfixing them as lightly as possible. The pill is now ready for coating. The coating solution is prepared as follows:—

℞ Gelatine, French (gold label) . . .	℥iv.
Gum arabic	℥j.
Sugar	ʒj.
Water	q. s.

Dissolve the gum arabic and sugar in eight (8) ounces of hot water in a capsule by means of a water-bath. Then add the gelatine and stir it until dissolved, Should the water have evaporated to such an extent that the solution is apparently too thick, add water gradually until it has the consistency of hot syrup. Continue the heat until a pellicle forms on the surface, then pour into a cold dish. A sixteen (16) ounce porcelain-covered casserole, with handle and lip, is a convenient dish to use, or a tin vessel may be made use of, a pint cup with a lip being about the size. Let the solution stand until the temperature is somewhat lowered, stir up the solution to break pellicle, and then dip the pills into the solution, lowering carefully until completely immersed. Pull them out slowly, that the surplus gelatine may run off, and then bring the needles to a horizontal position and rotate slowly for half a minute, when the cup may be set down. As soon as the coating is sufficiently set to prevent adhering to the fingers when touched, the pills are ready to come off.

Take an alcohol lamp with a small flame, and let the needle strike the flame about ½ inch from the pill. As soon as the needle is heated the gelatine begins to swell. Twist the pill off carefully, before the needle gets sufficiently hot to soften the pill, and with the finger stop the hole while the gelatine is hot. The pill is then ready to dispense.

If it is intended to keep the pills in stock they should be exposed to the air for a few hours before bottling. After the process is finished pour the coating solution into a wide-mouth pint bottle, and when cold pour on sufficient alcohol to make a strata ½ inch deep on the surface of the gelatine, and cork tightly. In this way the gelatine will keep for any length of time. When necessary to use again pour off the alcohol into a smaller bottle (kept ready for that purpose), place the gelatine bottle in a ½ gallon tin measure, putting a large piece of cork in the bottom to protect the bottle from direct heat, fill the measure nearly to the neck of the bottle with cold water and put over the gas flame or on the stove. Continue the heat until the gelatine is thoroughly liquified, and then pour into the coating-dish previously used. Place the empty bottle in the measure to keep it hot. As few or as many pills as you wish may be coated, and then the solution at once returned to the bottle. After the pills have been removed from the needles the next consideration is to restore the needles to their original condition.

A tin pan, or any convenient vessel having a flat bottom, is filled to the depth of an inch with hot water, and the cup is set in, the points being placed downward, the water not being deep enough to reach the cup. As soon as the gelatine is soft take the cup out, and with a small notched stick push the gelatine bulbs off, and then plunge the points into a bag of coarse emery a few times. This polishes the needles, and they are then laid aside until wanted again.

The only points of difficulty in the process, to the average pharmacist, will be the making of the pill and the proper consistence of the coating solution. Both must be learned by experience. If the coating is too thin on the pill, or does not cover it perfectly, evaporate the solution somewhat. Should it form too thick a coat, add a little hot water, and stir well. A pellicle forms rapidly, and it is necessary to stir frequently to prevent the pellicle from adhering to the pills as they are drawn out of the solution.

The difficulty in regard to the consistence of the pill shows itself in the bursting of the coating, and the exudation of the mass, when too soft, as is often the case in pills made largely from solid extracts. To remedy this, the mass must be made harder by the addition of gum arabic, or some other inert powder. Like all other labours in the laboratory, this process is open to the prospect of failure unless some degree of patience is exercised. The general working points are simple, the process does not require any elaborate machinery or contrivances, which might open a legal question as to "rights of protection," and anyone can, without fear of trouble, prepare for himself the simple apparatus described in this paper, and make any pills for which he may have a demand.

* Reprinted from the 'Proceedings of the New York State Pharmaceutical Association,' 1882.

RESEARCHES ON TARCHONANTHUS CAMPHORATUS.*

BY F. CANZONERI AND G. SPICA.

This plant, belonging to the Composite order, sub-order *Asteroïdeæ*, is indigenous at the Cape of Good Hope. On exhausting its dried leaves with warm alcohol in a percolator, and leaving the alcohol to cool, a greenish-white

* From the *Gazzetta*, 1882, pp. 227 to 231. Reprinted from the *Journal of the Chemical Society*, October, 1882.

gelatinous substance is deposited, which may be purified by washing it on a filter with alcohol as long as the filtrate exhibits a green colour, then drying it in the air, twice crystallizing it from alcohol, washing the waxy substance thus obtained with ether, and finally crystallizing it from alcohol.

The substance thus purified crystallizes in white light scales, having a silvery lustre, melting at 82°, solidifying at a slightly lower temperature, and afterwards melting at 72°. It is tasteless, burns with a bright flame, leaving no residue, and emitting the characteristic odour of burnt wax. It is insoluble in water, slightly soluble in cold, freely in hot alcohol; not attacked by strong sulphuric or hydrochloric acid or by strong potash-ley, and not sensibly altered by fusion with potash. Its analysis gave, as a mean result, 83·66 per cent. carbon and 14·44 hydrogen, and the chloride obtained by treating it with phosphorus pentachloride gave 80·77 per cent. C, 11·12 H and 4·17 Cl. These results, together with the resistance of the substance to the action of melting potash, lead to the idea that it might be a higher homologue of myricyl alcohol, $C_{32}H_{66}O$, which is also unattacked by potash; if so it must contain 50 or more atoms of carbon, and might be represented by either of the formulæ, $C_{50}H_{102}O$, $C_{51}H_{104}O$, $C_{52}H_{106}O$. The corresponding chloride melts at 67° to 68°; myricyl chloride at 64·5°.

It is not yet decided whether this alcohol, which the authors propose to call tarconyl alcohol, exists in the leaves in the free state or is produced by the action of the alcohol used in its preparation on a wax contained in the leaves. The solution from which the alcohol has been separated yields on evaporation a heavy, dark-coloured, pungent oil, consisting for the most part of an ether of an aromatic acid not yet examined.

ATOMS AND MOLECULES.*

BY BARNARD S. PROCTOR.

(*Continued from page* 486.)

In the various alcohols we have a step by step increase in complexity of molecular structure, with a like increase in density and decrease in mobility; at the same time we find the light mobile alcohols miscible with water in all proportions, the heavy alcohols insoluble in water but soluble in oils; the light alcohols standing between water and the heavy alcohols, and having considerable inter-solubilities with both.

The molecular motions and polarities of water are probably considerably influenced by most substances which may be dissolved in it, especially in those cases where one body has a conspicuous influence on the solubility of another, with which it does not enter into combination or decompose. Such, for example, as ammonia, which when present in large proportion has power to throw out of solution the double sulphate of copper and ammonia. The molecular relationships of the water are evidently much influenced by the great affinity of the ammonia; they are also much influenced, though in a different direction, by the great affinity of carbonate of potash when added to saturation, the saturated solution not being miscible with a strong solution of ammonia. On the other hand the sparingly soluble bodies probably have their molecular movements and polarities comparatively little influenced by the water, as in the case of hydrogen and oxygen, which may both be dissolved in water, though only to a small extent, and yet not enter into combination with one another. We regard the liquid condition as that most favourable to the combination of bodies having a tendency to unite, and yet the great affinities of O and H fail to bring them into union. Probably the affinity between the water and these two gases is so small as to exert very little influence on their movements, and leave them virtually in the free and gaseous state, occupying as it were only the interstices of the water. The case is necessarily different with ammonia, where the proportio is so great that we cannot suppose it to retain a molecular condition or mobility in any degree approaching that of its gaseous state. And the case is also very different when O and H are condensed upon the surface of platinum, where the amount of condensation is so great as to preclude the idea of a truly gaseous condition of the molecular movements, and where the affinities are brought into effective play. The great affinity of ammonia for water is seen not only in its abundantly taking the liquid form by their union, but also by its power to throw the carbonate of potash out of solution, when passed in the gaseous state through a saturated solution of this salt. Ammonia very much diminishes the solvent power of water for many other salts, but has no appreciable action on the solubility of ether, chloroform, sugar or gum.

I am not prepared to suggest any more definite relation between a substance and its solvent, than a harmony of molecular movements, and the existence of molecular polarities acting between the solid and the solvent, which enable the movements of the solid to throw off molecules under the influence of the motions and polarities of the solvent, with rates of frequency peculiar to the solid and solvent under consideration, and allow the re-attachment of the molecules of the solid to one another when the number of molecules of the solid to those of the solvent is beyond a ratio peculiar to themselves.

I think there is every reason to believe that the polarities of crystalline bodies by their inequalities cause the set of the matter in the crystalline form. I think there is also probability, though not yet so strong, that in amorphous or less crystalline bodies the intensities of the molecular polarities are more equal, and that bodies which are capable of taking both forms have polar intensities differing to so small an extent that a slight change of circumstances may determine the orderly or the heterogeneous arrangement of their molecules. It would be reasonable if such were the case, that the amorphous condition should be the less resistant to mechanical or chemical change, *i.e.*, should be softer, more soluble, more prone to enter into chemical combination. To illustrate my meaning, some substances may be thrown down as amorphous precipitates, becoming crystalline by time; the polarities being weak or of nearly equal strengths, the molecules attach themselves together in heterogeneous contact of those points which were nearest at the time of the formation of the new compound, and, being thus less combined, they are more readily dissolved by the mother-liquor. But some crystalline particles get formed, and are always surrounded by mother-liquor holding in solution more than the normal proportion of the salt. The crystalline particles are, therefore, always in circumstances to grow in size by attachment of more molecules drawn to them by the crystalline polarity; this reduces the solution to a strength below that at which it is capable of taking up the amorphous salt. The crystalline part of the precipitate is thus always growing, and the amorphous is constantly being dissolved till all has become crystalline. The whole phenomenon is very beautifully seen by aid of the microscope in the process for detecting traces of strychnine by precipitation with ferricyanide of potassium.

A drop of solution of strychnine on the microscope slide, being touched with a minute fraction of a drop of a solution of the ferricyanide, and the precipitate immediately examined under a half-inch objective, shows an amorphous cloud which quickly commences to exhibit a few crystals of a beautiful star-like shape. Around these the nebulous precipitate rapidly dissolves, leaving a clear space into which the stars expand, while the clouds clear away till all is bright and beautiful. Unless care be taken, it is sometimes difficult to repeat this experiment, as a trace of crystalline salt determines the rapid

* Presidential Address delivered before the Newcastle-upon-Tyne Chemical Society.

and less regular crystallization of the whole precipitate at once.

In this and many other cases the substance is capable of taking either of the two conditions distinctly. There are many in which a precipitate is apparently amorphous, though probably only so in appearance, from being in too minute a condition for its crystalline form to be noted under the microscope, and a considerable number of bodies exist in which no trace of crystalline property has yet been discovered, the most perfect of these being the gelatinous or colloid bodies.

The gelatinous state itself is probably due to polarities in the molecules acting equally in all directions. The hydration of colloid bodies has always appeared to me to be a subject worthy of speculation and of experiment. Its study relates to a debateable condition between the solid and the liquid state. We can trace every degree of change without any clear separation, from the most perfect fluidity through a great variety of watery combinations to the most perfect solidity and the most perfect insolubility, without losing the connection between the water and the solids with which it is brought into operation.

There is the most perfect gradation from the solution of ammonia, which is lighter and more mobile than water itself, through the solutions of crystalloid solids which add but little to the viscosity of the water, to solutions which are syrupy, to solutions of gums which are mucilaginous fluids or gelatinous semi-fluids, to combinations of water with gelatine or albumen, which by change of temperature become fluid in one case or lose fluidity in the other; to silica, which may be precipitated as a transparent gelatinous mass from a dilute solution, or as a pulverulent and opaque precipitate from a concentrated liquor, to clay which in small quantity remains diffused through pure water, with a persistency suggesting a union approaching that of solution, and from which it may be precipitated by hydrochloric acid, and to clay in its plastic state which presents some analogies to hydrated colloids; thus through many links till at the end of the chain we come to pure silicious sand and other pulverulent bodies, which retain the one remnant of analogy to solubility, that they are always left in a more coherent state by evaporation of water in which they have been immersed, than by lying in dry contact during any observable time.

I cannot at present enlarge upon more than one or two of the many suggestive links which merit study in this chain, first, as to the great force (molecular polarity I will assume) by which the gelatinous colloids are held together, and how great a force is represented by their union with water, and then to the adhesion, or cohesion of precipitates on the evaporation of water in comparison to the adhesion of the same substances under dry pressure. As regards the coherence of gelatinous colloids glue affords a convenient illustration. One part of gelatine dissolved in 100 of hot water makes a jelly on cooling. One molecule of gelatine confers proximate solidity to 100 times its weight of water; the molecules of gelatine may be regarded as separated from one another by this large proportion of water intervening, and still to have so much hold upon one another—still to be so strongly under the influence of one another's polarities, that they are held in position and not free to move, though the jelly is tremulous and easily broken. We might expect the polarities to increase inversely as the squares of the distances of the molecules, and to become something considerable as the water is diminished, and this is the fact to a larger extent than is often supposed. A solution of gelatine evaporated in glass or porcelain vessels contracts so much, and with so much force, as to tear away the surface of the vessel, thus indicating that the molecular attraction of the gelatine is at least as great as that of glass or porcelain. I have here specimens of glass and porcelain thus fractured. I had long ago heard of such results, but heard of them with a reservation of faith, till a few years ago, when experimenting with gelatine, my beaker fell a victim to this adhesive, cohesive, and contractile force. The effect on the evaporating dish is equally interesting. The force evidently exceeds the tensile strength of glass and porcelain, and if measured by pounds per square inch must be something considerable; but probably all the molecular forces would be large—indeed ungovernably violent, if our engineers were reduced to the size of molecules.

If the molecules of gelatine are held together with this great force, the force with which water attacks them must be equally great to enable it to penetrate the gelatine on immersion and expand it as it does. The swelling of a substance by becoming damp is frequently spoken of as the result of capillary attraction. I believe, however, that in most cases, if not in all, where swelling action takes place, it is the result of colloid hydration rather than capillarity. It is worthy of a passing remark, that while gelatine diffuses to a small extent only in water, water penetrates to a large extent into gelatine, and in contrast to this crystalloids diffuse freely in water, but water does not penetrate into a mass of solid crystalloid, though it diffuses into a solution of the same.

Turning now to another point, which I can do no more than touch upon, we may take pure silicious sand and wash it with the greatest care in distilled water, finally decanting the water and drying a small quantity of the sand in a beaker by evaporation. The particles of sand adhere to one another and to the beaker with sufficient force to permit of the inversion of the beaker without the sand falling out, though, if once disturbed after it has become dry, the adhesion instantly disappears, and does not show itself again after a long period of rest in the dry state. What is the nature of this adhesion, and what part the water takes in bringing it about is, as yet, problematical. We note the same effect in all bodies in varying degrees, from gelatine down to sand; it is not proportionate to the solubilities of the bodies in which it takes place. No doubt solubility has an effect of this kind, but we cannot regard the phenomenon as simply dependent on partial solution and the cementing of the undissolved particles, by means of the dissolved portion, left as a residue on evaporation.

The effect is variable in amount among bodies nearly equally soluble—for example, sand and clay—sand having the loosest possible adhesion, and clay a considerable one. It is more likely that the superficial molecules in a particle of sand or clay have one side of the molecule free to exert an affinity on the water, and that one side of the molecule is thus in the condition of hydration, the difference being that in hydrated colloids both sides of the molecule have water attached, and the action extends to every molecule in the mass. On this supposition when the water is evaporated, adhesion should take place wherever two molecules of silica come in contact, and the amount of adhesion should be proportionate to the relation between the size of the particles and the size of the molecules.

In a very interesting paper on regelation and the uniting of powders into masses under pressure, Professor Spring notices incidentally the disposition of powders, kept in bottles undisturbed for a length of time, to become united into masses which are more or less strongly coherent as they have been undisturbed for a longer or shorter time, and he attributes this result to a disposition possessed by most substances, but he thinks by crystalline substances especially, to weld when submitted to pressure —to unite promptly and perfectly under powerful pressure, or slowly and imperfectly under the pressure of their own weight. That many powders do agglomerate in our bottles is well known to us all, but the cause of their agglomeration I should think is mainly due to the action of moisture and change of temperature. The tendency to absorb moisture is not confined to deliquescent substances, or to substances commonly known as hygroscopic, but is probably possessed by all matter which has been carefully dried. In non-deliquescent salts the absorption of moisture ceases before the salt becomes palpably moist, but not before the particles are coated with an infinitesimal film of saturated solution of the salt. This film increasing in moist states of the air, and evaporating under the reverse circumstances, is sufficient to cause the agglomeration of the powder by a species of crystalline soldering of one particle to another. The same result would be produced by changes of temperature increasing or diminishing the solubility of the salt in its watery film. There is scope here for a series of careful observations which could not fail to be instructive. Professor Spring's results have had a great interest for me, perhaps the more so, as his conclusions are in some points opposite to my prejudices. He thinks that softness and a crystalline nature are, if not essential, at least favourable to this welding by pressure, Some years ago when Professor Brayley was lecturing on Physical Geography to our Literary and Philosophical Society, I performed for him an experiment in regelation, in illustration of his remarks upon glaciers, the point being the uniting of two pieces of ice while immersed in warm water. He expressed to me his conviction that it would ultimately turn out that regelation or welding could only take place with the matter in a colloid state. That ice, though crystalline in freezing, was probably colloid in melting, that iron, though feebly crystalline while cold, became colloid at a welding heat, and so on. He did not consider these points sufficiently mature for publication, but we discussed them as matters of interest to be kept in view as the subject of regelation and welding might develope, and I must say I felt strongly inclined to his view. I anticipated that the condition of matter which facilitated welding—using the word in a wide sense—was the reverse of that which is most favourable to, and most characteristic of, crystallization. My idea of crystalline matter was that the molecules had such polarities as caused their arrangement in a regular crystalline form, and the molecules would have little or no tendency to unite unless presented to one another in the position of this normal arrangement, and that colloid bodies consisted of molecules which cohered together in obedience to polarities which were not selective in their action, but which would cause the molecules to unite and cohere in any position or arrangement: and that welding or cohesion should take place when, by mechanical means, the masses can be brought together as closely as are the molecules within the masses. On this supposition welding should be a general property of such amorphous bodies as are soft enough to admit of their surfaces yielding so as to adapt themselves perfectly to one another. Practically, however, we had only a very limited experience of this till Professor Spring announced the success which he had achieved in uniting a great variety of powders by submitting them to pressures varying up to 20,000 atmospheres. I repeated a number of his experiments, and added others, and have now the pleasure of laying before you a few typical examples of the results. I had intended embodying, in the present address, some account of these experiments, but I find time will not permit me to do so at present, though it is possible I may find another opportunity of giving you a few details.

If we take a comprehensive view of welding, it is evident (without recourse to Professor Spring's experiments) that it accompanies a soft or semi-fluid condition rather than either a crystalline or colloid nature. The running together of two dew drops on the petal of a flower is the same thing in principle as the union of zinc filings under the pressure of 10,000 atmospheres in Professor Spring's apparatus, or the welding of the coils of a 100-ton gun in Sir W. G. Armstrong's works. Solidity and fluidity are but the different parts of an unbroken chain. The dew drop on a rose retains its rotundity against the force of gravity, in obedience to the greater force of its molecular attractions. On the other hand, the molecular attractions of the metal, great as they are, yield to the greater force of mechanical pressure, and zinc flows under the force of 10,000 atmospheres, or iron welds under the combined forces of the furnace and the forge. The probability is that all things would weld under circumstances such as would make them flow; that is, the molecular forces within the mass must be reduced or the external forces must be increased till the latter are at least equal to the former.

Pharmacists have long been familar with the welding tendency of powdered camphor, aloes, and other soft bodies of either a crystalline or amorphous nature. I should have felt considerable surprise if there had been a general difficulty in causing the welding of amorphous or colloid bodies, and among the first experiments I tried, after ascertaining that I could really obtain Professor Spring's general results, were those to determine the welding powder of sundry familiar colloids. Gums, sugar, gelatine, resins, and amorphous salts were tried with the general result that the amorphous bodies unite in a very similar degree and manner to the crystalline.

Amorphous sugar welds rather more easily and rather more perfectly than crystalline sugar under the same pressure. With crystalline and amorphous chrome alum there was no appreciable difference. The double citrate of ferric oxide and ammonia, though an amorphous salt, unites perfectly and readily; so does the double sulphate of the same bases which is a crystalline alum.

Though I have ceased to believe with Brayley that the colloid condition is an essential preliminary to a good weld, I have not learned to think with Spring that it is less favourable than the crystalline state; a definite judgment upon this point must be reserved for a much more extended evidence.

Professor Spring has obtained several other results no less interesting; he has shown that sulphur, in whatever condition it is put into the press, assumes its densest condition under pressure. Whether amorphous or prismatic in the first instance, it becomes octahedral by compression. Thus pressure is capable of producing molecular change, and the allotropic condition which is possessed of the greatest density. He has also submitted a mixture of copper filings and sulphur to a pressure of 5000 atmospheres, and obtained a block of sulphide of copper, showing that the pressure which suffices to cause the welding together of the particles of sulphur, or the particles of metal if applied to them separately, has the power of facilitating their chemical union if applied to them when mixed; but he thinks that such chemical union only takes place when the resulting compound occupies less space than the two elements in the separate state. In illustration of this I have upon the table a little block obtained by the same treatment of a mixture of sulphur and powdered tin, in which mechanical union and cohesion have been obtained, but not chemical union, the sulphur being still visible with the aid of a lens. There is here a resistance to blending, which we may compare to the immiscibility of oil and water, or to the aqueous solutions of ammonia and carbonate of potash previously noted, a resistance which we may suppose to be due to a want of harmony in the molecular movements of the bodies concerned, a discordance which is not removed by pressure such as we can apply, but which is removed by an increase in temperature. We may suppose the discordance to be similar to that of phosphorus and oxygen in the cold, where the union is retarded by pressure, and expedited by the reduction of pressure, or the increase of temperature. If the molecular movements of two elements in the separate state take place in one plane, the composition of these motions may result in a motion occupying more space, less space, or the same space as that occupied by the sum of the original elementary motions, but if the elementary motions are in different planes the result is a movement occupying more space than the sum of the previous movements. Under these circumstances there is a natural obstacle to this composition of forces, if the elements are brought together in a space too small to allow of the resultant motion. This is probably another way of putting the conclusion at which Professor Spring had arrived, *i.e.*, that combination takes place when the resulting compound has a greater density than the mean of the two elements, and does not take place if the density is less than the mean.

(*To be continued.*)

THE UNITED STATES PHARMACOPŒIA SYRUPS.

The following formulæ are taken from the new edition of the United States Pharmacopœia:—

Syrupus Calcii Lactophosphatis.

Syrup of Lactophosphate of Calcium.

Precipitated phosphate of calcium, *twenty-two parts*	22
Lactic acid, *thirty-three parts*	33
Orange flower water, *eighty parts*	80
Sugar, in coarse powder, *six hundred parts*	600
Hydrochloric acid,	
Water of ammonia,	
Water, each, *a sufficient quantity,*	
To make *one thousand parts*	1000

To the precipitated phosphate of calcium, mixed with *three hundred* (300) *parts* of cold water, add enough hydrochloric acid to dissolve it. Filter the solution, dilute it with *twelve hundred* (1200) *parts* of cold water, and then add water of ammonia, until it is slightly in excess. Transfer the mixture at once to a fine, wetted muslin strainer. As soon as the liquid has run off, return the magma to the vessel, mix it quickly with *twelve hundred* (1200) *parts* of cold water, and again transfer it to the strainer. When it has drained, mix the magma at once with the lactic acid, and stir until it is dissolved. Then add the orange flower water and enough water to make the solution weigh about *three hundred and fifty* (350) *parts*, filter, and pass enough water through the filter to make the filtrate weigh *four hundred* (400) *parts*. Lastly, add to this the sugar, dissolve it by agitation, without heat, and strain.

Syrupus Ferri Bromidi.

Syrup of Bromide of Iron.

A syrupy liquid containing 10 per cent. of ferrous bromide [$FeBr_2$; 215·5.—*FeBr;* 107·75].

Iron, in the form of fine wire, and cut into small pieces, *thirty parts*	30
Bromine, *seventy-five parts*	75
Sugar, in coarse powder, *six hundred parts*	600
Distilled water, *a sufficient quantity,*	
To make *one thousand parts*	1000

Introduce the iron into a flask of thin glass of suitable capacity, add to it *two hundred* (200) *parts* of distilled water and afterwards the bromine. Shake the mixture occasionally, until the reaction ceases and the solution has acquired a green colour and has lost the odour of bromine. Place the sugar in a porcelain capsule and filter the solution of bromide of iron into the sugar. Rinse the flask and iron wire with *ninety* (90) *parts* of distilled water, and pass the washings through the filter into the sugar. Stir the mixture with a porcelain or wooden spatula, heat it to the boiling point on a sand-bath, and having strained the syrup through linen into a tared bottle, add enough distilled water to make the product weigh *one thousand* (1000) *parts*. Lastly, shake the bottle and transfer its contents to small vials, which should be completely filled, securely corked, and kept in a place accessible to daylight.

A transparent, pale green liquid, odourless, having a sweet, strongly ferruginous taste, and a neutral reaction. With test-solution of ferricyanide of potassium it yields a blue precipitate. If a little disulphide of carbon be added to the syrup, then a few drops of chlorine water, and the whole agitated, the disulphide will separate with a yellow or brown colour. It should not deposit a sediment on keeping, and should not tinge gelatinized starch yellow (abs. of free bromine).

Ten gm. of the syrup should require for complete precipitation not less than 1·57 gm. of nitrate of silver (corresponding to 10 per cent. of ferrous bromide).

Syrupus Ferri Quininæ et Strychninæ Phosphatum.

Syrup of the Phosphates of Iron, Quinine, and Strychnine.

Phosphate of iron, *one hundred and thirty-three parts*	133
Quinine, *one hundred and thirty-three parts*	133
Strychnine, *four parts*	4
Phosphoric acid, *eight hundred parts*	800
Sugar, in coarse powder, *six thousand parts*	6000
Distilled water, *a sufficient quantity.*	
To make *ten thousand parts*	10000

Add the phosphate of iron to *twenty-five hundred* (2500) *parts* of distilled water, in a tared bottle large enough to hold the finished syrup, and agitate frequently until the salt is dissolved. Having added the phosphoric acid to the solution, triturate the quinine and strychnine gradually with the mixture, in a mortar, until they are dissolved, then return the solution to the bottle and add enough distilled water to make the liquid weigh *four thousand* (4000) *parts*. Lastly, add the sugar, dissolve it by agitation, without heat, and filter through paper.

Keep the syrup in small, well-stopped vials, in a cool and dark place.

Syrupus Hypophosphitum.

Syrup of Hypophosphites.

Hypophosphite of calcium, *thirty-five parts*	35
Hypophosphite of sodium, *twelve parts*	12
Hypophosphite of potassium, *twelve parts*	12
Citric acid, *one part*	1
Spirit of lemon, *two parts*	2
Sugar, in coarse powder, *five hundred parts*	500
Water, *a sufficient quantity,*	
To make *one thousand parts*	1000

Mix the hypophosphites, and dissolve them, by trituration, in *three hundred and fifty* (350) *parts* of water. Should there be a trifling residue undissolved, allow the solution to settle, pour off nearly all of it, and add the citric acid, so that the residue may be dissolved. Then, having mixed the liquids, add the spirit of lemon, and filter through paper, adding through the filter enough water to make the whole weigh *five hundred* (500) *parts*. In this liquid dissolve the sugar, by agitation, without heat, and strain.

Keep the syrup in well-stopped bottles.

Preparation: Syrupus hypophosphitum cum ferro.

Syrupus Hypophosphitum cum Ferro.

Syrup of Hypophosphites with Iron.

Lactate of iron, *one part*	1
Syrup of hypophosphites, *ninety-nine parts*	99
To make *one hundred parts*	100

Dissolve the lactate of iron in the syrup by trituration.

Keep the syrup in well-stopped bottles.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 23, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

RHEUM OFFICINALE.

TEN years have now passed away since there appeared in the pages of this Journal the first printed account of a species of *Rheum*, which Professor BAILLON had then recently brought under the notice of a meeting, at Bordeaux, of the French Association for the Advancement of Science, as having been received from Thibet, with the claim that it represented the long-disputed source of official rhubarb. The plant was first cultivated at Montmorency; afterwards it was grown in the gardens of the Academy of Medicine, Paris, at Clapham, by the late Mr. DANIEL HANBURY, and in the Royal Gardens at Kew, where its noble proportions have no doubt excited the admiration of many of our readers. It proved to belong to an entirely new species, which Professor BAILLON described under the name of *Rheum officinale*. Since then its claim to be considered at least as one of the sources of official rhubarb has been fairly well established, and in the two new Pharmacopœias just issued that drug is described as being yielded by *Rheum officinale* and other unnamed species of rhubarb. As a natural consequence attempts have been made, both in this country and in France, to cultivate the plant on a commercial scale for the sake of its root, but it cannot be said that the results yet obtained have been satisfactory. For instance, the root of a plant of *Rheum officinale*, three years old, grown at Banbury, and examined in 1877, presented none of the characters of true Russian rhubarb, and gave rise to the impression that the drug was the product of a plant of much slower growth. But this may be attributable to the climatic and other conditions under which the plant grows in its native country, especially as the result was not quite in accord with the observations made upon a plant grown at Clapham. Efforts to secure the naturalization of the plant have also been made by the Paris Acclimatization Society, and this body has recently had placed at its disposal some interesting information from Herr HEUDER, German Consul at Shanghai, that may facilitate the making of future experiments under more favourable conditions.

Herr HEUDER states that for two years he was engaged unsuccessfully in attempts to obtain living plants of *Rheum officinale*, being foiled sometimes by the opposition raised by the natives, and at others by difficulties attending the transport of the plants, which always perished in the course of the long journey from the western parts of China to the seacoast. Eventually success was achieved by Herr FRANZENBACH, an interpreter to the consulate, who brought back from an excursion into Mongolia three specimens which were considered to represent the true rhubarb plant by the native doctors, and two of which appeared to correspond with the botanical description of *R. officinale*. On leaving Pekin, Herr FRANZENBACH had first taken a north-west course to Kalgan, and then, proceeding in a line due west, he crossed the Yellow River twice, and reached the Mongolian region situated on the northwest of the Chinese province of Shensi, where he discovered large quantities of the plant, and was assured by the Mongols living there that it was the source of the rhubarb sent into commerce. He himself pulled up four specimens, including apparently two varieties; these he planted in a wooden Mongolian milk pot, and, after encountering many perils during a journey of six weeks, brought three of them alive and in good condition into Shanghai. According to Herr FRANZENBACH, these two varieties or species of *Rheum* grow wild in considerable quantity upon the mountain slopes, but they are especially abundant in the alluvial lands which are saturated with water only in the spring. In this region the temperature falls in the winter to seventeen degrees below zero Fahrenheit; the hard weather lasts about eight months, but there is little snow. In summer, the average temperature is from 72° to 77 F.

When the roots are about six years old the Mongols extirpate them, like asparagus, to about four inches below the surface, leaving the stocks in the ground, where they throw out new shoots. The cut portions, after being dried carefully in the air, are sold to the Chinese, who send them into commerce after removing the cortical portion. The method of multiplying the plant adopted by the natives is curious. A piece, about an inch in length, is cut from the upper part of the root, where there are a number of small shoots, and this is again subdivided, taking care that each fragment contains a portion of root. At the end of the root an incision is made, into which a seed of any kind is introduced, and the fragment is then planted with the shoot pointing upwards. The process has been imitated by Herr FRANZENBACH, and he says that he has in this way succeeded in raising fine plants. With seed he was less successful, as it appeared to lose its germinating powers after an interval of a few months. Herr HEUDER adds that various species of *Rheum* appear to grow in Thibet and Siberia and other countries west of China and Mongolia.

PHARMACEUTICAL LEGISLATION IN QUEENSLAND.

The pharmacists of Queensland appear to be making a vigorous effort to get the management of pharmaceutical affairs in that colony placed in their own hands, the power of granting certificates to carry on the business being, as mentioned recently, now vested in a Medical Board. About two years since a Pharmaceutical Society was established with the object of obtaining reform in this and other directions. Last year a Bill embodying the views of the Society was introduced into the Colonial Parliament and passed the Lower House, but after reaching the Upper House it had to be withdrawn, apparently under pressure of medical influence. The Pharmacy Bill has, however, been reintroduced in the present session and at the time of our last advices it appears to be again encountering resistance from the same quarter. The opposition has indeed been carried so far that seven members of the Medical Board have published a notification to members of the Queensland Parliament that they consider this application for legislation premature, on the grounds that the present status of chemists and druggists in Brisbane is far too low to fit them to undertake the responsibility sought by them, and that two official boards, one medical and one pharmaceutical, would lead to antagonism and an undesirable state of things. There may be something peculiar in the atmosphere of Brisbane which creates an exception to the rule that pharmacists have proved themselves capable of managing their own affairs without becoming antagonistic to the medical profession, though we do not think it probable. Anyway the work done under present arrangements must be very perfunctory, if the Medical Board takes the position, as is asserted, that it has no power to examine pharmaceutical candidates, and has no option but to grant certificates to all who present themselves for registration with evidence of having served a three years' apprenticeship. It is not surprising to learn that under such a system a man has been registered as competent, who recently confessed at an inquest his ignorance of any difference between the two oils of almonds. Surely, any change in the law could hardly give a more unsatisfactory result.

THE ENFORCEMENT OF POISON REGULATIONS IN VICTORIA.

We learn from the Melbourne papers that the Pharmacy Board of Victoria has just won one of those Pyrrhian victories which too frequently fall to the lot of bodies that have to fight the battles of the public. It occurred in connection with a charge against a grocer for selling a rat poison consisting of coloured arsenic, in contravention of the colonial Act regulating the sale of poisons, which resembles the English law. The defendant, who was unregistered and sold the poison without making any inquiry or entry of sale, appears to have treated the business very lightly, making no defence beyond saying that he had bought the poison from the representative of an English firm and that he knew nothing about it, except that it killed rats in a remarkably quick manner. The police magistrate, sympathizing with the defendant in his ignorance, fined him only one shilling and limited the costs to ten shillings, thus practically imposing a fine upon the Pharmacy Board for carrying out a public duty, probably amounting to several times that imposed upon the offender. It is satisfactory to notice that the magistrate's decision has been subjected to sharp editorial criticism in the colonial press, and what is more the editors appear to have made themselves acquainted with the actual provisions of the law before writing upon the subject, an example that might be in many cases followed with advantage by the editors of the daily and weekly press in this country.

THE DANGERS OF PYROTECHNY.

By order of the Secretary of State for the Home Department an inquiry has been instituted in regard to the circumstances attending the explosion of fireworks at the Hull Botanic Gardens last September, and in the report furnished by one of the inspectors of explosives it is shown that it was due to the use of a mixture of chlorate of potash and sulphide of antimony in the preparation of stars intended to be fired out of a mortar loaded with gunpowder. These stars instead of being thrown up into the air and ignited at the moment of discharge, exploded within the mortar, bursting it and causing the death of two persons besides serious injury to several others.

Captain Cundill, the reporter, points out the danger attending the use of this kind of fireworks and insists upon the necessity of all possible precautions being taken to minimize that danger, one of the conditions requisite for this purpose being naturally the possession of chemical knowledge on the part of those who make fireworks. There is reason to fear that this is too frequently wanting, and in the case now referred to the pyrotechnist admitted he had no chemical knowledge whatever, making compositions simply by receipts without knowing anything of the results of putting the various ingredients together. The report states in reference to this confessed ignorance, which seems to prevail with all firework makers, that though there does not appear to be reason for complaining of the substantial justice of the verdict of "accidental death" given by the coroner's jury there is at least an opportunity afforded of profiting by the terrible lesson given to pyrotechnists by the sad results of this accident.

BRITISH MEDICAL ASSOCIATION.

According to an official announcement of the arrangements at present matured, the British Medical Association will hold its Fifty-first Annual Meeting next year, in the Liverpool College, Liverpool, commencing on the 31st of July, the President-Elect being Dr. A. T. H. Waters. The Address in Surgery is to be delivered by Professor Reginald Harrison, and the Address in Pathology by Dr. Charles Creighton.

Transactions of the Pharmaceutical Society.

GENERAL MEETING—BENEVOLENT FUND.
ELECTION OF ANNUITANTS.

A General Meeting of the Members, Associates in Business, and Associates of the Pharmaceutical Society, and of the Subscribers and Donors to the Benevolent Fund, was held at the house of the Society, 17, Bloomsbury Square, on Friday, December 15, at 12 o'clock, for the Election of Six Annuitants.

Mr. Michael Carteighe in the chair.

The notice convening the meeting was read.

Scrutineers were appointed, who examined the voting papers and brought up the following report:—

Scrutineers' Report.

We, the undersigned Scrutineers, appointed at the eighteenth election of Annuitants on the Benevolent Fund of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us and report the following result:—

Dixon, Mary Elizabeth	6914
Rowlands, Amelia C.	3030
Sutterby, Catharine M.A.	2786
Henly, Mary Ann	2768
Davies, Henry Edward.	2753
Broadwater, Elizabeth	2278
Wavell, John	1687
Taylor, Henry	1094
Powell, Mary Jane	1018

3556* voting papers were received, of which number 64 were informal (54 unsigned) and were disallowed.

J. Robbins, *Chairman.*

Charles J. Mead.
T. Howard Hall.
E. N. Butt.
W. H. Ferguson.
Charles E. Turner.
J. T. Tupholme.
W. Inchle Gulliver.
R. Fisher Young.
Thomas Rich.
Walter Hills.
W. Toogood Frost.
R. A. Robinson.
Robert Rowe.
J. O. Braithwaite.
W. Smith.
Robert H. Davies.
George S. Taylor.
W. H. Symons.
Chas. B. Allen.

December 15, 1882.

The Chairman declared the following six duly elected Annuitants:—

Broadwater, Elizabeth.
Davies, Henry Edward.
Dixon, Mary Elizabeth.
Henly, Mary Ann.
Rowlands, Amelia C.
Sutterby, Catharine M. A.

On the motion of the President it was resolved—

"That the best thanks of the subscribers are due, and hereby tendered, to the Scrutineers for their valuable services."

A vote of thanks was also given to the Chairman.

* 5742 voting papers were issued by the Secretary.

EXAMINATIONS IN LONDON.

December 13, 1882.

Present—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Gale, Greenish, Linford, Martindale, Plowman, Southall, Taylor and Thresh.

Dr. Greenhow attended on behalf of the Privy Council.

MAJOR EXAMINATION.

Six candidates were examined. *Four* failed. The undermentioned *two* passed, and were declared qualified to be registered as Phamaceutical Chemists:—

Fowler, George ....Tewkesbury.
Marshall, Joseph Jewison ......Beverley.

MINOR EXAMINATION.

Nineteen candidates were examined. *Twelve* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Armstrong, Frank ....Workington.
Bing, Charles ....Canterbury.
Blackham, William George......Liverpool.
Brisley, George......................Margate.
Carr, Percy ....Sheffield.
Chater, Arthur Brand.............Elmdon.
Clague, Thomas Maltby ....Douglas.

December 14, 1882.

Present—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Gale, Greenish, Linford, Martindale, Plowman, Southall, Taylor and Thresh.

Dr. Greenhow was also present.

MAJOR EXAMINATION.

Seven candidates were examined. *Three* failed. The undermentioned *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Burton, Walter.......................Mansfield.
Nichol, Anthony ....Carlisle.
Richards, Thomas..................St. Clears.
Williams, William Jesse ....Crickhowell.

MINOR EXAMINATION.

Eighteen candidates were examined. *Eleven* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Collins, Herbert Sleight ....Bradford.
Cox, Webster ....Liverpool.
Critchlow, Henry...................Oldham.
Doo, James Emile ....Atherstone.
Eastwood, Thomas Earnshaw...Skelmanthorpe.
Freeman, John Henry............Ipswich.
Goodwin, Walter Frederick ...Norwich.

December 19, 1882.

Present—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Gale, Greenish, Linford, Martindale, Plowman, Taylor and Thresh.

MINOR EXAMINATION.

Twenty-four candidates were examined. *Twelve* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Harvey, Frederick ....Margate.
Holwell, Alfred ....Loughborough.
Hopkins, William Richard ......Aberystwith.
Houfe, Robert William ....York.
Hurcomb, Lawrence Edmund...Nottingham.
Isaac, James Griffith ....Strood.
Jenkin, William John ....Plymouth.
Lambert, John Thomas ....Hoyland.
Langley, Frank Collins ....Ashford.
Luxmoore, Charles Mann ......Bristol.
Marsh, Edward......................Luton.
Oldershaw, John ....Nottingham.

December 20, 1882.

Present—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Gale, Greenish, Linford, Martindale, Plowman, Southall, Taylor and Thresh.

MINOR EXAMINATION.

Twenty-four candidates were examined. *Ten* failed. The undermentioned *fourteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Hopkinson, Harry ....Grantham.
Jones, William......................Carmarthen.
Neve, Annie..........................London.
Parker, Charles Henry Mitchell.South Molton.
Pask, Thomas Edward ....Newark.
Perkins, Charles Lynham ......Plymouth.
Pope, Albert Harry...............Southport.
Pridmore, Sydney Spencer......Hinckley.
Puckey, Courtenay ....Herne Hill.
Rednall, William Rush ....Northampton.
Rees, John Arthur ....Cardiff.
Ridgley, Cromwell ....Huntingdon.
Rigden, George ....Folkestone.
Ryley, Edward......................Louth.

December 21, 1882.

Present—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Gale, Greenish, Linford, Martindale, Plowman, Southall, Taylor and Thresh.

MINOR EXAMINATION.

Twenty-four candidates were examined. *Fifteen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Gulliver, Walter Frederick......London.
Sharpe, William Cecil............Madeley.
Skyrme, Henry Edward ....Cardiff.
Smalley, Arthur William ......Stamford.
Smith, William Thomas ....Bath.
Steward, Henry Clarke ....Ludlow.
Walton, Frederick Miles.........Reading.
Whiffin, Henry.......................Market Harborough.
Young, Robert John ....Bideford.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's examination:—.

Certificates of the College of Preceptors.

Arnison, William S. ....Sunderland.
Baker, Sydney George ....High Barnet.
Hayward, Savill ....Trowbridge.
Humphreys, Thomas H. P. S...Denmark Park.

Certificate of the Faculty of Physicians and Surgeons of Glasgow.

Parkinson, James..................Oldham.

Certificate of the Royal College of Surgeons in Ireland.

Dodd, Richard Jefferson.........Sunderland.

Certificates of the University of Cambridge.

Everett, John Garwood ....Ipswich.
Everett, Walter Edes ....Colchester.

Certificate of the University of Edinburgh.

Cockburn, David ....Dunse.

Certificate of the University of Oxford.

Palmer, Charles Joseph ....Wingham.

Resolved—"That the Board of Examiners desire to convey to Mrs. Allchin and family the assurance of their sincere sympathy in the severe loss they have sustained through the decease of the late Mr. Allchin.

"Mr. Allchin had won and retained, during a lengthened career on the Board, the confidence and esteem of his co-examiners, and in this expression of condolence with the family, they also bear testimony to their own loss of a valued friend and colleague."

Resolved—"That Mr. Martindale, having expressed his intention to retire from the Board of Examiners in consequence of the increasing claims of his own business, the Board desires to record its appreciation of the valuable services rendered by Mr. Martindale during the ten years he has been an examiner, and its regret at losing an esteemed colleague."

Resolved—"That the foregoing resolutions be entered on the minutes of the Board."

NORTH BRITISH BRANCH.

EVENING MEETING.

The second meeting of the present session was held in the Society's Rooms, 119A, George Street, Edinburgh, on Wednesday evening, December 13, at 9 o'clock.

Mr. Alexander Napier, President of the Branch, in the chair.

The minutes of the former meeting were read and confirmed.

The Secretary to the Branch then announced the following donations;

To the Museum:—

Specimens illustrating the manufacture of soda, consisting of the following:—

Salt Cake, Black Ash, Diamond Soda, Soda Crystals, Caustic Soda, Hydrochloric Acid, Bleaching Powder, Black Oxide of Manganese (recovered), and Crystal, Rock and Roll Sulphur (recovered from Alkali Waste by Mactear's process).

From Messrs. Charles Tennant and Co.

Twelve specimen bottles for the above.

From Mr. Alexander Kinninmont.

Capsicum annuum, fructus, and
Convolvulus scammonium, radix.

From Messrs. T. and H. Smith and Co.

A piece of Spurious Opium.

From Messrs. J. F. MacFarlan and Co.

In calling attention to these donations, the Secretary remarked that the specimens of alkali products had come through the Glasgow Apothecaries' Company. The specimens of recovered sulphur were very pretty, and they were of interest from the fact that a waste material was utilized in their production. The specimens of scammony root exhibited had been selected from a large bale; the roots were very typical. The donors, he understood, went through large quantities of scammony in manufacturing the resin; a specimen of which would be exhibited at a future meeting. The piece of spurious opium was one of twenty-five pieces which had been picked out of six cases of opium imported from Smyrna. The weight of the twenty-five pieces was 16 lbs. 12 ozs. With the exception of the covering, the specimen in no way resembled opium; internally it was of a lighter colour, of a tough and glutinous consistency, and it had a faintly aromatic odour somewhat like Socotrine aloes. The specimen contained no morphia.

On the motion of the President a vote of thanks was given to the various donors.

Mr. Robert Aitken, then read a paper on "The Pharmacopœial Extracts of Aloes and their Preparations," which is printed on p. 501.

The President said that aloes was an important drug, and one of great antiquity; indeed, our knowledge did not seem to grow with the length of time in which it had been in use. The late Professor Christison had shown that prolonged heat greatly deteriorated the drug, and it was his opinion that it is better to use the purest samples of aloes as imported in preference to aqueous extracts of the drug. The investigations of Mr. Aitken showed that aloes is subject to very great change when converted into extract by the pharmacopœial method; and it was gratifying to know that he had prepared an extract free from resin. In moving a vote of thanks to Mr. Aitken he remarked that the paper was one of practical utility. It was such papers, more especially from young pharmacists, which proved interesting, and he hoped that there would be many more of the same kind.

Mr. Young said that the meeting was indebted to Mr. Aitken for having drawn attention to the matter. From the circumstance which led him to institute the experiments it was well to suppose that there was some difference in the preparations, and he deserved commendation for having acted as he did. The paper would direct attention to the subject, he hoped, and manufacturers would probably act upon the suggestions which had been thrown out.

Mr. Aitken stated, in reply to Mr. Young, that he had been particular in selecting good samples of Barbadoes and Socotrine aloes. He had made extracts with both of these and he got the best results by evaporating with hot air.

Mr. Hill said that he had much pleasure in listening to the paper, which dealt with a practical question and pointed out a discrepancy which, he was afraid, occurred with other official preparations than extract of aloes. Manufacturers were apt to adopt expedients by which they could produce preparations more rapidly than by the official process, without a due regard to the properties or efficacy of the resulting products. He hoped that the method of evaporation by hot air would commend itself to manufacturers.

The next paper read was on "The Preparation of Syrupus Ferri Phosphatis by a New Method," by Mr. Daniel Gorrie. The paper is printed on p. 501.

The President said that he had not found much difficulty with the official process; however, Mr. Gorrie's method seemed to be simpler and the syrup more permanent than the ordinary preparation. He had much pleasure in moving a vote of thanks to Mr. Gorrie.

Mr. Nesbit said that although the method proposed was a very simple one, yet he did not think that it would ever come into general use; for although it might answer very well in the hands of a careful and competent person, yet if entrusted to some one not so competent there would be liability of contamination with baryta, the poisonous nature of which, he maintained, precluded its use.

Mr. Stephenson said that he held much the same opinion as the previous speaker, and he could only add that he had found the syrup by the official method to keep for a long time; still the method proposed was an ingenious one and as such the author deserved credit for it.

This being all the business the meeting adjourned.

Provincial Transactions.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION

A lecture was delivered at the rooms of the above Association, on Wednesday evening, December 13, by Mr. J. E. Weatherhead, on "Teeth." Mr. J. J. Edwards presided. There was a good attendance.

The lecturer having described the substances, number and form of the teeth, pointed out the peculiarities in dentition of the different species of animals, showing skulls and teeth belonging to the orders Mammalia, Quadrumana, Rodentia, Carnivora, Proboscidia, Ungulata, Cetacea, Reptilia, Amphibia and Fishes. The lecture was illustrated by a quantity of beautiful diagrams and specimens, and was delivered in a highly interesting and instructive manner, and appeared to be thoroughly enjoyed by the audience.

Mr. Edwards proposed a vote of thanks to Mr. Weatherhead, which was seconded by Mr. Shirlby and carried.

BLACKBURN CHEMISTS' ASSOCIATION.

The annual meeting was held at the rooms, Exchang Street, on Monday, December 11. Mr. W. Farnworth presided.

The balance sheet was read and approved of.

The following are the officers for the ensuing year:—President, Mr. A. P. Garland; Secretary, Mr. J. W. Clayton; Assistant-Secretary, Mr. Jowett; Librarians, Messrs. W. C. Rundle and J. Hindle.

Votes of thanks to the various officers for their services during the past year were passed.

On Friday, December 15, in connection with the Improvement Class, Mr. S. Kirklan delivered a lecture on "Arsenic." Mr. J. G. Tier presided.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth meeting of the session was held on Wednesday, December 6, in the rooms of the North British Branch. Mr. P. Boa, President, in the chair.

The minutes of the previous meeting having been read and adopted, the Chairman called upon Mr. C. F. Henry to open, on the affirmative side, a debate on the question, "Does a necessity exist for further legislative restriction as to the sale of poisons?"

Mr. Henry first gave a brief historical *résumé* of the legislation in regard to poisons which had taken place during the last thirty years. He then proceeded to argue:—1st. That that part of section I. of the present Poison Act should be more definite which stipulates the drawing up of regulations for the keeping, storing, dispensing and selling of poisons. No regulations at present existed for the storing of drugs. Mistakes often occur through the too close proximity of poisonous to harmless drugs, and he thought that some regulations were imperatively required. Cases of accidental poisoning had increased 15·3 per cent. during the last five years, and he thought this indicated a necessity for some regulations in regard to the way in which poisons were placed in the hands of the public. 2nd. That the present poison schedule is far from complete. He suggested that the following should be added to the second part of it, viz.:—phosphorus and its medicinal preparations, carbolic acid and vitrio in quantities under one gallon, the salts of lead, copper, and zinc, croton oil and tincture of hyoscyamus. A reference to the Registrar General's Reports for the last ten years showed that some of the foregoing were far oftener the cause of fatal poisoning than many of those at present in the poison schedule. For instance, in one thousand cases of poisoning, 30·8 were caused by vitriol; 17·5 were caused by phosphorus; 94·2 were caused by carbolic acid; 1·7 was caused by hellebore; 1·2 was caused by cantharides; 4·8 were caused by aconite; 39·8 were caused by arsenic, and 12·3 were caused by chloroform, chloral and chlorodyne. 3rd. That legislative restriction should be imposed on the sale of poisonous patent medicines. Coroners had over and over again expressed an opinion to this effect and their opinion had been unanimously endorsed by juries. It short, it was admitted on all hands that something ought to be done to bring the sale of these articles under some control. The fact that a 1*s.* 1½*d.* bottle containing a solution of some powerful scheduled poison could be purchased from many country grocers, as easily as a pound of cheese or a couple of farthing candles, he thought sufficient to convince anyone that these poisonous patents ought to be included in the Poison Act. 4th. That no child under sixteen years of age should be supplied with any scheduled poison. 5th. That the sale of poisons should be restricted not only to pharmaceutical chemists and chemists and druggists, but also to qualified assistants, and that no others should be allowed to sell or retail them by any means. He knew that here he was treading on delicate ground, but he trusted he would not offend anyone if he stated his humble opinion on this matter. He reminded them of the argument which was used with great force against the Pharmaceutical Society by the law agent of a cooperative company in London who had been prosecuted for retailing and dispensing poisons,—the argument, viz., "That the public were safer in going to a co-operative store for poisons than to the branch shops of chemists, as most of these shops were conducted by unqualified assistants, whereas at the store the company kept a qualified assistant." It seemed to him that the time had come, if it was not far past, for this flaw in the Pharmacy Act to be remedied. No doubt the framers of the Act never intended that such a state of matters should be possible, and no doubt also in the existence of such a state of matters the spirit, if not the letter of the Act, was broken. In addition to the foregoing arguments he might, he said, have gone into the question of transferring the duties at present discharged by the Pharmaceutical Society to a public prosecutor, but he thought he had said enough to prove that the present legislation restricting the sale of poisons was incomplete, and that a necessity existed for further restriction.

The negative side of the question was opened by Mr. W. S. Adamson, who contended that no necessity existed for further legislative restriction, because, 1st. In the law, as it at present stood, there was sufficient power to cope with any emergency that might arise, and that it only rested with the Council of the Pharmaceutical Society to exercise the powers conferred upon them by clause 2 of the Pharmacy Act, 1868. 2nd. Any further restriction would tend to embarrass the seller. This point was illustrated by one or two incidents typical of what took place even under the present regulations, and he contended that any further restriction would only increase this embarrassment without conferring any advantage either on the public or on the chemist. 3rd. He concluded by saying that in agitating for further restriction on the sale of poisons they were doing that which would lower the standing of the chemist in the estimation of the public, and confessing that they were not competent to discharge the responsibility which at present rested upon them in connection with this matter. He, therefore, hoped that the majority of those present would agree with him that no necessity at present existed for any further legislative restriction.

The debate was continued by Messrs. Boa, Low, Maben, MacEwan, Robertson and Turnbull. The opener having replied, a vote was taken, and the affirmative declared carried by a majority of 14.

The Chairman, having intimated that the next meeting would be on Wednesday, December 20, when a paper on "The Haloïd Elements," would be read by Mr. J. Suttar, the meeting was closed.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The annual meeting was held at 23, Burlington Chambers, New Street, Birmingham, on December 13. The attendance was very fair, considering the inclement state of the weather. The chair was occupied by Mr. Barclay.

The Chairman, after some remarks, moved the adoption of the balance sheet, which showed a satisfactory balance of over £39 in the treasurer's hands.

This having been carried, the meeting proceeded to the election of officers, Mr. Lucas being appointed President, Messrs. Barlow and Brown accepting the Vice-Presidentships, the Treasurer, Auditors and Committee being re-elected.

The question of publishing a revised edition of the Price List aroused considerable discussion, and was decided in the affirmative; a sub-committee was then formed for that purpose.

It was then, on the motion of Mr. Barclay, resolved to appoint a sub-committee to carry out the arrangements for the annual *soirée*, the profits of which are devoted to the Benevolent Fund of the Society. It was also decided to resume at an early date the meetings for the reading of papers, and several gentlemen were reported as willing to give their services.

A sum of £5 was voted for the further increase of the Library, which the Librarian reported was being more appreciated by members.

It was then resolved, upon the motion of the Chairman, that a sum of £5 be voted from the profits of last year's *soirée* to the Benevolent Fund of the Pharmaceutical Society, the proposer testifying to the very able and careful manner in which that Society disbursed the money at its disposal.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Wednesday, December 20, 1882, at 4 p.m.

Present—Professor Attfield, F.R.S., President, in the chair; Messrs. Brady, Ekin, Naylor, and Messrs. Benger and Plowman (Hon. Secretaries).

The minutes of the previous meeting were read and confirmed.

Letters of apology for non-attendance were read from Messrs. Ashton, Kinninmont, Payne and Radley.

A letter was read from the printers saying that the whole of the matter of the 1882 Year-Book was in type, and that copies would be ready for delivery during the last week of the year at the rate of about two hundred and fifty per day. Members who have paid their subscriptions will be supplied in alphabetical order. Although the publication has been delayed, owing to domestic affliction of the editor, the Year-Book will nevertheless be in the hands of members somewhat earlier than usual.

Mr. Siebold was appointed editor of the Year-Book for 1883.

The following gentlemen were elected to membership: Mr. J. Clower (Leamington); Mr. F. Hole (Mansfield); Mr. C. J. Mead (London); Mr. S. C. Nicholl (Belfast); Dr. F. Taylor (London); Mr. R. Berkley (Brisbane); Mr. B. Fawcett (Sydney); Mr. T. Ingham (Rockhampton); Mr. O. J. Kempthorne (Dunedin); Mr. E. Taylor (Brisbane).

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, December 14, Professor Attfield, F.R.S., President in the chair.

The following paper was read on—

THE PRESENT STATE OF ORIGINAL INVESTIGATION IN PHARMACY IN THIS COUNTRY.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society of Great Britain.

The title I have chosen for this paper will perhaps be understood to mean the examination for the first time of substances used in pharmacy, which never before have had the light of science thrown upon them from a chemical, histological or botanical standpoint.

But as I am addressing gentlemen of whom many have but recently commenced a course of study, and who therefore are not in a position to do this, who have, in fact, as yet to acquire the necessary knowledge and skill, it is obvious that another meaning must be sought in these words.

The true meaning of language becomes apparent only when the derivation of words is traced out. Now original is derived from *origo*, a beginning, and investigation from *in*, in or upon, and *vestigium*, a footstep. The idea, then, which seems to be conveyed by the word "investigation" in the first place was probably the following up or tracing a person or animal by the footsteps, and this meaning would naturally be afterwards applied to inanimate objects, and ultimately to abstract ideas. As applied to pharmacy, it would also signify the following of footsteps, and the word "original" would imply that this following must have a beginning with the one who undertakes it.

Having, then, the opportunity of observing footsteps, numerous and varied, imprinted on the many divergent ways which lead to and from the home of pharmacy in this country, I will endeavour to direct you along the right path and to advise you in which footsteps to follow.

The majority of those who visit Bloomsbury Square appear to be travelling on the road which may be named prosperity in business; a lesser number along one which may be called a scientific career, and apparently very few indeed who have before them the long, straight, and apparently difficult road of a life successful in a moral sense.

Let us, then, in the first place, look around to observe traces left by those who have already made their mark, or left their imprint on the road before us, *as successful men of business*, and trace back as far as we can their previous footsteps, so that we may learn the secret of their prosperity. In one or two cases which have come under my own notice, it may be interesting to direct your attention to some of the footsteps which I have been able to trace back. In conversation with Mr. T. N. R. Morson, in the Museum of this Society, a few years ago, he informed me that he usually obtained from opium a much larger percentage of morphia than that mentioned in books, and it is well known his aconitine and creasote for many years defied competition. Now this implies scientific chemical knowledge in advance of his compeers. Such knowledge is obtained only by hard work and careful observation and experiment.

Mr. Peter Squire himself informed me that his success in life was largely due to the hard work and careful observation and experiment bestowed on the preparation of extracts of good quality at a time when it was almost an impossibility to obtain such an article in the trade. He had purchased some hemlock brought to the door by a countryman, and knowing that it would heat and spoil if kept until the next day, he sat up until three o'clock a.m., to transform it into extract. On examining it by daylight, he found it so superior in colour, odour and taste to any he had been able to purchase, that from that day forth he determined to make all his own extracts. These, exposed on his counter, attracted the attention of the Royal Physician, so that it shortly after became true of him, "He that is diligent in business shall stand before kings."

Those who have read the 'Progress of Pharmacy" will remember that Thomas Herring, of the firm of Herrings and Co., was the first to introduce vegetable powders of good quality ground on his own premises.

I need only recall the names of others, such as Howard and Huskisson, to remind you that scientific knowledge and manipulative skill have a great deal to do with success in business.

The reputation of most of the celebrated firms, both wholesale and retail, whose names are inseparably connected with the history of pharmacy in this country, rest upon the same foundation.

We may next trace the footsteps of *scientific men* who have been connected with this Society. Take, for instance, Dr. Pereira. His work on materia medica remains unsurpassed at the present day as a monument of industry and thorough mastery of detail. He allowed no obstacle to stand in his way; whether a foreign language, crystallography, or polarization of light,—every subject connected with his work was thoroughly mastered. His mantle, so to speak, fell upon one of his favourite pupils, Daniel Hanbury. When 'Pharmacographia' appeared it was felt at once that a new era in the history of materia medica had begun; that here was a book which was not made with scissors and paste, into which no errors of preceding authors had been copied with unquestioning faith, but one in which no statement was made which had not been verified by the personal experiments of the authors; in fact that it was the outcome of the patient research of a lifetime.

Mr. Hanbury was in the habit of carrying with him wherever he went a note-book in which to copy memoranda derived from books, information given him by travellers, or the results obtained by his own experiments. These note-books were of quarto size, and carefully indexed, fifteen of them being filled during his lifetime; the sixteenth was left unfinished.

These I have recently had the privilege of examining with a view to extract remarks which might throw light on the specimens in the rich and interesting collection of materia medica subsequently presented to this Society by his brother, Mr. Thomas Hanbury. I have been struck on going through them by the pertinacity with which he followed up any clue, the unsparing and yet gentle hand with which he corrected errors, and the conscientious striving for accuracy and exact truth which characterized all his investigations. Thus his inquiry into the botanical source of liquid storax necessitated correspondence in Europe, Asia, and America, extending over a considerable time. Yet he would never accept a statement as fact unless he obtained corroborative evidence from an independent source, although in some cases he had to wait weeks, months, or even years for it. It is this "veracity" as Carlyle would have called it, this love of truth, which gives such a high value to 'Pharmacographia.' Every fact there stated is vouched for by the author's well-known character as an accurate scientific observer, this feature being as it were stamped upon every page.

Some of the entries in the first book show that when any new statement was made in the *Pharmaceutical Journal* he at once tested it by experiment, and recorded the result in his book. Others show that he examined carefully such chemicals as aconitine soon after they were bought. These experiments seem to have been carried on contemporaneously with his attendance at the lectures, and indicate that he was not content with merely reading and hearing, but as far as possible followed out the apostolic injunction to "prove all things and hold fast that which is good."

Our honoured Chairman, Professor Attfield, must indeed have traced with pleasure the footsteps of several of his pupils who have held the enviable position of Bell Scholars, and especially of the first one. No one could write such lucid and yet concise papers as those which appeared from Dr. Tilden's pen in the *Pharmaceutical Journal*, unless he had a clear conception of the facts in his own mind, such a conception, indeed, as could only have been acquired by the habit of doing thoroughly everything he took in hand.

But there are, I am happy to say, footsteps still more recent. I allude to Dr. Thresh. It must have required an indomitable determination and no small degree of courage to attack such a subject as capsicum; for so penetrating and irritating is the effect even of the crystals of capsaicin, that in moving it from one bottle to another with the greatest care severe coughing is sure to ensue. But it is this same faculty of perseverance and courage in overcoming difficulties that has enabled Dr. Thresh to attain the high scientific degree he now holds.

It is scarcely within the scope of my subject to allude here to those few who travel along the road of life with the aim of living a life successful in a moral sense. There have been and are those who have placed this aspiration first, and who have been none the less successful business men and have had no less a brilliant scientific career in consequence. But of the satisfaction which rewards the travellers on this road, none can judge but those who experience it.

Having, then, endeavoured to trace the secret of success from the "footprints in the sands of time," may we not reasonably conclude that the qualities with which it is necessary to start on an equally successful journey are the capability of working hard and systematically, of exercising a close observation, a wise scepticism, followed promptly by experiment and by a record of the results obtained; and to crown all, the invincible resolution to overcome all obstacles in the path entered upon?

Underlying all there must be the golden maxim, "Whatsoever thy hand findeth to do, do it with thy might," and a conviction of the truth of the motto, *Labor omnia vincit.* These qualities should have been formed during apprenticeship, so as to have developed into habits by the time that a course of scientific study has to be begun; they do, in fact, constitute what are commonly known by the name of business habits.

When these habits are once formed and applied to study, all difficulties vanish and success is morally certain.

Unfortunately it needs but little observation to see that all have not received this necessary training, but that some, on the contrary, have developed habits of indolence, procrastination, superficial observation, carelessness of detail, and want of earnestness; in fact, an almost entire absence of the qualities essential to manhood or self-mastery, on which success in life largely depends.

This is due no doubt in some measure to want of careful parental training, and in no less a degree perhaps to the absence of conscientious supervision on the part of the business employer.

It is the absence of business habits, which should have been formed during the period of apprenticeship, and not the acquisition of scientific knowledge, that makes bad assistants. It is the same cause which gives rise to so many failures at the examinations; in other words business habits have not been applied to the study of science.

To those who have not had the advantage of this kind of training I would especially point out that the way in which work is done is far more important than the work itself; that, just as muscular strength is the result of physical labour, so mental and moral strength are the result of intellectual and moral exercise. Just as surely as it is true that he that will not work, neither shall he eat (because he cannot), so is it the fact that valuable habits will not be formed without regular exercise of the intellectual faculties. The true balance of the mind, like the balance of the body necessary to skating or tricycling, can only be obtained by practice.

If business habits and manipulative skill have not been obtained during apprenticeship, they will have to be gained during the subsequent course of study. Let your studies be mapped out for each day during the whole course and then carried out systematically with all the thoroughness and earnestness of which you are capable, and with the determination to leave no difficulty unsolved, and to know not merely all that is in the Pharmacopœia, but everything that is likely to be met with in any branch of the business, so that you can conscientiously feel that wherever you may be engaged no more competent assistant or more thoroughly equipped man of business can be found. This thoroughness is absolutely essential to success in any career. This is as true of nations as of individuals; it was this feature developed, in the almost microscopical character of national education, that made all the difference between defeat and victory to the German people in the late Franco-Prussian war.

I shall probably be expected to make a few remarks concerning original investigation in pharmacy in the ordinary acceptation of the term, and these must be addressed more particularly to those who have already formed business habits, and having applied them to their subsequent course of study have passed their examinations with flying colours.

In glancing through the index of the *Pharmaceutical Journal,* I have been struck with the comparatively small number of papers by English authors on subjects connected with the business of a pharmaceutical chemist, and with the fact that the greatest number as well as the majority of the best and most thorough articles have been written by German, Russian or French chemists. This may arise from the fact that, on the continent, graduates in pharmacy are required to write a thesis on a subject as yet untouched. This, however, cannot be the only reason since the inaugural essays published in the *American Journal of Pharmacy* by intending graduates are almost entirely wanting in the thoroughness and completeness which characterize those produced on the European continent. Nor does it arise from lack of subjects. To take a few instances:—Is there no room for improvement in decoct. aloes co., and pil. aloes co., ext. calumbæ or liquor taraxaci? Are there none of the numerous species of Eucalyptus that will yield a more satisfactory kino than that at present in use, or is it impossible to prevent the gelatinization of the tincture and yet preserve its activity? Is the present formula for ipecacuanha wine the best that could be devised? Is not the relative activity of the two resins of jalap worthy of investigation? Is it impossible to devise more economical processes for the extraction of alkaloids and active principles? Are there no vermifuges used in other countries possessing the advantages and none of the disadvantages of santonin. Are the preparations of aconite as satisfactory as they might be? Preparations of eserine keep very badly and a readily soluble salt that will keep well is still a desideratum. The purity of olive oil and of essence of lemon is always questionable, and no good test for the purity of either has yet been made known. Exact information is wanting also concerning the relative value and purity of artificial chemicals, such as benzoic acid, salicylic acid, chinoline, etc., as compared with the natural products.

These are a few points which occur to me as an outsider. But there are innumerable ones which must occur in daily business which need investigation, and on which the mental powers might be sharpened like iron on a whetstone. The *eye trained to observe and the hand to experiment and the spirit of thoroughness* are all that are needed to take away this reproach to pharmacy in this country. If I may venture to illustrate my meaning by alluding to a member present, I would point out the admirable investigations by Mr. R. H. Parker of some crystals found in furniture-polish; these crystals might have been thrown on one side, and an example of a research carried out in a most thorough and business-like manner might have been lost. In this case the only reward seems at present to be in the feeling that his example may lead others to attain equally valuable habits, and that thus he may benefit humanity. But this is not always the case. There are many points to be met with in the ordinary work of a pharmacist which, if followed up by experiment, will as surely lead to success in business and in benefit to humanity at large as Watt's observation of the lifting of the kettle-lid and his experiments thereupon. Those who have formed the habits I have alluded to cannot help applying them in their daily lives, and many a fortune has sprung out of a simple investigation. It was the search after a method of making quinine artificially that led to the discovery of the aniline dyes. It was the examination of seaweed at

Worthing, by a former student of this Society, Mr. E. C. C. Stanford, that led to the establishment of one of the largest manufactories of iodine in this country.

If my remarks have been rightly understood they will indicate that unless the habits of observation and experiment are formed in early life, it is vain to hope for an increase in original investigations in pharmacy, and that success in business, in science and in life, is dependent upon the possession of certain sterling qualities, of which knowledge is merely the instrument. That there is room enough in pharmacy for those who will take the trouble to cultivate these, I entertain not the slightest doubt; they have commanded success before and always will. Let the pharmacist be a pharmacist and not a grocer, a perfumer, or a drysalter, and he will no longer have to compete with those trades to his disadvantage. The only points upon which you can lay claim to public consideration and to proper emolument rest on special knowledge and skill.

A discussion followed, in which the President, Secretary, Messrs. Alcock, Giles, Greenish and Parker took part.

A vote of thanks was passed to Mr. Holmes.

The Secretary then announced that the Executive Committee had appointed the following gentlemen to act as a Committee of Reporters for the ensuing session:

Pharmacology	Mr. H. G. Greenish.
Materia Medica	Mr. W. Elborne.
Botany	Mr. J. O. Braithwaite.
Physics	Mr. H. Allen.
Organic Chemistry	Mr. W. R. Dunstan.
Inorganic Chemistry	Mr. F. W. Short.
Analytical Chemistry	Mr. C. Thompson.

The Executive Committee had also drawn up the following constitution and rules for the administration of the Research Fund:—

1. The fund shall be called "The Research Fund of the School of Pharmacy Students' Association," and its object shall be to encourage research in pharmacy and allied subjects by the defrayment of expenses incurred by members in the investigation of subjects forming the bases of communications to the Association. The balance in the hands of the Association shall be applied for this purpose and the administration of the fund shall rest with the Executive Committee.

2. The maximum grant for one subject in any one year shall be £2.

3. No grant shall be made for the payment of personal expenses.

4. Any member desirous of obtaining a grant from the fund shall submit a written statement of his application to the Secretary, specifying the nature of the investigation, the probable length of time which will be occupied by the same, and the amount of the grant applied for; also furnishing any other information which is likely to be of assistance to the Committee in considering the application. The Secretary shall then bring the application before the Executive Committee at its next meeting.

5. Members holding grants from the fund shall once a year forward to the Secretary a statement of the progress made with the investigation and of the expenses incurred since the grant was made. The Secretary shall then bring the statement before the Executive Committee, who shall report the same to the Association at the Annual Meeting.

6. When a grant is made to more than one member, the first member named shall be considered the secretary, unless a specific nomination is made, and he will be the only person entitled to receive the payment of the grant from the Treasurer.

Parliamentary and Law Proceedings.

Defective Measures.

At the Clerkenwell Police Court, on Thursday, December 14, Mr. William Davies, chemist, of 292, Gray's Inn Road, was summoned for having, on December 4, had in his possession three glass measures which were not stamped according to statute, one of them being 10 per cent. over measure.

The Defendant, in answer to Mr. Barstow, said he used the measures for poisonous drugs, but he knew his business and it made no difference whether the measures were stamped or not. He did not sell laudanum or any such drugs to the public in poisonous doses. He knew how to make the exact quantities with the glasses complained of. He had, however, had them replaced by stamped measures.

Mr. Barstow said that the defendant could not seriously allege that it made no difference whether glasses in which he measured poisonous drugs were right or wrong, and ordered him to pay a fine of 20*s.*—*Daily Chronicle.*

Alleged Acceleration of Death by an Opiate.

On Friday, December 15, Dr. Danford Thomas opened an inquiry, at the Islington Coroner's Court, on the body of Mary Wemhurst, aged 43.

Dr. George Brown, of Gibson Square, said that he was called to see the deceased by Mr. Burt, who stated that the deceased had taken a sleeping draught, and could not be awakened. He at once went to the house and found the deceased dead. He was handed a prescription written by Dr. O'Connor, dated 1876, each dose of which contained a sixteenth part of a grain of opium, in addition to other drugs. He had made a *post-mortem* examination, and had no doubt that death had been directly produced by an overdose of opium. In her condition such a draught should never have been given. All the evidences were those of opium poisoning.

By the Coroner: The dose she took would probably cause sleep in a healthy person, but undoubtedly death in a person suffering as the deceased did.

Dr. Alexander Wynter Blyth, the Public Analyst for Marylebone, said that he agreed with the last witness, but would not like to say that the death had been actually caused by the narcotic. He had no doubt whatever as to the inadvisability of giving any narcotic to a lady suffering as the deceased did. He held that a chemist had no right whatever to prescribe for a patient.

Mr. William Armstrong, of No. 33, Liverpool Road, deposed that he was a chemist's assistant, in the employ of Mr. Wootton. He was in the habit of putting up prescriptions for Mrs. Wemhurst, and did so on Monday evening. That was the prescription of Dr. O'Connor. At nine the same night, a young lady and gentleman came to him for an opiate, and he gave them 6 minims of tincture of opium and 10 grains of bromide of potassium. It was measured in a minim glass, and witness told Mr. Wootton of it then and there. The dose was made up to 1½ ounce by adding water. There was no prescription brought from Mrs. Wemhurst.

The Jury returned a verdict of death from bronchitis, accelerated by an overdose of opium, and blamed the chemist's assistant for prescribing.

Alleged Infringement of Trade Rights.

In the Chancery Division of the High Court of Justice, on Friday, December 15, the case of Smith *v.* Surfleet was heard before Mr. Justice Chitty. The plaintiff is a pharmaceutical chemist carrying on business in the Walworth Road and formerly in the Brixton Road, London, and the defendant is a chemist carrying on business in the Brixton Road, having purchased the plaintiff's business there. The plaintiff has for upwards of thirty years prepared and sold "Smith's Dr. McCann's Diarrhœa Mixture" and "Tasteless Dandelion Pills," and he has been in the habit of enclosing the mixture in a buff-coloured wrapper and the pills in blue wrapper. He alleged that the defendant, who sold similar compounds, had used labels which were a fraudulent imitation. The plaintiff accordingly asked that the defendant might be restrained from continuing the use of the labels in question. The defendant denied that the labels were in any way an imitation of the plaintiff's and contended that even if they were he had a perfect right to use them as they formed part of the good-will of the plaintiff's business, in the Brixton Road, which had been sold to him. The defendant in order to make his labels distinctive had placed his name in large letters upon them and had also used other distinctive marks. In addition, he produced evidence to show that it was the custom of the trade to use blue wrappers for pills.

His Lordship, after comparing the two labels upon the mixture, held that the defendant's was not a fraudulent imitation of the plaintiff's, and with regard to the wrapper on the pills said that although there seemed to be some similarity between the two he could not in the present conflicting state of the evidence decide the matter upon interlocutory motion, and therefore he must decline to make any order upon the motion. The question as to what passed to the defendant by the sale of the good-will of the Brixton business was a matter which could very well be decided at the hearing of the action.

Obituary.

SAMUEL URWICK JONES.

Mr. Samuel Urwick Jones, to whose death reference was made last week, began business as a chemist and druggist on his own account in Bath, about the year 1840. From that city he removed four years afterwards to Leamington, where he carried on business successfully for thirty years. In 1845 he joined the Pharmaceutical Society, and for many years filled the office of Local Secretary to the Society in the Leamington district. When the Conference of chemists and druggists, held at Birmingham in July, 1876, decided upon the formation of a Chemists and Druggists' Trade Association, Mr. Jones was unanimously requested to become its first President, and he continued in that office until May, 1879. In Leamington, Mr. Jones's business ability and sound judgment were much appreciated; he was twice chosen to be Chairman of the Local Board of Health, and he besides served his townsmen in several other offices. A few months since he removed to Budleigh Salterton, where he died on the 9th inst.

Notice has also been received of the death of the following:—

On the 24th of October, Mr. Albert Edward Newbery, Chemist and Druggist, Ramsgate. Aged 33 years.

On the 20th of November, Mr. William Fox, Chemist and Druggist, Pontefract. Aged 79 years.

On the 30th of November, Mr. Alexander Gorrie, Chemist and Druggist, Kirkcaldy. Aged 43 years.

Subacet.—Add half an ounce of mucilage to the water before the quinine is mixed with it.

J. B. A.—Yes; the formula is borrowed from the German Pharmacopœia, where the liquorice is directed to be decorticated.

"*Pertinctus.*"—The three simple tinctures are not official; but if a prescription ordering one of them was of recent date, it would be generally assumed that the compound and official tincture was intended by the writer.

D. M. P.—Tinct. digitalis gives a slight opacity and a little colour to the mixture. A dark flocculent deposit will form after twelve hours' standing.

D. G.—A separation of matter, having the colour of yellow bark, takes place in this mixture and is gradually deposited. The quantity will vary with different samples of ext. cinch. flav. liq. used.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Election of Annuitants.

Sir,—The recent election of annuitants presents such an anomalous and inexplicable result, that I think the attention of the subscribers to the Benevolent Fund should be directed thereto.

In nearly every benevolent society, it is a fundamental axiom that those who have subscribed to its funds should have the first claim to its benefit, whenever adverse circumstances unfortunately render it necessary for them to participate therein, and provided they are found deserving.

On a reference to the *Pharmaceutical Journal* of December 9, at the bottom of page 471, will be found the following:—"The Secretary reported that only one of the thirty-six annuitants then on the list had ever subscribed to the Fund," therefore, voters at previous elections had little opportunity to elect other than non-subscribers; but at the recent election, out of nine candidates no less than five had been subscribers, and in virtue of such subscriptions were entitled to be credited with an aggregate of 375 votes. Naturally one would think these five were more entitled to our sympathy from their having been "one of us," yet of the three unsuccessful candidates, two had been subscribers for many years, while a third subscriber was only elected by the addition of votes obtained at a previous election, when the preference was again given to non-subscribers.

Last week the total number of votes polled by the five subscribers was only 2088 more than the votes polled by one non-subscriber, a result certainly not in accordance with what might have been expected.

Now a few words to the voters on another subject. On the last polling day, for nearly five hours twenty gentlemen were engaged in examining the voting papers and counting the votes. These gentlemen found their work unnecessarily increased by the great difficulty many of the voters experienced in following the very plain and explicit directions which were given to enable them to fill up their papers correctly, non-compliance with which caused the rejection of many of the papers and the loss of a large number of votes. This occurs every year, both at the election of annuitants and at the election of the Council.

I will give a few illustrations. Printed on the voting paper is a column headed "Insert votes here in figures," an instruction which one would think was plain enough for anyone to comply with; yet some *write* the number of their votes in words, others put *crosses*, others again put the number in the wrong columns, and even to the left of the list of names. Some only give away a portion of their votes; others are much more liberal, for having, say, only two votes to dispose of, they give votes to each of four, five, and even six candidates; one gentleman with seven votes, kindly distributed twenty-eight votes as follows:—1, 2, 3, 4, 5, 6, 7, whilst another with ten votes gave one to each of eight candidates and two to the ninth, thus he nullified all his votes except one, but caused the scrutineers to make twenty-seven separate entries. Finally no less than fifty-four voters neglected to sign the voting paper with their name and address and 2186 omitted sending in their papers at all.

In conclusion, I may say I have no especial interest in either of the candidates but have been

A Scrutineer for several Years.

W. F. G.—See before, pp. 90, 156, and 510.

J. Hickling.—(1) Fresenius's 'Quantitative Chemical Analysis' (Churchill's). (2) Distil the ammonia into pure water.

X. Y. Z.—The article you refer to is a proprietary arsenical preparation; the London agents for it are Messrs. Schacht and Co., Finsbury Pavement.

Y. L.—The mixture should be perfectly clear and colourless. The precipitate can be accounted for only on the supposition that the liq. ammon. acet. was so alkaline as to neutralize the acid in which the quinine had been dissolved.

Communications, Letters, etc., have been received from Johnson, Hunn, Barnard, Clayton, Finch, Wells, Garry, Proctor, C. E., Ajax, Nemo.

"THE MONTH."

The recent work on 'The Colours of Flowers,' by Mr. Grant Allen, could hardly fail, from the elegance and clearness of his style, to attract considerable attention; but the position he assumes of taking useful theories as established truths naturally gives rise to scientific criticism. The editor of the *Gardeners' Chronicle* points out that the great mass of the facts of evolution militate against the acceptance of Mr. Allen's theory that petals are merely flattened out filaments and are developed subsequently to the stamens. Specialization and adaptation do not necessarily indicate lateness of origin in point of time, but are, in fact, the outcome of arrest of development, of a check to progress rather than an advance. Mr. Allen's theory that yellow was the colour of the earliest flowers, and that then in order of time came the white, red, purple and blue flowers, the last-named being the most highly organized, has no better basis than his theory concerning the origin of the petals. In the genus *Linum*, for instance, in which yellow, white, red and blue flowers occur, the blue-flowered species can scarcely be said to be more highly organized than the yellow.

Mr. Meehan, in the 'Proceedings of the Philadelphia Academy of Natural Sciences' (*Gardeners' Chronicle*, Nov. 25, p. 683), makes some interesting observations concerning *Acer dasycarpum*. During a period of fourteen years he found that a female tree would sometimes change the sex and bear only male flowers; also that this change resulted from a greater check to the vegetative force than that required to produce female flowers, and therefore signified exhaustion of vital power. Pursuing his researches he found that although at the time of the fall of the leaf there is little to distinguish a flower bud from a leaf bud, yet the former grows at a comparatively low temperature at which the leaf bud remains stationary, also that male flowers expand at a temperature at which the female flowers remain quiescent. Probably it is for this reason that some trees, like birch, which in countries where vegetation is suddenly developed during the short summer produce both kinds of flowers at the same time, rarely ripen fruit in more temperate climates because the male flowers are likely to be expanded long before the females. It is somewhat remarkable that the trees of *Acer dasycarpum* bearing male flowers were never observed by Mr. Meehan to change their sex to female. These observations may perhaps lead to some practical means of improving the culture of nutmegs, of which, owing to the uncertain sexual character of the trees, the crop is very precarious.

At the meeting of the Royal Horticultural Society, on December 12 (*Garden*, Dec. 16, p. 542), the Rev. G. Henslow gave a lecture illustrating the power of plants to render themselves attractive, independently of, or in addition to the corolla, in proof of which he exhibited various species of *Salvia, Poinsettia, Epiphyllum, Cornus* and *Euphorbia jacquinæfolia*, etc.

An interesting account of a spectroscopic study of chlorophyll, by Messrs. W. J. Russell and Lapaiche, will be found in *Nature* (Oct. 26, p. 637). These observers find that a mixture of 2 parts of alcohol and 1 of ether will extract from green leaves a substance which they regard as normal chlorophyll. The green substance so obtained is a body which very easily undergoes two modifications. Since these are produced by acids, heat and metallic solutions, they are regarded as the result of a molecular change, and not of a chemical one. Weak organic acids such as tartaric, oxalic and citric, cause a change in the spectrum, but this change does not go beyond a certain point. When strong acids, such as sulphuric, nitric or strong hydrochloric acid, are used a further change in the spectrum is produced. The modification produced by vegetable acids is distinguished by the authors as α-chlorophyll, and that produced by strong acids as β-chlorophyll. The authors state also that the spectrum remains unchanged after the yellow body, described by Conrad, has been extracted by benzene, and that hence this substance cannot be considered as a constituent of their normal chlorophyll. Some leaves, such as those of the vine, yield the α-chlorophyll to the alcohol and ether mixture, but this has been found to occur when the leaves are acid through being bruised; if carbonate of calcium or sodium be added, the normal chlorophyll only is detected by the spectroscope. The change from normal to α-chlorophyll takes place naturally in leaves after being gathered, whether in light or darkness. In some leaves, such as those of rhubarb, the chlorophyll evidently undergoes decomposition, the extract becoming of a tolerably bright red colour, and no longer giving the chlorophyll bands. Neither this red substance nor the majority of colouring matters in flowers give visible spectra. When to a solution of normal chlorophyll hydrochloric acid is added it has apparently considerable power of destroying certain bodies which absorb the blue ray, since after its addition blue rays come through where before it was quite dark. When a strong chlorophyll solution is very considerably diluted a striking change of tint from a dark to a light yellowish-green takes place; to this fact, viz., the greater or smaller amount of chlorophyll in a given area, is probably due the difference in shade between young and old leaves. The action of alkalies on chlorophyll produces a modification in which only the dominant band remains visible in the spectrum. This one-banded chlorophyll is much more permanent than the α and β modifications, solutions exposed to the sunlight for three months remaining unchanged in colour and constitution. This modification is also formed when a small quantity of sulphate of copper is added to an alcoholic solution of normal chlorophyll.

It is not unusual to see violets and primroses and other spring flowers blossoming in the mild weather of late autumn, especially if they have been prevented from flowering by having been transplanted at the period of flowering. From some interesting facts stated by Dr. Brandis, in the *Indian Forester* for July, 1882 (communicated by Mr. W. T. Thiselton Dyer to *Nature*, November 23, 1882), it would appear that similarity of season has more to do than the time of year with the time of flowering. Dr. Brandis observed that, from 1845 to 1850, *Acacia dealbata*, one of the Australian wattle trees, flowered in India in October; in 1860, it was observed to flower in September; in 1870, in August; in 1878, in July; and in 1882, in June. In Australia the tree flowers in October, which is the spring month there. In Ootacamund, the corresponding month is June. The tree has thus gradually worked back its time of flowering from October to June, from Indian autumn to Indian spring, during a period of forty years. *Acacia decurrens*, in the same way, appears to have flowered, during May to July, at Kew, in 1790, but now blossoms in February.

At a meeting of the Royal Horticultural Society, on November 16 (*Nature*, November 30, p. 119), some singular monstrosities of flowers were exhibited by the Rev. G. Henslow. One of these was a specimen of Solomon's seal (*Polygonatum officinale*) in which the normal flowers were developed as leafy racemes; another was a violet in which the sepals bore abortive ovules on the margins and midribs. Mr. Henslow also exhibited some drawings illustrating various stages of ovuliferous stamens in the alpine poppy.

In the same Journal Mr. A. M. Stapley, of Owens College, describes the fertilization of *Veronica officinalis*. According to his observations a fly trying to alight on the flower is obliged to clasp the two divergent stamens on account of the vertical position of the flower; this brings the two anthers close together below the pistil, where the front of the fly's head becomes dusted with pollen. The stigma, when mature, droops a little (the flower is proterandrous), so that it receives the pollen deposited on the insect's head. In another species, *V. hederæfolia*, in which the corolla is not so easily detached, the stamens and pistil are close together and self-fertilization appears to be the rule.

Dr. T. F. Hanausek, of Krem, describes (*Zeits. d. allg. öst. Apot.-Vereins*, xx., 465) a new kind of ginger, said to be of Japanese origin, in which the starch grains differ very considerably in appearance from those found in *Zingiber officinale*. This ginger is met with in commerce in the form of compressed pieces, with the flat side pared as if the root had been sliced longitudinally. The colour of the ginger is a light slaty grey or dirty greyish white. At the edge a grey corky bark remains, but sometimes this is absent. The freshly cut surface shows numerous yellow streaks or dots, indicating the vascular bundles, consisting chiefly of scalariform reticulated vessels, and small brown points which are resin cells. The taste and smell resemble those of ginger but are weaker. The starch grains are broadly oval or elliptical, without the point which forms such a marked feature in ordinary ginger, and the concentric rings and hilum are well marked and easily seen. Mixed with these are numerous compound starch grains, with their component parts sometimes separated; these somewhat resemble those of the nutmeg. Nothing resembling these starch grains has ever been found by Dr. Hanausek in Bengal, Jamaica or Africa ginger, and hence he thinks that Japanese ginger mnst be produced by another species.

In a note read at the Linnean Society, on Nov. 16, by Mr. W. T. Thiselton Dyer "On the Origin of *Cassia lignea*," he remarks that the want of exact evidence as to the botanical source of this spice is now cleared up. Mr. C. Ford, Superintendent of the Botanical Department at Hong Kong, has made an expedition to the districts in which the cassia tree is cultivated, and has brought back herbarium specimens in flower, which prove to be those of *Cinnamomum Cassia*. So far as Mr. Ford could ascertain, cassia buds and leaves as well as barks are obtained from this tree only. The leaves are sent to Canton for the distillation of oil of cassia, and the buds are gathered when about one-eighth grown. The thick bark, so much valued by the Chinese, is obtained from trees reserved for seedbearing, when such can conveniently be spared for the purpose.

Some interesting results concerning the germination of seeds have been obtained by Dr. Liebenberg, and published in the *Journal of the Vienna Academy of Sciences* (*Garden*, Dec. 2, p. 480). He finds that many plants require the presence of lime in the soil during the germination process, and that the seedlings die if it is not present. On the other hand, there are some plants which germinate freely without it. The cinchona trees are known not to require lime, but the frequent failure in Jamaica to raise seedlings, may, perhaps, be due to the soil not containing the other ingredients necessary to their healthy growth.

Several valuable memoirs have recently been presented to the Academy of Sciences upon points connected with the chemistry of vegetation. M. Leplay (*Comptes Rendus*, xcv., 1133) has given the conclusions he has drawn from the analysis of the different organs of maize at three different periods of its vegetation. He has found that at the end of the first period of vegetation (1st July) potash and lime are present in all parts of growing maize, in the soluble state in combination with vegetable acids in the juices, and also in the insoluble state in the tissues. From this time, however, no more potash appears to be taken up from the soil; but that already present in the plant in soluble organic combination undergoes an extraordinary migration from one part of the plant to another. During the second period the growing ear is supplied with potash entirely at the expense of the stalks, which lose as much as 39 per cent. of the quantity present in them at the end of the first period; but in the third period the proportion of this base in the stalks is restored to the extent of about 25 per cent., the reserve drawn upon now having previously been stored up in the leaves. The quantity of potash in the roots is not affected or only very slightly diminished during these movements. On the other hand whilst the total quantity of potash in the plant remains stationary, the amount of lime in organic combination in the different parts of it is increased during the second and third periods (July 1st to September 1st) by about 140 per cent., the first augmentation taking place in the stalks, from whence as the plant approaches maturity it passes in considerable quantity into the ear and especially into the seeds. During the formation of the reproductive organs the potash in organic combination with the tissues is gradually diminished and disappears entirely from the stalks, being replaced by lime. The vegetable acids combined with the potash and lime are considered to have their origin in the carbonic acid taken up by the plant from the soil in the form of carbonate or dissolved in water. According to M. Leplay (*Comptes Rendus*, xcv., p. 895) this transformation is effected by (1) reduction of carbonic acid or elimination of oxygen; (2) condensation or assimilation of carbon; (3) assimilation of the elements of water in the same proportions as they exist in water. Equations representing the manner in which these changes are supposed to take place are given in the paper.

Another memoir, by M. Leplay (*Comptes Rendus*, Nov. 27), throws some light on the relations between the presence of starch and sugar in plants. He found that sugar occurs in the leaves and accumulates in the stem until the moment of the formation of starch in the seeds. It then passes first into the inflorescence to support it, and subsequently into the seeds themselves, where it is replaced by starch. The function of the sugar would appear, therefore, to be that of furnishing the seeds with the elements of starch.

At a meeting of the Linnean Society on November 2, Mr. W. E. Armit, of Queensland, contributed a paper on "The Native Medicinal Plants of North-West Australia." Among these he enumerated *Erythræa australis*, used as a tonic in febrile complaints; *Careya arborea*, a myrtaceous plant, the leaves of which are used as an application to ulcers; *Grewia polygama*, a tiliaceous plant, said by the author to be very useful in dysentery, he having "never known it to fail in any case, however serious;" *Petalostigma quadriloculare*, a euphorbiaceous plant, the bark of which is used as a tonic in fevers in doses of 10 grs. three times a day; *Datura australis* and *Euphorbia pilulifera*, remedies for asthma. Of the two last, the former is said to be fatal to horses and cattle, the latter has recently been introduced into this country, and appears to be valuable as a remedy for bronchitis as well as asthma.

Dr. A. F. Currier, of New York, has published in the *American Journal of Medical Sciences* (October, 1882) an article on the use of *Eucalyptus Globulus* (*Med. Times and Gaz.*, Dec. 2, p. 666). The oil is said to diminish the action of the heart and the blood pressure, and to act as a stimulant, astringent and antiseptic on mucous membranes. It is also said to destroy entirely the unpleasant smell of iodoform. Dr. Currier speaks highly of its use as a disinfectant and antiseptic in chronic ovaritis and tumours of the breast in removing the fœtor of the discharges and relieving the pain and discomfort.

Doubts have from time to time been expressed as to the solubility of dialysed iron in the juices of the stomach. Dr. Prosser James, in the *Medical Times and Gazette* (December 2, p. 660), remarks "that the metal is really taken into the blood is not to be doubted," and that in five cases of anæmia with diminished corpuscles, as determined by the hæmatocytometer the globules increased rapidly under the use of 90 drops daily, and general improvement went on *pari passu* with this increase.

In the *Therapeutical Gazette* (p. 401), J. M. Blackerly speaks very highly of *Chionanthus virginica* as a remedy in chronic cases of enlarged and indurated liver. He states that in his hands it has proved superior to iridin, leptandrin, euonymin, podophyllin, or phosphate of sodium.

Dr. C. H. Ralfe, in a paper read before the Royal Medical and Chirurgical Society (*Brit. Med. Journ.*, p. 1095), gave an account of the results obtained by the use of nitrite of sodium in epilepsy. This remedy is stated by him to possess the advantage over nitrite of amyl and nitroglycerine, of more slowly producing effects which are more permanent. The author remarked that it is necessary to ascertain the purity of the drug, as some samples contained an admixture of nitrate. The dose that is usually given appears to be from 10 to 20 grains. Judging from the discussion which followed the reading of the paper, the new remedy does not seem likely to be received with much favour, and its usefulness would appear to be confined to a certain number of cases in which bromide of potassium is of little service and in which there is a state of low vascular tension.

A remarkable case in which the administration of pilocarpine cured a severe attack of pleurisy is described in the *Practitioner* for December (p. 453). A puncture and three blisters having failed to effectually reduce the pleuritic effusion, a hypodermic injection of two centigrams of nitrate of pilocarpine caused such a violent perspiration and salivation that the patient was entirely relieved in an hour and a quarter.

Some excellent results appear to have been obtained by Dr. Seifert in the treatment of diphtheria by chinoline (*Practitioner*, December, p. 447, from *Berl. klein. Woch.*). Dr. Seifert prefers the pure chinoline to the tartrates, on account of the bad taste and smell of the latter. The chinoline is prescribed in a 5 per cent. solution for painting the fauces, the solvent being a mixture of equal parts of alcohol and water. A new brush of hair or cotton wool is used each time, the old ones being burned. The stinging pain at first produced is succeeded by a sense of comfort and by the ability to swallow, if the throat is washed out with cold water after being painted. The following formula is the one which is prescribed for a gargle:—Pure chinoline 1 gram, distilled water 500 grams, sp. vini rect. 50 grams, and menth. pip. gtt. ij.

Dr. P. Miall (*British Medical Journal*, December 10, p. 1206) recommends the use of sulphocarbolate of sodium in the vomiting of pregnancy, in doses of 7 grains in half an ounce of water.

A French correspondent of the *Medical Press and Circular* (December 6, p. 485) speaks very highly of the local application of chlorate of potash in cancroid affections, such as epithelioma, lupus, etc. He states that a medical man has just treated, in a very effectual and rapid manner, a case of the latter by the application of the salt in powder. The cure was effected in a month although the disease was of five years' standing, and no other treatment was used, although previously many other things were tried.

In an interesting note on "epidermic medication" (*Ephemeris*, p. 152), Dr. Squibb calls attention to the facilities which the oleates dissolved in oleic acid present for this form of treatment and the desirability of more systematic experiment as to their mode of action. He points out that an oleate of glycerine,—olive oil, for example,—when used as a solvent or vehicle for an active medicine, is absorbed or passes through the skin very slowly and imperfectly; but that when the glycerine radical is replaced by a basic medicinal agent and the resulting soap is dissolved in excess of oleic acid, the whole passes rapidly through the skin and the local effect is correspondingly prompt and certain. As illustrating the affinity which oleic acid appears to have for the skin, he states that wood, porcelain and cloth coated with oils, glycerine or oleic acid retain a greasy appearance indefinitely, but that if the skin be similarly treated the oleic acid disappears much more quickly than oils or glycerine. This observation appears to have some bearing upon a recommendation, recently made, to use the definite oleates with heavy petroleum oil for a vehicle.

In connection with this subject it may be mentioned that in consequence of a failure to effect solution of a specimen of Duquesnel's "aconitine cristallisée" in oleic acid, and from the fact that he found it to be soluble in water, Dr. Squibb was induced to examine it more closely. Some of the crystals were dissolved in water and the solution was precipitated with slight excess of normal solution of sodium; the precipitate when carefully washed and dried at about 44° C. weighed only 80·7 per cent. of the weight of crystals used. The mother liquor, tested physiologically, gave no indications of aconitine, but contained nitric acid equal to about another 8 per cent., making together 88·7 per cent. The other 11·3 per cent. was not accounted for. Dr. Squibb is therefore of opinion that "Duquesnel's crystallized aconitine is not what it purports to be, but is a nitrate of aconitine containing not more than 80·7 per cent. of the hydrated alkaloid."

At a recent meeting of the Berlin Pharmaceutical Association, Dr. Carl Schacht called attention to some specimens of formamide of mercury, a new mercurial preparation recommended by Dr. Liebreich for use in subcutaneous injections (*Pharm. Zeitung*, December 16, p. 764). Formamide is a colourless liquid, boiling at about 195° C., which is a product of the reaction of the ethylic ether of formic acid upon ammonia; it is neutral when pure, but easily becomes acid, and it can only be distilled without decomposition in a vacuum. When a dilute solution of formamide is heated in a water-bath with precipitated mercuric oxide a clear colourless solution of formamide of mercury is obtained, in which sodium hydrate causes no precipitate, and which does not produce a precipitate in a solution of albumen. A solution for subcutaneous use, each cubic centimetre of which represents one centigram of mercury, is prepared by gradually adding 10 grams of formamide to 10 to 13 grams of freshly precipitated well-washed mercuric oxide, gently heated with some water in a water-bath, and as soon as solution takes place, filtering the colourless liquid into a litre flask and filling this up with distilled water. The solution of formamide of mercury keeps well in brown glass and is therefore dispensed in bottles of that colour.

According to the *Sanitary Engineer* (December 14, p. 31) the distilled extract of hamamelis is chiefly prepared in the States of Massachusetts, Connecticut, and New York. For this purpose the small twigs of the witch hazel are collected, preferably in the fall, when the leaves are off, and sold by the farmers to the distillers. Some of the stills employed hold more than a ton of these twigs, together with sufficient water to cover them. Steam heat is used, and from a ton of twigs fifty to eighty gallons of distillate is produced, to which 5 to 10 per cent. of alcohol is added to prevent change. The composition of the volatile substances thus separated has not yet been determined. There remains in the still a dark-coloured very astringent liquid, which is said to be available as a source of tannic acid. The leaves and not the twigs of hamamelis have been made official in the new edition of the United States Pharmacopœia, and the single official preparation is a fluid extract made by percolation with a mixture of alcohol and water.

M. Pasteur has communicated to the Academy of Sciences some interesting results of an investigation he has carried out together with M. Thuiller in connection with a serious epidemic of *rouget* or pneumo-enteritis among pigs in Bolène (*Comptes Rendus*, xcv., 1120). These investigators have arrived at the conclusion that the disease is the product of a special microbe, of such tenuity as to be easily overlooked, which can be readily cultivated outside the animal. In appearance this microbe approaches most nearly to that to which the "chicken cholera" is attributed, but it differs essentially in its physiological properties, since it is without action upon fowls, whilst it is fatal to rabbits and sheep. The inoculation of pigs with an almost inappreciable quantity of the microbe is promptly followed by the appearance of the disease, followed by death. The most important statement is that animals inoculated by a benign modification of the microbe, resulting from suitable cultivation, are not liable to a fatal attack of the disease.

The synthesis of uric acid, which foiled the best efforts of Wöhler and Liebig, has just been effected by Dr. Johann Horbaczewski, of Vienna (*Monatshefte*, iii., 796). It was known that when uric acid is treated with hydriodic acid it splits up into glycocoll, ammonia and carbonic acid. Dr. Horbaczewski has succeeded in reversing this process. Pure glycocoll was finely powdered with ten times its weight of urea (the diamide of carbonic acid), and heated rapidly in a retort on a metal-bath to a temperature of 200° to 230° C., until the liquid, at first perfectly clear and colourless, became yellow and turbid. After cooling the fused mass was dissolved in dilute potash solution, and the resulting clear reddish-yellow solution, after supersaturating it with ammonium chloride, was precipitated with a mixture of ammoniacal silver solution and magnesia mixture. The precipitate was washed with dilute ammonia, and decomposed with potassium sulphide, the silver sulphide filtered off and the filtrate acidulated with hydrochloric acid. Upon concentrating it in a water-bath there was a separation of uric acid, which after purification was obtained as a yellowish crystalline powder, presenting all the characters and having the elementary composition of that body.

Difficulty has been experienced by some experimenters in obtaining the alkaline potassium permanganate solution required in the analysis of water by the ammonia process free from ammonia. Mr. J. Stapleton (*Chemical News*, December 22, p. 284) is decidedly of opinion that the chief source of the ammonia evolved during the preparation of this solution is nitrogenous matter which is present in most commercial specimens of potash and cannot be entirely removed, even by fusion at a low red heat. As a serviceable device for overcoming the difficulty he recommends first that in preparing the potash solution a "hard" water should be used, as the precipitate of calcium carbonate formed by the neutralization of carbonic dioxide in the water apparently carries down with it a large proportion of the organic matter. The solution is allowed to clear by subsidence during twenty-four hours, or if necessary filtered through asbestos. The potassium permanganate is dissolved in a separate quantity of hot distilled water, and the solution when cold is added to the potash solution and the mixture brought up to half the proper bulk with distilled water. The alkaline permanganate solution thus prepared requires further purification, as it is still capable of yielding a comparatively large quantity of ammonia. This is most conveniently effected by distillation, by means of a current of steam generated from non-ammoniacal water passed at atmospheric pressure through the liquid heated on a water-bath, the steam being led almost to the bottom of the retort. The distillate is nesslerized after a few c.c. have collected, and this is repeated until the solution contains not more than 0·005 milligram of ammonia per litre.

Mr. Shelford Bidwell has given an account before the Physical Society (November 25) of some experiments he made to test the theory of Dr. James Moser that the action of a selenium cell under light is due to the heat rays making a closer microphonic contact between the selenium and the metal electrodes by expanding the material. He has submitted selenium cells to dark heat rays and found their resistance to *rise*. Under light rays, however, their resistance fell. He, therefore, considers that Dr. Moser's theory is erroneous, and that the fall in resistance due to the light rays is the differential result of the rise due to heat and the fall due to the light. He also explained the fatigue of a selenium cell by use as caused by its increase of temperature. When the cell cools again the fatigue disappears.

An interesting account of a selenium photometer constructed by Messrs. Siemens and Halske, of Berlin, appears in the *Electrician* (December 16, p. 100). The idea embodied in the instrument is to get galvanometer readings from optically excited selenium. If experience should prove the reliability of this method of photometry, a valuable instrument will result, free from the "personal" uncertainty that attaches to the best of those in use at the present time.

Professors Ayrton and Perry, at a meeting of the Physical Society, held on December 9, read a paper "On the Resistance of the Voltaic Arc, or the Opposition Electromotive Forces set up." The electromotive force was measured by a voltmeter connected between the terminals of the lamp. Keeping the width of arc constant the electromotive force was found to diminish as the current increased. Keeping the current constant the electromotive force increased rapidly at first with an increasing width of arc, and afterwards more slowly. The authors gave a curve representing the change. About 80 volts are required to produce an arc of $\frac{1}{3}$rd of an inch. For further increase of arc electromotive force is therefore proportional to increase of length of arc.

Professors Ayrton and Perry also read a paper on "The Relative Intensities of the Magnetic Field produced by Electromagnets when the Current, Iron Core, and Length of Wire, etc., are Constant, but the Wire differently distributed." In (*a*) case the wire was wound uniformly from end to end; in (*b*) case it was wound from the middle to one end; in (*c*) case it was wound only at both ends; in (*d*) case it was wound only at one end. The field was measured along a line running through the axis of the poles beyond the magnet. Of the above plans, (*a*) gave the strongest field, except at short distances, when (*b*) was best.

ATOMS AND MOLECULES.*

BY BARNARD S. PROCTOR.

(*Concluded from page* 510.)

Chemical action is probably the influence or effect of the force exerted by molecules of one nature upon the motions of molecules of a different nature, and having different kinds of movement; the resulting motion determining the nature of the resulting compound, and the action taking place when the differing molecules come in contact. Or, if we accept the current theory, that the spaces between the atoms in solid bodies is large in comparison to the size of the atoms, instead of saying when the atoms come in contact, we must say when the ethereal atmospheres which surround them, come in contact. The idea that combination is the result of a harmony of some of these molecular movements is supported by the fact, that mechanical union takes place when powdered sulphur and chlorate of potash are powerfully compressed, and that chemical union takes place when they are powerfully rubbed together, the harmony of their molecular motions not being close enough to cause chemical union till the mechanical motion of friction assists, probably by altering one or both of the molecular motions, in such a way as to make them harmonize more closely, or by the mechanical disintegration of particles disturbing the polarities of the simple body, as chemical decomposition effects the nascent state of molecules liberated from chemical union. Friction is said to ignite a match by causing heat. Why not say it causes chemical action directly? We have no evidence that heat is produced *before* the chemical action, except the general experience that heat is one of the results of friction; and no evidence at all that the chemical action observed is due to the heat produced by the friction. We also know that light and electricity are results of friction, and though light is said to be one of the evidences, or consequences of a certain degree of heat, we cannot for a moment admit that light is invariably an evidence of heat or at least of that degree of heat which is said to be luminous, and when, by rubbing two quartz pebbles they shine in the dark, there is scarcely a possibility that any portion of the stone has been raised to the temperature of incandescence. Again if, instead of quartz, we take loaf sugar for the experiment, the sugar would not bear a temperature capable of producing light through the development of a luminous heat. Is it not more philosophical to say—*friction produces molecular motions of various degrees of intensity, which manifest themselves as heat, light, electricity, or chemical action?* In the friction light of quartz the yellow rays preponderate, while in the friction light of sugar the blue rays predominate, and both are no doubt accompanied by that lower grade of molecular motion which is known as non-luminous heat, and possibly also by electricity. The odour of the rubbed quartz may be the result of chemical action, though of what nature we have no evidence; it does not resemble ozone, though it might be a silica compound of a parallel nature.

Assuming that all bodies are endowed with molecular movements, and that their disposition to unite depends upon the harmony of those movements, we may naturally conclude that chemical change will be facilitated by change of temperature. It has been a common saying that heat was promotive of chemical change, but that is a one-sided statement, true only in relation to certain degrees of heat. If we were inhabitants of the sun or some other very hot place, we might note that chemical action was promoted by a reduction of temperature, and that few combinations could be produced without it. The fact is, while a low temperature usually adds to the stability of a compound, when once formed, a high heat prevents the majority of combinations taking place. The aqueous zone, that is the temperature between the freezing and boiling points of water, is the fertile land of chemical change; here combinations and decompositions in infinite variety take place.

It being admitted that the contact of one body will communicate to others of a different temperature, some of its molecular movements—that harmony of these movements causes combination, and want of harmony causes separation, it is not unnatural that the presence of one body may cause sympathetic vibration in another of the same temperature, but of different normal velocity of vibration, and thus bring about combination or decomposition in the manner long known as catalysis. The surface action of charcoal and spongy platinum effecting the union of H and O, is probably of this nature, and the reverse of the way heat effects the same; the latter increasing the molecular movements till they come into

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* Presidential Address delivered before the Newcastle-upon-Tyne Chemical Society.

harmony, the former retarding them till another harmony; a different chord produces a like result. The doctrine of catalysis is going out of favour. Fermentation was formerly spoken of as a catalytic process; then it was attributed to the force of vegetable life, but to call it vital force instead of catalytic is only moving the difficulty from one place to another, not getting rid of it. There is too much disposition to get difficulties put a little further away, just out of sight for the time being, and then neglecting them; such, for instance, as the recent endeavour to explain the process of digestion by saying that solution of the food in the stomach is principally due to the action of the living vibrios which always abound under these circumstances; and omitting to explain at the same time what aids the digestion in the stomachs of the vibrios. Perhaps they have no stomachs, so the difficulty of explaining their digestion disappears. There are, however, a number of cases in which the presence of one body affects the chemical action of another, where we have not the opportunity of hiding our ignorance under the statement that the phenomena are due to vital force. The decomposition of peroxide of hydrogen by oxide of silver. The more ready decomposition of chlorate of potash when mixed with oxide of manganese. The decomposition of chlorate of silver into chloride and oxygen by the action of nitric acid. The increased explosiveness of fire-damp in the presence of non-combustible dust, such as calcined magnesia. The solubility of platinum in nitric acid, if first alloyed with a large proportion of silver, and many other cases which will readily occur to you. In some of these there is probably no explanation more ready or more rational than the supposition that the contact of one body influences the motions of the others, and by this means influences their tendencies to combine or separate.

Johnstone Stoney, in the *Philosophical Magazine*, vol. xxxvi., p. 134, estimates the velocity of the oxygen molecules. The pressure of the gas on its containing vessel equals its weight multiplied by the velocity of its molecules. He goes on to say if oxygen be replaced by hydrogen, which has only $\frac{1}{16}$th of the weight under the same pressure, the velocity must be square 16, (16^2) times as great, that is 256 to 1, to account for the same pressure. Feeling conscious of my own deficiency in mathematical training and experience, it is with some hesitation that I criticise this latter statement. If the momentum of O equal 16, that of H at the same velocity equals 1. At 4 times the velocity it equals 4 for each impact; but at 4 times the velocity it makes 4 times the number of impacts in an equal time, and so brings up the resultant force to 16, the force being proportionate to the *square root* of the velocity instead of the square. This velocity is that of the molecule through space from one part of the vessel to another, however small the movement may be; but the internal molecular movements are more regular and minute, and more ready to act upon the waves of light, causing bright spectral lines or absorption lines. The regularity of the motion is shown by the *narrowness* of the spectrum lines; and the complexity of the motion, by the number of lines belonging to any gas, by how many different velocities of undulations are interfered with, and how sharply the interference is limited. He quotes Maxwell to the effect that the free path of a molecule of air equals 7 "eighth metres." That is, a molecule of air between its collisions, moves on the average $\frac{7}{10^8}$ (7—one hundred-millionths) of a metre, that is $\frac{1}{8}$th of the wave length of the ray D.

The molecule is deflected 7×10^9 (7 thousand million times) in a second, and each free path lasts $\frac{14}{10^{11}}$ (14 thousand millionths) of a second. This is 50,000 times the double vibration of a red ray, and 100,000 times the double vibration of a violet ray. All the molecular motions affecting light must, Stoney says, vary in velocity only between these limits.

Clausius estimates that the mean distance between the molecules of a gas equal about $\frac{1}{60}$ of the length of their free path. Stoney concludes from Maxwell's experiments that the normal distance is probably about $\frac{1}{10^9}$ (1 thousand millionth of a) metre, consequently there are about 10^{18} (a trillion) molecules in a cubic mm. of gas. These statements and such as these may be regarded as knowledge in the nascent state, knowledge which scarcely yet exists, but which is to be. We have been taught that heat is a great promoter of chemical change, but the greater part of the chemical processes with which we are acquainted can only take place at moderate temperatures, that is between the freezing and the boiling points of water. The vital zone of temperature bears a luxurious growth of chemicals. The zone higher is characterized by decomposition and dissociation, the lower zone by stability of compounds, and the formation of some which are easily decomposed by heat.

In physical conditions also the middle or liquid state is the zone of chemical activity; it is here that molecular movements are sufficiently active to facilitate change, and yet kept within the bounds in which the motions of heterogeneous atoms have a probable chance of harmonizing.

Hardness is a physical obstacle to the act of combination of solids, elasticity equally so in the case of gases, though neither of these obstacles are insuperable. Increased temperature (and consequent increased elasticity) facilitates the combination of some gases, probably by bringing their molecular movements into harmony with one another. If an equal number of vibrations per second be added to the motions of two inharmonious musical strings, a point may be reached at which they harmonize. If one string vibrates forty-five times, while the other vibrates ninety-five, they will produce a discord, but if we add five vibrations to each, making fifty and a hundred respectively, the one will sound the octave above the other. An analogous action may enable the movements of two uncombined gases to become so harmonious as to result in their union. The compound motion resulting would then be constant in its character, unless the action of heat be increased so much that dissociation ensues, which would take place if the motion of one of the atoms was acted on by a rythmical heat vibration, which would so far enlarge its orbit as to set it flying off from its companion atom.

The harmony of vibration may be brought about by other agencies than heat or light, such as pressure: increased pressure tending to combine sulphur and copper; reduced pressure facilitating the union of oxygen and phosphorus.

The molecular motion of a compound is probably the result of the composition of the forces of the molecular movements of its elements, but it is not probable that it is so in the simple mechanical sense in which we represent the composition of two forces as the diagonal of their parallelogram; the elements no doubt retain some of their individuality. Professor Mills, of Glasgow, objects to our saying that water contains H_2O (*Phil. Mag.*, January, 1876). He prefers to say that water plus energy equals $H + O$; and that $H + O$ forms water plus energy. He thinks we might with equal exactness say that water is a simple body intermediate between H and O. If matter were only directed motion as he suggests, the compound water might be only compound in the same sense as the diagonal is the compound in a parallelogram of forces, a simple line intermediate between the two forces H and O; but the conception of motion or force without matter seems to me to require a new definition of matter, or else to require the resolution of both force and matter into motion of luminiferous ether, the existence of which is hypothetical, and the nature of which we assume to be any that suits the requirements of our hypotheses. Had water been a force or motion as simple in its nature as the diagonal in a parallelogram of force, or as any simple force resulting from the combination of two forces acting in different directions, it would not necessarily be resolvable only into the two forces from the union of which it resulted. The fact that no application of force, varying in kind or quantity, has resulted in the production of anything but H and O from water supports the view of the elements of water retaining their individuality, to some extent at any rate, while in combination, and does not encourage us to regard Aq as a simple body or a simple force intermediate between H and O.

In Ag_2O the union is feeble because the normal movements of the elements are not closely harmonious. In H_2O the union is stable because of a closer harmony. In H_2O_2 the second equivalent of O is feebly held, because the normal movement of O is not closely harmonious with that of H_2O. And Ag_2O, we may suppose, decomposes H_2O_2 because of the harmony between the loosely attached oxygen atoms, continuing in their combination, and because the polarities of these atoms are not better satisfied by association with silver or water than they are by the union of two atoms of oxygen into one molecule, which constitutes oxygen in the free state. This partial satisfying of the polarities by the union of two or more atoms into one molecule, constitutes the difference between the chemical activity of free and nascent elements.

Dr. Siemens has recently propounded a theory of the sun's heat, based upon the fact that the radiant heat and light have the power of dissociating the elements of water when they pass through its vapour in a highly rarefied state, and that the dissociated elements, when drawn down to the denser atmosphere of the sun, reunite, giving out again the heat which had effected their separation. A reasonable objection has been raised to this theory, that is, that the heat which we estimate as the sun's loss is only that which escapes this trap to catch the sunbeams. But, however much heat may escape from the sun into space, it does not seem necessary that we should establish new laws for the conservancy of the solar system. If force radiates from the sun as heat and light against space, diminishing in proportion to the square of the distance from the sun, the same force reflected back from space as from a hollow spherical reflector would come back directly to the sun undiminished. But as space is not a reflector of heat and light, may we not speculate on these overflowing vibrations causing a mechanical reaction, the backward flow of some other force, say gravity? Is it not a more reasonable speculation that gravity should be convertible with the other forces and keep up the cycle of natural change, than that all the stars are pouring forth their heat and light into infinite space, receiving nothing in return, and so to go on till, in the lapse of countless ages, all comes to utter darkness and inconceivable cold? Our common experience is that a hot body tends to become cold, but he would be a bold physicist who would assert that the universe as a whole had the same tendency. On the one hand we have no experience of the universe as a whole, and on the other we have experience of numberless cases where, in ignorance, it was supposed that force was lost, but in which further knowledge showed that it was not lost, but converted into another form. We are as yet unacquainted with any means by which gravity may be converted directly into any force except mechanical motion, but the conversion of the forces is a subject so new, in comparison with the length of time during which the forces have been studied as separate and unconvertible agents, that it would be unreasonable to assume that because we have not yet seen the means of converting the force of gravity into heat or light except through the intervention of mechanical motion, we are not likely to do so. We have converted heat into electricity and electricity into heat—magnetism into electricity and electricity into magnetism, and so on in many other cases, which have been among the most interesting achievements of science during the last half-century.

If the action of gravity be reduced to that of radiant force acting in all directions, the apparent attraction being the subtraction of impacts on that side of a body to which the action of gravity tends to move it, then all bodies must have a diadynamous property at least as perfect as the diaphanous and diathermanous property of air. The proportion of impact force a body transmits, compared to that which it intercepts, gives the difference in weight of a second body weighed above and below the first. The proportion of impact force which a body intercepts, compared to that which it transmits, gives its mass, and the excess of impacts it receives in one direction over the other, multiplied into its mass gives its weight. One very marked difference between gravity and other forces, is that the relationships which an element bears to all the other forms of force are changed by chemical combination, while its relation to gravity remains constant. When iron combines with chlorine, its relations to heat, light, electricity and magnetism are essentially changed, but its weight remains the same. On this exceptional constancy in the relationship between gravity and matter in its different states of combination depends the possibility of exactness in chemical science.

It is with pleasure, not unmingled with reverence, that we feel our views of force and matter extending and promising that we shall see the unity and harmony of all nature. It must be regarded as a narrow view, a small-world prejudice, to look upon our solar system as a centre, radiating force upon all creation, giving out force in the form of heat and light, in quantity inconceivably greater than it receives. Our common experience is that there is a general tendency in all nature to the restoration of physical equilibrium, the bent spring tends to relax, the suspended weight to come to the ground, the hot or cold body to come to the temperature of the bodies surrounding it, and we have naturally assumed, though with too little reason, that a state of rest, of inactivity, of monotony, and of death, is the natural goal to which all things tend.

We do not *know* that our system is becoming colder, and the sun less luminous; and if we did, we still do not know that we are not accumulating some other force, at present beyond our discovery.

On the other hand we are daily becoming more convinced—more *certain* that force is not destroyed.

We are learning to count the atoms, to weigh the imponderable, and to measure that which has neither size nor shape; and we may with hopeful anticipation look for the laws which govern the chemical action of heat and light, and bring gravity into close relationship with the other forces of nature.

THE MEDICINAL OLEATES.*

BY DR. SQUIBB.

Chevreul ('Recherches sur les Corps Gras') discovered oleic acid about 1811, and notices of medicinal oleates may be found in the chemistry and pharmacy of France about that time. The first paper met with in the English language, however, is by Professor Attfield. This is "On a Method of Dissolving Alkaloids in Oils," and is published in the British *Pharmaceutical Journal and Transactions*, for 1862-63, vol. iv., p. 388. This paper refers mainly, but not entirely, to the use of oleates for the purpose of rendering these bases soluble in oil, and both in the paper and in the discussion which followed the reading of it, this use of the oleates was discouraged as tending to useless polypharmacy. From this time nothing very definite has been met with until

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the publication of the paper of Mr. John Marshall, in 1872. Since 1872, very general notice has been taken of the subject, in a casual, inexact way, by authors on therapeutics and materia medica, and several papers have appeared upon the chemistry and pharmacy of the oleates. Various methods of preparation have been advocated, but none so good as the direct union of the acid with the dry base without heating. The preparation should always be either a liquid or a semi-solid which is easily and completely liquefied by the natural temperature of the surface to which it is to be applied, and hence normal oleates undiluted are not applicable to therapeutic uses, but only solutions of the oleates, and these solutions should always be in oleic acid as the solvent rather than in oils, because the acid is more readily absorbed than the oils. In the rare cases where the excess of acid as a solvent of the oleates proves irritant to the skin, dilution with a bland oil becomes admissible. A paper has appeared recently by Dr. John V. Shoemaker (see the *Medical Bulletin* for July, 1882, p. 153), in which it is stated that the oleates as commonly prepared and used are not chemically true oleates, but merely solutions of oxides in oleic acid, and as such will often give negative results. This is a mistake, and is as great an error as it would be to say that mercuric nitrate, made by dissolving mercuric oxide in nitric acid, was not a chemical nitrate, but only a solution of the oxide in the acid. This author also states that the best method of making oleates for medicinal uses is by double decomposition; and this, as a general statement, is also a mistake, as very few oleates are well made in this way, and it is doubtful whether any are best made by double decomposition between solution of oleate of sodium and solution of salts of the bases. At least this is neither the simplest nor the easiest way of making the solutions of the oleates in oleic acid as required for the best and the easiest absorption through the sound or unbroken skin, and it is incorrect to write of preparations made by direct union of the acid and base as "supposed oleates" of "indefinite and unstable character."

The oleates which, up to this time, appear to have been most used, are oleates of aconitia, atropia, mercury, morphia, quinia, strychnia, veratria and zinc. These are for general or epidermic use through the skin, while for special or dermic use in diseases of the skin, oleates of copper, lead and zinc are those most frequently heard of.

Oleates of the more active alkaloids, namely, aconitia, atropia, strychnia and veratria, are usually and properly made of the strength of 2 per cent. of the alkaloid. The oleate of morphia usually contains 5 per cent. of that alkaloid, while the oleate of quinia is made as strong as is practicable, and usually contains 20 per cent. of the alkaloid.

All of these are very simply and easily made by putting the weighed quantity of the alkaloid into a mortar, adding a small quantity of the oleic acid, little by little, and triturating until the alkaloid is completely dissolved. The strong solution thus made is then poured into a tared bottle, and the mortar and pestle rinsed twice into the bottle with small quantities of oleic acid. The proper weight is then made up by the addition of oleic acid. No heat is needed, nor should any be used in the preparation of many oleates, but in some of these the digestion is prolonged, and intervals of trituration are needed. All heating has a great tendency to change their molecular constitution. If well-made oleate of morphia be shaken with dilute sulphuric acid, the morphia should be washed out as a sulphate, but it is a singular fact that it cannot all be so recovered as morphia; yet the morphia effect of the oleate is prompt and decided. This appears to show that some change is effected in the alkaloid even by combining it without heat, while if heated the changes are destructive.

The molecular or combining weight of oleic acid is high, namely, 282, but the weights of the alkaloids are still higher. That of aconitia is 645, atropia 239, morphia 285, quinia 324, strychnia 334, and veratria 592. Hence the molecule of the respective oleates would be very complex and very easily split up by any forces tending to decomposition, as heat, light, etc., or by oxidation from undue exposure to air. Hence it is that oleates may not keep well, but should be as freshly made as practicable, and should not be relied upon for their full effect when more than a year old, even if they have been carefully kept in a cool place.

The normal oleates—that is, when the oleic acid is fully saturated by the base—contain the following percentage of the respective bases:

Oleate of aconitia,	about	69·6	per cent.	of	aconitia.
Oleate of atropia,	„	50·6	„	„	atropia.
Oleate of morphia,	„	50·3	„	„	morphia.
Oleate of quinia,	„	53·5	„	„	quinia.
Oleate of strychnia,	„	54·2	„	„	strychnia.
Oleate of veratria,	„	67·7	„	„	veratria.
Oleate of bismuth,	„	22·2	„	„	Bi_2O_3.
Oleate of copper,	„	12·7	„	„	CuO.
Oleate of iron,	„	11·7	„	„	FeO.
Oleate of lead,	„	29·	„	„	PbO.
Oleate of mercury,	„	28·4	„	„	HgO.
Oleate of zinc,	„	1·29	„	„	ZnO.

A brief notice of the therapeutic application of some of these oleates may not be without use. In epidermic medication it must be borne in mind that the skin, in common with the mucous membranes of the primæ viæ, does not absorb with equal facility or rapidity at all times. As was forcibly said by Professor Charles D. Meigs in regard to the occasional inactivity of powdered ergot in parturient women: "There are conditions of stomach in which you might as well put your medicines in a bladder and hang it up on a nail." So there are conditions of skin wherein absorption is slow and difficult, and in all such, hypodermic medication has great advantages, and it is highly probable that the hypodermic use of these oleates would be effective in such cases.

In reviewing the principal oleates somewhat in detail, it may be useful to begin with oleic acid.

Oleic Acid.—This is made from the so-called "red oil" of the makers of stearin candles. The other fatty acids are separated from the oleic by solidifying at higher temperatures, when they can be filtered out. But they are never completely separated, nor is it necessary they should be, since this oleic acid for medicinal uses does not aim at a high degree of chemical purity. The crude oleic acid is next washed with solution of sulphurous acid, and finally is repeatedly washed with water, and carefully filtered in the cold with the least practicable exposure to air.

It is then an oily liquid of the colour of pale sherry wine, having a faint, peculiar, indescribable odour and taste, free from acridity. Its specific gravity is ·898 to ·900, at 15·6° C. = 60° F. It is thinner than the oils, and much more easily wiped off from surfaces without leaving them greasy. Applied to the skin, it wets it almost like water, and if very thinly applied it is so quickly absorbed that it seems as if it had evaporated like water; and it leaves the skin as clean and free from greasiness as though it had been wet with water. The peculiar odour of the acid is much stronger when it is spread upon the skin than when in a bottle. It should be kept from the light and air as much as practicable, although it does not appear to rancidify as easily as fats and oils do. As it has not yet been determined how the oleates keep, it is very good practice to keep the oleic acid on hand, and from it make the oleates as they are required for use—not necessarily each time they are prescribed, but every month or two.

Oleate of Aconitia.—This is made by simply putting the dry alkaloid and the acid together, when the alkaloid, if pure, instantly dissolves and disappears.

This is, however, only the case with the alkaloid precipitated from the "aconitine" of Duquesnel.* With the other aconitias of the market the solution is not quite so prompt, and a little residue is often left undissolved, and has to be filtered out. The oleate should, however, always be made from the best aconitia, although it be thus rendered very expensive. The increased cost is, however, rather apparent than real, since half a drachm of such an oleate is more effective than an ounce made from ordinary aconitia.

There is no pharmacopœial authority for the strength of this oleate, but usage has started it at 2 per cent. That is, 2 grains of aconitia in 98 grains of oleic acid. Then, as the aconitia precipitated from "Duquesnel's aconitine" costs at least forty cents a grain, the 100 grains of this oleate would cost say eighty-two cents. But the preparation is an exceedingly active and potent one, and is, therefore, required in very small quantity. Remembering that the dose of this aconitia for internal administration is from the one-hundredth to the two-hundredth of a grain there will be at least three hundred doses in 100 grains of the oleate. Hence it will be required, in any probable use of it, in very small quantity, and as it must be a very dangerous substance, it should never be put up or dispensed in larger quantity than about the sixteenth of a fluid-ounce, or 2 cubic centimetres, and this quantity would contain the eighth of a grain. Each minim weighs eight-tenths of a grain, and contains about one-sixtieth of a grain of aconitia. A drop from the thin lip of the vial in which it is dispensed is about half a minim.

This oleate should be applied by means of the end of the cork which stops the bottle containing it. If twice the quantity which the end of the cork will carry be spread over about half a square inch of the skin on the back of the hand, a glow of warmth in the part is almost immediately felt. This will continue for some minutes, then become intermittent, and in a half hour will have entirely disappeared. If twice this quantity be then applied to about a square inch of surface, including the first portion, the glow will be more pronounced, and there will be prompt tingling in the nerves which pass under the part down to the ends of the fingers. In a few minutes the glow will have increased to a sense of heat and pricking in the part, and the tingling along the course of the nerves will have increased. In a quarter of an hour there will be slight numbness in the ends of the fingers to which these nerves are distributed. All these sensations will increase slightly and steadily for about half an hour, and will then subside, becoming intermittent with longer intervals, until they disappear at about the end of an hour, when the oleate will have nearly disappeared from the surface. If, however, at the end of half an hour the dose be repeated on the same surface, all the sensations are promptly increased and extended to the whole hand. In a quarter of an hour a slight glow of warmth is felt throughout the arm, with just perceptible intermittent tingling. This tingling was noticeable with widening intervals for at least ten hours, and on the following day there was itching of the surface.

This much may serve to show the potency of the preparation, and to indicate both the dose and the use. If in trigeminal neuralgia such an application of this oleate be made over the course of the branch involved, or over the point of emergence and distribution of the nerve, it will probably soon do all that aconite can do for the case in a better, safer and more manageable way than by internal administration. The active medication of the whole organism to get at a local nerve at a point of pain seems to be a roundabout way when access can be had directly to it by such means as this oleate, while at the end of a few hours of the above-mentioned experiments it seemed quite plain that the aconite influence had extended to the entire organism, for the sensations were distinctly felt in the opposite hand, and although the temperature and pulse were not taken, they were evidently both reduced.

Oleate of Atropia.—This oleate is made in exactly the same way as the oleate of aconitia, and by general usage is of the same strength, namely: 2 per cent. Although an active and potent preparation, it is by no means so active or dangerous as the oleate of aconitia. It has been said that the application of 5 minims of this oleate to a knee-joint of a adult patient has produced dilatation of the pupils within a quarter of an hour just as a very good belladonna plaster should do, with prompt relief of pain, and if this be true it serves well to indicate the power and the dose of this oleate. There is, beside, considerable loose and scattered testimony to its steady though slow effect upon the pupil when applied in the neighbourhood of the eye. It would seem that it ought to be very manageable and very useful in ophthalmology as a substitute or alternate for instillation of the watery solution, but up to this time it has not attracted much attention so far as any published statements go. Yet there is a good deal of it sold, and judging by the sales its use is increasing, probably mainly as an application to painful joints as a substitute for belladonna plasters.

Each minim contains about one-sixtieth of a grain of atropia, and a drop from a common 1-ounce vial is about two-thirds of a minim, or from a homœopathic vial with thin lips about half a minim, or one one-hundred and twentieth of a grain.

Oleate of Morphia.—This is made precisely as the preceding oleates, except that as the morphia of the markets is in crystals, their solution in oleic acid is slow, unless the crystals be rubbed into powder before adding them to the acid in the bottle in which the solution is to be made. A little agitation is then all that is needed. This is the only one of the oleates of the alkaloids that within a short time changes much in keeping. When the elements of it are first put together the solution begins to grow darker, and this change progresses until within a year it becomes very dark indeed. This change in keeping does not destroy its efficacy, but whether it diminishes it or not has not been shown. This oleate was introduced by Mr. John Marshall, who made it of the strength of 5 per cent., or 5 grains of morphia to 95 grains of oleic acid, and this strength has now been generally adopted. This oleate is quite largely used, and yet very little accurate information or observation in regard to it has been published in the ten years that have passed since its introduction. Several good observers within the writer's personal knowledge have occasionally used it for some years past in special cases, and with alleged success, especially as an anodyne and sedative in infants and children. Five to ten minims applied to the abdomen under oiled silk seems to be about the usual dose for children of one to four years.

As a simple sedative hypnotic it is often applied to the inside of the thighs and arms of infants, one or two drops spread over a large area in each locality so as to get not more than four or five drops in all for infants of six months. It should be dropped on to the surface with care, and be spread by the ball of one finger, and as sometimes the absorption is slow the dose should not be repeated within an hour if the first one be insufficient. It is said to have less tendency to constipate than any other opiate. Each ordinary drop contains nearly $\frac{1}{20}$ of a grain of morphia. It is probable that this oleate should be doubled in strength.

Oleate of Quinia.—This, although it has not attracted general attention, is probably one of the most important of the oleates. From the larger quantity of quinia needed in medicine this oleate is made as strong as possible. While a normal oleate of this alkaloid would by calculation contain about 53 per cent. of the alkaloid

* This "aconitine" is a nitrate of aconitia, and requires to be precipitated and dried. As sold under the name of "Duquesnel's aconitine" it is entirely insoluble in oleic acid.

it has been found impracticable to dissolve that quantity in the acid. In a series of experiments made some years ago when this oleate was introduced, it was concluded that 25 per cent. was the best proportion. But as the quinia of the market holds some hygrometric moisture, it is better to take 26 grains of the alkaloid and 74 grains of oleic acid as the formula. The alkaloid is simply rubbed to powder, and added to the acid in a bottle. Like the other alkaloids this dissolves so readily that, being in much larger proportion, it is liable to clog together and be slow in dissolving. But this clogging together is easily broken up by means of a glass rod. Or the solution may be effected in a capsule and the clogging be prevented by a pestle. In this way it is easily made in a very few minutes. A fluid ounce of this oleate weighs about 410 grains, and, therefore, contains about 102 grains of quinia, which is equivalent to about 140 grains of the ordinary sulphate of quinia. Therefore, a fluid drachm contains the equivalent of about 17 grains of the sulphate, and a minim is equivalent to a little more than a $\frac{1}{4}$ of a grain. A hypodermic injection of a fluid drachm will, therefore, carry the equivalent of 17 to 18 grains of sulphate of quinia.

It happens, perhaps oftener with the administration of quinia than most other medicines, that the physician wants to save the stomach. And many conditions need quinia when the stomach will not accept it, or will not utilize it if given by the mouth. These circumstances have long indicated the hypodermic use of quinia, but up to this time no solution has been proposed that is well adapted to hypodermic use, first, because of the large dose required, and again, because of sparing solubility of available quinia salts. Hence this oleate has been sometimes used hypodermically, but with what success is unknown to the writer. The epidermic use, however, is of late not uncommon, and since it was first proposed occasional trustworthy testimony from private sources has led the writer to consider it an important adjunct to the more common methods of using quinia. The quantity of oleate needed here is considerable, often amounting to 1 or 2 fluid drachms. Hence it should always be applied under oiled silk or gutta percha tissue. When put directly on the skin a minim will require about 4 square inches of surface or it will run, and a fluid drachm would require about 2 square feet of surface, an area hardly accessible under ordinary circumstances. But two pieces of very thin fine old muslin or linen, 6 by 9 inches, will easily hold $\frac{1}{2}$ a fluid drachm each, and may be applied to the insides of the thighs, covered by oiled silk. This leaves the abdomen available for another similar application if desirable, and the oleate can be renewed on these places as rapidly as it is absorbed. Another good way of applying it, especially in walking cases, to get a moderate continuous effect, is to anoint the spinal tract for an inch or more on each side of the spinous processes morning and evening with a $\frac{1}{2}$ fluid drachm, and cover it with a strip of oiled silk under the clothing. The writer has heard of several instances in which ringing in the ears was speedily produced by such applications of the oleate.

Oleate of Strychnia.—This is made exactly in the same way as the oleate of quinia, the crystals of the alkaloid being simply rubbed to powder and added to the acid in a bottle, the solution being promptly and easily effected.

In strength this oleate has been generally made 2 per cent., that is, 2 grains of strychnia to 98 grains of oleic acid; but of course it may be as easily made of any desired strength, short of the saturation of the acid.

When of 2 per cent., each minim will represent about $\frac{1}{60}$th of a grain of strychnia, and a drop will represent from one-half to two-thirds of this quantity, according to the thickness of the vial lip from which the drop falls.

This should be a very effective way of using strychnia, but it has not yet come into use to any extent. For application to the temples in the treatment of some eye diseases, it would seem to be better adapted than the present mode by hypodermic injections, because the effect would be more prolonged and more permanent. That is, the strychnia would remain in the neighbourhood of the nerves to be affected by it for a longer time, and the application could be more easily made.

The general effects of strychnia would doubtless be as easily obtained by this oleate as in the instances of the other alkaloids.

Oleate of Veratria.—Made in exactly the same way as oleate of strychnia and of the same strength, namely: 2 per cent., the minim representing the $\frac{1}{60}$th of a grain.

This oleate has been more used than many of the others, and generally as a local application in the various forms of neuralgia. It is much weaker than aconitia, and as it is applied to similar uses much more of it is required. It should, therefore, be made much stronger or as strong as the skin would bear it. Probably 10 per cent. would be much better than 2, and would make the preparation more serviceable, as then a sufficient dose could be applied without involving too great a surface. If of the strength of 10 per cent. the effective dose would be much more manageable, and more nearly parallel with the oleates of aconitia and atropia; and it would then have more chance of sustaining its reputation for controlling some cases of neuralgia which resist the action of aconitia.

These oleates of the alkaloids are all fluids and should be, as their application demands an accuracy of dose easily attained by minims or drops, but not so easily attained if they were semi-solids; but the oleates with metallic bases do not need such accuracy of dose, and are best dispensed and applied as soft ointments.

Oleate of Copper.—This should be made to contain at least 5 per cent. of oxide of copper, but it may be made of normal strength, that is, containing 12·7 per cent. of oxide. The 5 per cent. oleate is liquid when first made, but soon acquires a kind of semi-gelatinous consistence. It is very easily made by simply adding the oxide and acid together in a bottle. In the cold the solution of the oxide is slow, requiring two or three weeks and frequent agitation. When warmed, however, a few hours only is necessary. The resulting oleate is of a beautiful dark-green colour, and appears to keep well.

It has been used solely in dermic medication, that is, in treating skin diseases, so far as is known to the writer, and its value is not known.

Oleate of Lead.—This oleate, in order to be of a proper consistence, should contain 20 per cent. of oxide of lead. The oxide dissolves slowly in the cold, but more easily and rapidly when warmed to about 66° C. = 150° F.

It forms a yellowish unguent, and is used only in skin diseases, so far as is known to the writer, and very little testimony in regard to its uses or value has been met with.

Oleate of Mercury.—This is the oldest and, perhaps, the most important of the oleates, perhaps because it has been most used, and, therefore, its effects and uses are best known. As introduced by Mr. Marshall it contained 6 per cent. of oxide of mercury, and this strength is still the one most requently used; but a strength of 10 per cent. has also been largely used, and more recently one of 20 per cent., which latter should and probably will soon supersede the others. Either strength is easily made by simply putting together the yellow oxide of mercury and the acid in the cold, and waiting until the solution takes place, stirring occasionally. All heating should be avoided in making this oleate, even the heat of the combining elements being probably hurtful. Time and patience easily effect the combination, but even with the greatest care the weaker or more liquid preparations do not keep well. In a few weeks a film of metallic mercury shows itself at the bottom of each vial, and in a few months this film will represent about 1 per cent. of the mercury used. From this circumstance it has been the practice of the writer to always put up both the 6 per cent. and the 10 per cent. with 1 per cent. excess of the oxide to compensate for this decomposition, so that the practitioner will really get the strength called for by the label if the preparation be not very old, and be well protected against heat and light. These strengths can, however, never be very accurate, because the decomposition though slow begins early, and probably continues indefinitely or until all the mercury is reduced. When made of the strength of 20 per cent. however, this decomposition does not occur, or at least does not occur to any practically hurtful extent. Of a sample that had been made three years 19 per cent. was soluble in ether, thus showing that it keeps well, while the others do not. It is a very soft solid, like very soft butter, but yet solid enough to prevent all circulation among its particles, and it is probably to this condition that its superior keeping properties are due. Because it keeps so well and the other strengths do not, it is the only oleate of mercury that should be used. Its greater strength is no valid objection to its application, as it is only necessary to apply so much less of it. Or if not easily enough controlled in that way, it can be diluted at the time of using to any definite strength with olive oil, or preferably with oleic acid.

No reduced mercury has ever been noticed in any well made oleate of this strength.

The uses and applications of oleate of mercury are now too well and too generally known to need repetition here. Suffice it to say that by its epidermic use the most prompt, the best and the most easily controlled mercurial impression can be obtained, whereby a remedy often dangerous has been rendered, under proper skill and care, comparatively harmless or altogether beneficent in a very large number of cases which cannot be very successfully treated without mercurials.

Oleate of Mercury and Morphia.—This double oleate was also introduced by Mr. Marshall, and, therefore, is among those which are oldest and best known. The formula generally adopted and most used has been 10 per cent. of the oxide and 2 per cent. of morphia. The morphia was at first used to correct or control the irritation of the skin from the application, but it was found to give a decided anodyne effect in painful joints, etc., while the tendency to irritate has been largely corrected by the use of a better oleic acid. The preparation, however, does not keep well. A specimen made in 1878 is now almost black in colour, with a very considerable film of reduced mercury at the bottom of the vial. It is highly probable, however, that a 20 per cent. oleate of mercury would dissolve 5 per cent. of morphia and make a better preparation which would keep much better. Small quantities of such a preparation could be much better applied than the larger quantities of the weaker one.

Oleate of Zinc.—A 20 per cent. oleate of zinc is not unfrequently spoken of and asked for of late, and a preparation is sold as such. But as a normal oleate of zinc only contains the equivalent of about 13 per cent. of the oxide, such a preparation can only be a mixture of oleate and oxide. It is generally in the condition of a dry, soapy, granular powder, and not susceptible of easy application for absorption even in skin diseases, but only applicable as a surface powder. For appropriate therapeutic use as a zinc preparation it should not be stronger than 5 per cent. When of this strength it is a soft solid of proper consistence for easy application in diseases of the skin. Of this strength it is well adapted to become a very useful preparation, but as yet its uses have not been very definitely stated.

Several other oleates have been mentioned as available for medicinal uses, and possibly some of them may be found useful, but as yet there is no accumulation of testimony in regard to them. Those occasionally heard of are oleates of aluminium, arsenic, bismuth, iron, nickel and silver, but the latter is an impracticable, if not an impossible, oleate.

COMMERCIAL OIL OF THYME.*

BY J. S. LEMBERGER.

Oil of thyme of commerce is said to be very often deprived of its thymol. Is this statement true?

In experimenting with oil of thyme, in answer to this query, we have taken for granted that the declaration made by A. W. Gerrard, who ably investigated thymol, its sources, manufacture and application as an antiseptic agent, was justified by his researches. He is credited with saying, oil of thyme is said to yield as much as 50 per cent. thymol on the Continent. We, therefore, hoped to obtain from pure oil of thyme, if not 50 per cent., at least a considerable percentage of thymol. The writer purchased nine separate lots of oil of thyme from as many different houses in New York and Philadelphia. Only one of these, however, is known to have been distilled in the United States, and this one only we feel warranted in vouching for as a pure distillate of *Thymus vulgaris.* The experiments we conducted in the following order:—

No. 1 was bought as pure red oil of thyme, and yielded 1·67 per cent. of dark crystals.

No. 2 was bought as pure white oil, and yielded 6·67 per cent. lighter coloured crystals.

No. 3 was bought as pure red oil, and yielded 16·67 per cent. of dark crystals.

No. 4 was bought as pure white oil, and yielded ·80 per cent. of light-coloured crystals.

No. 5 was bought as pure white oil, and yielded ·42 per cent. of light-coloured crystals.

No. 6 was reported as very old white oil, and yielded also only ·42 per cent. of light-coloured crystals.

No. 7 was bought as pure French red oil, and yielded 7·92 per cent. dark crystals.

No. 8 was the undoubted American white oil, four months old, distilled from dried French herb, and yielded ·84 per cent.

No. 9 was a dark red oil, rich in colour and very odorous, obtained direct from the importer, and this yielded 38·75 per cent. dark-coloured crystals.

The process used by the writer for separating the thymol consisted in treating the oil with a twenty per cent. solution of pure caustic soda, and, after separating the solution of thymolate of sodium formed, treating this with ether, which, on evaporation, yielded the thymol in the form of irregular crystals. That obtained from the dark oils was dark in colour; that from the white oil much lighter.

Another process was employed upon portions of the same oils to prove the former experiments, viz.: that of treating the oil with caustic soda, then separating the alkaline solution and adding to this hydrochloric acid so long as the supposed thymol separated or rose to the surface as a float. The float was separated by filtration, and weighed after drying; the estimate made appeared to be about the same.

The last process is not so satisfactory, although undoubted crystals were detected as in the first, and numerous minute crystals were found adhering to the vessel, which appeared to be the same under the microscope as those obtained by the former process. The odour of this float in some cases, and more so that obtained from the oils yielding the least percentage of the crystals, was very suggestive of the action of acids upon turpentine, giving rise to a peculiar empyreumatic odour, and corresponds closely with a product described by Gerrard as obtained by him, as being "12 per cent. of oily matter, differing to such an extent in colour, odour, and look from thymol that he could not pronounce it as such."

We observe that the dark oils seem to be the richest in thymol.

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* Read at the meeting of the American Pharmaceutical Association held at Niagara Falls, 1882.

The experiments as made seem to justify the declaration suggested by the query that very little of the oil of thyme of commerce is pure, but in all probability is first deprived of its most valuable constituent by manipulations before it is thrown upon the market.

In the discussion which followed the reading of this paper, Mr. Sloane, of Indianapolis, mentioned that thymol is excellent to disguise the odour of iodoform.

Professor Maisch stated that a considerable proportion of the thymol remains in the terbene. It should be produced by fractional distillation. It can be obtained from the American product in considerable quantities.

Mr. J. A. Lloyd said he had failed to get enough thymol from the commercial oil of thyme to pay for the trouble of preparation.

Professor Remington stated that possibly the manufacturers found the sale of thymol so profitable that they make that and sell the residue as oil of thyme.

Professor Bedford stated that the price of oil of thyme is so low that there is now no pure oil of thyme on sale except a brand known as white oil, which is sold at four times the price of the ordinary, the one selling for 55 cents and the other at 2 dollars.

Professor Maisch stated that the herb should yield a larger proportion of thymol than can be obtained from oil of thyme. It may be that the plants grown in different localities yield a different amount of thymol. The amount of thymol does not increase with the age of the oil of thyme.

CURCUMIN.*

BY C. L. JACKSON AND A. E. MENKE.

This substance, the yellow colouring matter of turmeric, has been examined by several chemists, whose experiments have led to the conclusion that its formula is either $C_{10}H_{10}O_3$ or $C_{16}H_{16}O_4$; that it melts at 172°; forms red-brown salts with alkalies; is converted by boric or sulphuric acid into rosocyanine; by reduction with zinc-dust into an oily body; by oxidation into oxalic or terephthalic acid; and by fusion with potash, into protocatechuic acid. The experiments of Jackson and Menke have, however, led to results differing in many respects from those above detailed, which were probably obtained with impure preparations.

The curcumin used in the authors' experiments was prepared by treating ground turmeric root (Bengal or Madras) with light petroleum to remove turmeric oil, and then with ether, which dissolves the curcumin together with a large quantity of resin; and it was finally purified by crystallization from alcohol. The quantity of curcumin thus obtained was only 0·3 per cent. of the root; the total quantity contained in the root is, however, much larger, as a considerable amount remains mixed with the resinous impurities, and some also in the oil.

Curcumin thus prepared crystallizes from alcohol in stout needles, appearing on microscopic examination to be made up of well-formed prisms with square ends, or in spindle-shaped crystals often arranged in radiate groups. It has an orange to yellow colour, according to the size of the crystals, with a beautiful blue reflex: its solution in ether exhibits a strong green fluorescence. It is inodorous when pure; melts at 178°, apparently with decomposition. It is nearly insoluble in water, somewhat soluble in cold, more readily in hot ethyl and methyl alcohols, more soluble in glacial acetic acid, less in ether, very slightly in benzene and carbon bisulphide, and all but insoluble in light petroleum. Strong sulphuric acid dissolves it with a fine reddish-purple colour, gradually changing to black from charring; the same effect is produced, though more slowly, by strong hydrochloric acid. Curcumin dissolves readily in alkalies and alkaline carbonates, to a slight extent also when boiled with water and calcium carbonate. Its ammoniacal solution gives off ammonia when boiled, and deposits unaltered curcumin. Baryta-water converts it into a blackish-red powder, but lime-water gives a red solution like that obtained with calcium carbonate. Curcumin is not affected by acid sodium sulphite.

Pure curcumin gives, as the mean of several analyses, 68·30 per cent. carbon and 5·63 hydrogen, leading to the formula $C_{14}H_{14}O_4$, which requires 68·29 C, 5·69 H, and 26·02 O; and this formula has been confirmed by the analysis of several derivatives.

The *dipotassium salt*, $C_{14}H_{12}K_2O_4$, prepared by adding a large excess of strong alcoholic potash to a hot alcoholic solution of curcumin, separates in flame-coloured crystals, and may be precipitated from weaker solutions by addition of ether. When first formed, it consists of globular radiate groups of flame-coloured needles, but assumes a deep claret colour on drying. It is freely soluble in water, somewhat less so in alcohol, and nearly insoluble in ether. The alcoholic solution assumes a magenta colour on exposure to the air, probably from oxidation. The *monopotassium salt*, $C_{14}H_{13}KO_4$, is formed on adding an excess of potassium carbonate to a hot solution of curcumin in absolute alcohol, and separates on addition of ether in crimson-black flocks, having the lustre of rosaniline and a somewhat blacker green colour. It is very soluble in water and in alcohol. It may also be made by adding an excess of curcumin to the dipotassium salt, or by adding potash, not in excess, to curcumin suspended in alcohol. The *calcium salt*, obtained by precipitation from the monopotassium salt, is flame-coloured, and slightly soluble in water. The *zinc salt* appears to be soluble, the *barium salt* insoluble; the *silver salt* appears to be very unstable.

The fact that only 1 atom of the hydrogen in curcumin can be replaced by the potassium in potassic carbonate, seems to indicate the existence of one, and only one, carboxyl-group in its molecule, whilst the replacement of a second H-atom by the action of an excess of potassium hydroxide points to the existence of a hydroxyl-group, probably a phenolic hydroxyl, and leads to the inference that curcumin is a diatomic monobasic acid.

Parabromobenzyl-curcumin, $C_{14}H_{13}(C_7H_6Br)O_3$, is formed by adding an excess of *p*-bromobenzyl bromide to an alcoholic solution of monopotassium-curcumin and separates in pale yellow crystals, which, after purification, melt at 76° to 78°. It is more soluble in glacial acetic acid than in alcohol, but crystallizes better from the latter; readily soluble in ether and in benzene, slightly in carbon sulphide, nearly insoluble in light petroleum; it is not attacked by potassium carbonate, but dissolves in caustic potash, though without the red colour characteristic of curcumin.

Oxidation of Curcumin.—By oxidation with chromic acid mixture, curcumin is wholly converted into acetic acid and carbonic anhydride, not a trace of terephthalic acid having been found in the product; by incomplete oxidation with potassium permanganate in alkaline solution, it yields vanillin,—

$$C_8H_8O_3 = C_6H_3\overset{1}{(CHO)}\,\overset{3}{(OMe)}\,\overset{4}{(OH)}.$$

Hence, and from the fact previously established that curcumin contains a carboxyl-group, the authors infer that its constitutional formula is—

$$C_6H_3\overset{1}{(CH.C_5H_5.COOH)}\,\overset{3}{(OMe)}\,\overset{4}{(OH)}.$$

The structure of the group C_5H_5 will be made the subject of further investigation.

* From the *American Chemical Journal*, iv., pp. 77 to 91. Reprinted from the *Journal of the Chemical Society*, October, 1882.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 30, 1882.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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ANNUAL REPORT ON THE ROYAL GARDENS AT KEW.

THE Report on the Progress and Condition of the Royal Gardens at Kew, during the year 1881, which has just been issued, shows that whilst they are becoming increasingly important to all interested in botanical science, they fully maintain their popularity as a place of public resort. In fact, the number of visitors reached a higher point in the year 1881 than in any previous twelve months, amounting to 836,676, or 111,254 in excess of the year 1878, which had up to that time remained the maximum. The largest number of visitors admitted in any one day in the year was reached on Whit Monday, when it was over 50,000. But the work carried on in connection with these gardens, under the superintendence of Sir JOSEPH HOOKER and his able assistant, Mr. W. T. THISELTON DYER, is not confined to catering for holiday folks, but it also includes much that is of special importance to our readers, and as usual many of the passages in the report furnish matter suitable for quotation in this Journal.

Kew has now become the centre of botanical correspondence, and the authorities of the gardens actively participate in nearly all the experiments in acclimatization or the utilization of vegetable products that are made throughout the world. Hence these annual reports are always extremely rich in information as to the success or non-success of such attempts, many of which are made with a view to securing the better supply of drugs. In the present report, for instance, there is much interesting information respecting cinchona cultivation. We learn that a great deal of attention has been attracted, in India and Ceylon, to a cinchona which is supposed to be a hybrid between *C. officinalis* and *C. succirubra*, and to which reference has already been made in this Journal. Next to the *Ledgeriana* variety it is considered to be one of the most promising kinds. In Darjeeling it grows splendidly at an elevation where *C. succirubra* does not do well, and where *C. officinalis* will not grow at all, and it yields a bark which chemically resembles that of *C. officinalis.* In habit of growth this plant resembles *C. succirubra*, though at a distance it has more the appearance of *C. officinalis*; it never comes true to seed, the seedlings resembling as a rule nearly pure *C. officinalis.* The valuable cinchona associated with the name of Mr. LEDGER, which has recently been described as a distinct species by Dr. TRIMEN under the name *Cinchona Ledgeriana*, Moens, and a figure of which accompanies the report, is now being cultivated in India, Ceylon and Jamaica. As the bark yielded by this species is so rich in alkaloid it is satisfactory to read that, after a visit to the Dutch plantations in Java, Dr. KING is satisfied that the plants cultivated under this name at Darjeeling, seeds from which have also been sent to Jamaica, are true *Ledgerianas.* Satisfactory information has been received also respecting the Santa Fé plants, yielding "Columbian bark," which were sent to the Nilgiris in 1880. The present financial success of cinchona cultivation is illustrated by the fact that England now takes all the Jamaica bark that can be shipped and at remunerative prices, whilst it is thought probable another market for the bark will be found at no distant date in the United States. A paragraph is devoted to the Sikhim febrifuge, and, according to a quotation from a report by Dr. KING, the quantity used as a substitute for quinine in Government hospitals and dispensaries during the year ending May, 1881, was so great as to represent a saving of more than four and a half lacs of rupees, or a sum nearly equal to half the total expenditure on the Darjeeling plantations, including compound interest at 4 per cent., since their commencement.

Jalap is another drug the cultivation of which is said to have given rise to some inquiries, and to answer these an interesting account of the method adopted for the propagation of the tubers in the Ootacamund gardens is quoted from an official report. According to this, one acre of land should at the end of three years produce five thousand pounds of green tubers, which will yield when dried one thousand pounds of jalap powder. The cost of cultivation, collection and drying of the root during the same period is said not to exceed three hundred rupees, and it is therefore estimated that dried jalap tuber can be produced at Ootacamund at a cost of 4 annas and 10 pies (about 6*d.*) per pound.

A drug, known under the name of "waras," is exported in considerable quantity from Aden, and is said to be used as a substitute for kamala. Its origin being unknown, Captain HUNTER, Assistant-Resident at Aden, obtained specimens of the plant said to yield it in Arabia, and sent one to Kew, with a note stating that it had been gathered at an elevation of six thousand feet, on Jebel Dthubarah, sixty miles due north of Aden. The plant was immediately identified with *Flemingia congesta*, Roxb., a leguminous species, and of course, therefore, having no affinity with *Mallotus philippinensis.* Kamala yields to alcohol a splendid red colour, whilst the name "waras" signifies "saffron;" and it is mentioned in support of the notion that a substance similar to kamala is yielded in Arabia by perhaps one or more species of *Flemingia* that dried specimens belonging to this genus stain paper in the herbarium a bright yellow colour when washed over with the alcoholic solution of corrosive sublimate used to protect them from the attacks of insects. *Flemingia rhodocarpa*, from the Mozambique district, has its pods covered with a bright red resinous pubescence.

The cultivation of various medicinal plants in the Government Botanical Gardens at Saharunpore, and the preparation from them of extracts for the use of the Indian medical department, has been the subject of some correspondence. Roots and seeds of English taraxacum have been sent to the gardens, and samples of extract have been prepared from plants raised.

The foregoing represents the principal subjects in this Report which are directly allied with medicine, but it does not by any means include all the matter of economic interest. The information respecting the plants yielding caoutchouc and gutta percha, for instance, is of great importance, considering the fact that we are believed to be within measurable distance of the exhaustion of the natural supplies of the latter of these substances at least. There is also good news for coffee drinkers in connection with results obtained with the "wild coffee" from *Cassia occidentalis*. But to these subjects we hope to have another opportunity of referring.

SIR JAMES PAGET ON UNEXPECTED THERAPEUTICAL EFFECTS.

When it was known that Sir James Paget had undertaken the task of initiating a new annual "lecture," instituted in memory of the late Mr. William Wood Bradshawe, and that he had chosen for the subject of his discourse "Some Rare and New Diseases," it needed no prophet to foretell the success of the experiment. The topics discussed were, however, so purely medical in their character that notwithstanding many portions of the argument were capable of apprehension and enjoyment by any well-educated person, we should not under ordinary circumstances give the address more than a passing notice in these columns. But one passage in it so well illustrates the tendency of a master to question where a novice would dogmatize that we feel warranted in referring to it somewhat more fully, because it has some bearing upon what we have always considered to be an injustice done to pharmacists. In the sensational ebullitions which are periodically manifested in our medical contemporaries in respect to the alleged adulteration of the medicines supplied by pharmacists one allegation which is ever present is that a proof of sophistication is to be found in the failure of medicines sometimes to produce the therapeutic effects expected. Of course, if it were the business of this Journal to bandy vulgar charges with such persons as the writers of these statements, the retort would be obvious; but nothing is gained by such personalities, and it is not in this spirit that we call attention to the words of the eminent lecturer on the subject.

We may premise that Sir James Paget throughout his discourse laid emphasis on the probability that different diseases are continually undergoing more or less modification due to heredity and other causes; some diseases in the form in which they were formerly known becoming exceptional, whilst others which a century ago were considered rare or had not yet been observed are becoming more and more frequent. This he attributes partly to the previous oversight of what existed, but he also considers there is sufficient evidence that new diseases are in progress of evolution and that some that are now looked upon as rare diseases are simply the earliest instances of new ones. He points out that the study of these variations of diseases is not one of mere pathological curiosities, but might be made of great practical utility, and he urges that one direction in which it should be pursued vigorously is in relation to the frequently alleged uncertainty of medicines and the disappointments in the use of supposed remedies that have caused substances long in good repute for the treatment of particular diseases to be spoken of with disrespect. Whilst in many cases it cannot be questioned that the belief in the utility of a medicine has been maintained by completely erroneous observations, yet in others uniform effects are not produced although the diseases treated seem to be the same. Referring to these disappointing results, which he illustrates as occurring sometimes during the use of bromide of potassium in epilepsy, of guaiacum in chronic rheumatic arthritis and of arsenic in lymphadenoma, Sir James says:—"I suppose there is not a "medicine in the Pharmacopœia which does not "sometimes disappoint him who gives it hopefully; "not one which is not therefore spoken of with "contempt or blame, as if it were a responsible "agent convicted of default. But here is an unfair "imputation. It is not these medicines which are "in fault, but ourselves. That which some call the "fallacy of therapeutics is generally the fallacy of "diagnosis. To state the facts roughly, we suppose "cases to be alike which are really different, and "very naturally the medicine which does good in "some of them is useless in others."

We do not wish to place any strained interpretation upon these words; in fact their meaning is too clear to allow of it being obscured or quibbled over. We do not even wish that they should receive an application for which they were possibly not intended. But we do suggest that in future they should be allowed to have due weight with any medical practitioner who is disappointed in the results following the administration of a particular medicine, before he jumps to the conclusion that the pharmacist who dispensed it was either dishonest or incapable.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association will be held on Thursday, January 4, 1883, at 8 p.m., when the following papers will be read:—"Genius, Talent and Industry in Relation to Pharmaceutical Research," by Mr. R. W. Giles. "Some Hints on Practical Photography," by Mr. R. J. MacDermott.

The Lord Chancellor has been pleased to add the name of Mr. Charles James Blelock, Chemist and Druggist, to the Commission of the Peace for the city and borough of Chester.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fifth general meeting of the above Association was held at the Royal Institution on Thursday, December 7, 1882.

In the absence of the President and Vice-President, the chair was occupied by Mr. T. Fell Abraham.

The minutes of the last meeting were read and confirmed, and the following donations announced:—The *Pharmaceutical Journal* and the *Canadian Pharmaceutical Journal.*

Mr. Edward Davies, F.L.S., F.I.C., delivered a lecture on "The Relation between the Physical Forces." The lecturer began with the consideration of chemical force, which was explained to be a form of cohesion, as illustrated by the experiments of Dr. Spring, who by means of enormous pressures brought about the chemical union of sulphur and copper, etc. The connection of heat and electricity with chemical action, as shown in a galvanic cell, was not a conversion of chemical force into heat and electricity, for the force which brought the elements together continues ever at work, keeping them together. They are produced during the impact of the atoms on one another, just as a bullet may by striking an iron target develope heat enough to melt it, but we cannot say that chemical action becomes heat or becomes electricity. The relation of electricity to magnetism was shown in the formation of an electromagnet, and by means of a Gramme machine the production of electric light by motion, and the reciprocal production of motion by electricity was strikingly illustrated. Thermo electricity, or electricity produced by heat, was then shown, as well as heat produced by electricity. The lecturer thought that it was too much to say that one kind of force could be transformed into another. Two forces might stand in the relation of cause and effect, but to go farther than this would naturally lead one to look for the transformation of matter of which we have no evidence. Some explanation of the telegraph, telephone and other applications of the physical forces brought the lecture to a close.

A vote of thanks, proposed by Mr. Birchall, and seconded by Mr. M. Conroy, F.C.S., was passed with acclamation, and Mr. Davies having briefly replied, the proceedings terminated.

YORK CHEMISTS' ASSOCIATION.

The first of a series of lectures was delivered before the members of this Association, at the rooms, 9, High Ousegate, on Wednesday evening, December 20, by Mr. Spencer, L.R.C.P., on "The Relationship between Medicine and Pharmacy," when there was a numerous gathering of the younger members of the trade.

The lecturer reviewed the ancient as well as the modern and scientific methods of the administration of drugs and chemicals, and gave practical information for the guidance of the rising students in pharmacy. After a brief reference to the antiquity of the use of drugs in the treatment of disease, Mr. Spencer observed that our present therapeutics were partially dependent on the results of clinical experience, and partly on a knowledge of the physiological action of drugs. Empiricism had been of great use to humanity, but was full of fallacies. The physiological action of drugs was studied partly by intentional experiments on both man and the lower animals, and partly by the results of poisoning. The advance of therapeutics meant the gradual inclusion of all remedies of which the physiological action was known. Having given several illustrations of this part of his argument, the lecturer dwelt upon the necessity of an advancing pharmacy; in the separation of active principles from drugs, and their preparation in shapes suitable for inhalation and injection under the skin as well as by the mouth. In the concluding part of his address he advocated the practice of pharmacy proper apart from a miscellaneous trade, and the abolition of dispensing by medical men and prescribing by druggists; the extension of provident and co-operative principles for the wants of the working class, showing that modern ideas of development and division of labour must be applied to medicine and pharmacy.

A vote of thanks was passed to the lecturer, and also to Mr. F. Slinger, who occupied the chair.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fifth meeting of the session was held on Wednesday, December 20, in the rooms of the North British Branch, Mr. P. Boa, President, in the chair.

The minutes of the last meeting having been read and confirmed, the Chairman called upon Mr. J. Suttar to read a paper on the "Haloid Elements."

Mr. Suttar having referred to the history of the discovery of the elements chlorine, bromine, iodine and fluorine, and to the strong family likeness that pervaded the group, proceeded to describe their various compounds, and point out their characteristic and distinguishing properties. The paper was illustrated by a number of interesting and successful practical demonstrations by Mr. Macfarlane.

The Chairman moved, and Mr. MacEwan seconded, a vote of thanks to Mr. Suttar, which was heartily awarded, as was also a similar vote to Mr. Macfarlane.

Mr. J. D. Robertson then gave notice of a motion in connection with the sale of poisonous patent medicines, and the Chairman having intimated that an open meeting would be held on January 10, 1883, the meeting was closed.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on December 21, Dr. Gilbert, F.R.S., President, in the chair.

The following certificates were read for the first time: H. C. Bond, J. T. Donald, A. H. Jackson, H. Jones, J. E. Johnson.

The Secretary then read a paper—

On the Condensation Products of Œnanthol. Part II. By W. H. PERKIN, jun.—When œnanthol is acted upon by nascent hydrogen it is well known that heptylic alcohol is produced, but, in addition, other products of higher boiling points are formed in some quantity, and the author has accordingly investigated them. The œnanthol was first dissolved in acetic acid and a sodium amalgam containing 2 per cent. of sodium added; when the action was finished, water was added and the oil which separated dried and distilled at 300 mm. pressure. The portion which distilled under 200° consisted chiefly of heptyl alcohol and œnanthol. The higher fraction contained the aldehyde $C_{14}H_{26}O$ and the alcohol $C_{14}H_{28}O$. The œnanthol was next dissolved in a large excess of ether, floated on water and treated with sodium. The aqueous solution contained some heptylic acid. The ethereal solution was distilled at 150°–200° when œnanthol and heptylic acid came over. The temperature then rose and between 250° and 310° most of the remainder came over. This distillate was refractioned and an aldehyde obtained in crystalline plates melting at 29·5, distilling between 266°–268°, and having the composition $C_{14}H_{28}O$; a second substance was also separated as an oil solidifying at $-10°$, boiling at about 320°, reducing ammoniacal silver nitrate and having the formula $C_{21}H_{40}O$. The author next studied the oxidation of the aldehyde $C_{14}H_{28}O$. The chief products (with chromic acid or silver oxide) were heptylic and hexylic acids, but with silver oxide an acid boiling 300°–310° was obtained in small quantity with the composition $C_{14}H_{28}O_2$. By acting on the aldehyde $C_{14}H_{28}O$, dissolved in acetic acid, first with zinc slightly coated with copper and subsequently with sodium amalgam, an oil was obtained boiling at 270°–275°, which analysis proved to be the alcohol $C_{14}H_{30}O$ already obtained in Part I. The author then discusses the constitution of these bodies; the solid aldehyde and the acid obtained from it are isomeric with myristic aldehyde and myristic acid, but myristic aldehyde fuses at 53·8°, the new substance at 29·5°. From the oxidation products the author considers that the acid must be heptyl-pentyl-acetic acid—

$$\begin{array}{l} CH_3(CH_2)_5CH_2 \\ \quad\quad\quad\quad | \\ CH_3(CH_2)_4CH-COOH. \end{array}$$

The next part of the paper refers to the polymerization of œnanthol. The solid polymer $(C_7H_{14}O)_n$ which had been previously obtained was distilled and from various experiments the author concludes that $n=4$ and the body has the composition $C_{28}H_{56}O_4$.

Dr. Armstrong congratulated the author on having completed an arduous piece of work, which was besides very interesting as it gave a synthetical method for preparing the normal paraffins.

Professor W. Foster then read a paper—

On the Behaviour of the Nitrogen of Coal during Destructive Distillation, with some Observations on the Estimation of Nitrogen in Coal and Coke.—It is usually stated in text-books that coal contains about 2 per cent. of nitrogen, which when the coal is heated in close vessels, usually comes off as ammonia. The author, however, finds that only a small fraction of the total nitrogen comes off as ammonia. A Durham coal was employed which contained 1·73 per cent. of nitrogen and left 74·46 per cent. of coke. A weighed quantity of the coal was placed in a combustion tube, sealed at one end, and the issuing gas was washed free from ammonia by hydrochloric acid. The gas thus freed from ammonia was passed through a second heated combustion tube containing slaked lime; the additional ammonia thus obtained came from the decomposition of cyanogen in the gas. Taking the total nitrogen in the coal as 100, only 14·5 per cent. is evolved as ammonia, 1·56 per cent. as cyanogen, 35·26 per cent. is present in the coal-gas as nitrogen, whilst 48·68 per cent. remains behind in the coke.

Dr. Percy Frankland said that Dr. Hofmann, in his report in connection with the Exhibition of 1862, stated that only one-third of the nitrogen was evolved as ammonia, two-thirds remaining behind in the coke, and as far as he knew nothing had been done with the subject until Mr. Foster had taken it up. He had made some combustions of the coal used by that gentleman, using the apparatus employed in the combustion of a water residue. About ·024 gram of coal was taken; great difficulty was experienced in gettting all the nitrogen off.

Dr. Armstrong suggested that as regards the results obtained everything would depend on the temperature and it would be interesting to know how the quality of the coal affected the results.

Professor Foster said that in his experiments he had endeavoured to imitate as far as possible the usual process employed in the manufacture of coal gas. He hoped to be able to make some experiments shortly, in which he should employ a Siemens regenerating furnace, and so have the temperature under control.

The Secretary then read a paper—

On the Absorption of Weak Reagents by Cotton, Silk and Wool. By E. J. Mills and J. Takamine.—The object of the authors was the quantitative measurement of such absorption. 250 c.c. of the weak reagent (dilute sulphuric acid, dilute hydrochloric acid or dilute caustic soda) were placed in a bottle and kept at a constant temperature; in the bottle was placed also a known weight of the tissue (usually 3 grams). After a week or more the tissue was removed and a known volume of the emaining liquid titrated. The diminution of strength gives, so the authors state, the amount of absorption. In the second part of the paper the authors have determined in a similar way the ratio of absorption from mixtures of the acids. The paper contains numerous tables giving the results calculated to five places of decimals and the mean probable errors. The paper concludes as follows:—"There is thus a very intimate relation between silk and cotton, a relation which, whatever it may be in part, is shown by the changes to be, to a great extent, of a strictly chemical nature. We have, in conclusion, to express the hope that an investigation, while bearing on the one hand on questions of great technical importance, may not be without its value in the profounder future study of cotton, silk and wool; three bodies of definite chemical composition, but the intimate constitution of which still remains obscure."

Mr. Cross said the subject was extremely interesting as bearing on the constitution of fibre. He had made experiments of a similar kind, but had found it very difficult to separate the various factors involved. He did not think that it was correct to assume that the loss in strength of the solution was an accurate measure of the absorption by the fibre, because the fibre might absorb a solution of a different density to that left outside the fibre. He had investigated the subject and could not satisfy himself that the fibre did not take up a solution of different density to that left outside the fibre. In some experiments with aniline dyes he found that asbestos gave results similar to these obtained with some of the fibres used. The effect of the constituents of the ash seemed to have been neglected by the authors.

Dr. Schunck said it was important to determine the absorption by different samples of the same fibre.

Mr. W. A. Shenstone then read a paper entitled—

The Alkaloids of Nux Vomica. No. 2.—On Brucine.—The author has made many experiments as to the limited oxidation of brucine and strychnine, but at present without any definite results. Strecker, Liebig and others state that brucine when treated with dilute nitric acid yields, amóngst other products, either methyl or ethyl nitrate or nitrite. As the formula of brucine suggested that it might be a dimethoxyl derivative of strychnine, the author proceeded to investigate the question. He finds that 1 gram brucine when heated with fifteen times its weight of hydrochloric acid for fourteen hours to 135°, then for thirteen hours to 145°, then seven hours to 150°, and finally seven hours to 160°, evolved 90·2 c.c. of a gas, which analysis proved to be methyl chloride; 1 gram of dimethoxystrychnine should give 113 c.c. During the analysis, after exploding with oxygen, much calomel was formed. It is probable, therefore, that brucine is strychnine in which two atoms of hydrogen are replaced by two methoxyl groups, and that it has the formula $C_{21}H_{20}(CH_3O)_2N_2O_2$. The contents of the sealed tubes after the escape of the gas were black and usually tarry; an examination led to no satisfactory results. The author also studied the action of hydriodic acid upon brucine, but the substances formed are unstable. The author intends to examine strychnine, and thus endeavour to make out the relations of the nux vomica alkaloids, since the removal of the methyl groups from brucine seems to give rise to bodies of such unstable character.

Dr. W. H. Perkin then read a preliminary note on—

Some Diazo-derivatives of Nitrobenzyl Cyanide.—When alcoholic solution of nitrobenzyl cyanide is mixed with an alcoholic solution of caustic potash, an intense crimson red colour is produced, which gradually changes through a brownish purple to a greenish blue colour. It appeared, therefore, that some definite though unstable compound was produced, and it seemed probable that it might yield a derivative with the diazo bodies. The alcoholic solutions of the above-mentioned bodies were mixed, and immediately afterwards an aqueous solution of diazobenzine chloride was added until the red colour disappeared; the product was further diluted and filtered, the precipitate washed, purified by recrystallization, and finally orange-yellow needles obtained melting at 200°–202°, having the formula $C_{14}H_{10}N_4O_2$. The constitution of this body has not yet been established, but it appears to be analogous to the phenylanilo-acetic nitryl, obtained recently by Tiemann.

The Secretary then read a paper on—

Researches on the Induline Group. By O. N. WITT and E. J. P. THOMAS.—The term induline is applied in commerce to a series of violet and blue dyes, distinguished by great fastness to light and atmospheric influences. Scientifically the term may be applied to all coloured compounds formed by the action of amidoazo compounds on the hydrochlorides of aromatic amines with elimination of ammonia. In the present paper the authors give an account of their researches on the formation of amidoazo-benzene and its action on aromatic hydrochlorides. It has long been known that amidoazobenzene, when treated with anilin hydrochloride or nitrate, produces a dark blue coloration. The authors find that invariably several colouring matters, differing from each other both in composition and properties, are formed, and that the nature as well as the quantities of the products depend largely on the temperature at which the reaction takes place, and the manner in which it is conducted. In this paper the authors describe these various compounds and their preparation, and promise, in a future communication, to explain the reaction and the constitution of the products.

The Society then adjourned till January 13, 1883.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the above Association, held on Wednesday evening, December 20, an interesting paper "On Plant Names," was read by Mr. C. E. Stuart, B.Sc. The paper, which will be printed in a future number of this Journal, gave rise to a lively discussion, in which Messrs. Wrenn (President), Parkinson, Alcock, Dodd and others took part.

A hearty vote of thanks to the author was passed.

SUBNITRATE OF BISMUTH.*

BY F. HARRIS ALCOCK.

Some time ago, while engaged in examining a commercial sample of subnitrate of bismuth, I was led to collect a number of specimens and to investigate their general condition. The outcome was sufficiently important to induce me to review the history, general literature, modes of preparation, physical and chemical characters, impurities, and pharmacy of this remedial agent. I venture to think that an account of these several labours will be interesting.

HISTORY.

Basil Valentine, who lived 1413 (*circa*), says in his last testament "that bismuth is a bastard Jovis (Jupiter ♃ = tin)." Paracelsus (1493–1541) classed it amongst the semi-metals. It was for a long time known under the name of marcasite or pyrite, and had been confounded with tin and lead. But it is to Agricola, who lived about 1529, that we owe the first description and definite name of this element; he calls it bisemutum or plumbum cinereum, and says that it is a true metal which is usually added to tin in order to make it work better. This, however, does not seem to have been plain enough for those who were to come after, for we are told that Andrew Libavius (a German physician who lived 1550–1616) thought that the metal was the same as antimony, and Nicholas Lemery (1672) fancied that it was identical with tin. Boyle, the physicist (1626–1691), states, in one of his many dissertations, that the metal bismuth dissolves in aqua fortis (meaning thereby nitric acid), and that the resulting liquid, mixed with common water, was almost completely precipitated by its means. A. Libavius was cognizant of the fact that when a solution of the metal was made in nitric acid, and poured into water a precipitation occurred, but did not offer any remarks about its composition. Lemery describes the preparation (a translation of his original method, with remarks being given below), adding that the product weighs more than the metal used. He added common salt, and many chemists afterwards believed that it was essential to the process. This error was corrected by J. H. Pott (1692–1777), a German chemist, pupil of Stahl and Fr. Hoffmann, who made numerous experiments and increased the knowledge which was then possessed of this substance very much; they will be found in his 'Prima Collectio Observationum et Animadversionum Chymicarum' (1739).* Of the chemists who have contributed much to our information on this subject may be mentioned Geoffroy the younger (1753 *circa*), Stahl (1660–1734), Dufay (1698–1739), the Swede, Cronstedt (1722–1765), Kerwan (1750–1812), Bergman (1735–1784), G. Neumann (1683–1737), Hellot (1685–1766) and of those in this century, John Davy (1812); Jacquelin Berzelius, Phillips, Gmelin, Freundt, Lagerhjelm (1815), Stromeyer, Schneider, Nickles, Bechamp, Saint Pierre, Ritter, Ruge, Gladstone, Duflos, Muir, etc., and many others, and amongst them some eminent pharmacists of our own day.

MODES OF PREPARATION.

In honour of M. Lemery it may not be out of place to quote the method adopted by him. It will be found in his 'Cours de Chymie' (1675),† and as he was remarkable for a clear mode of expressing himself, and for his superior chemical skill, and also as he had gained considerable reputation for the manufacture of this article, you may rely on something useful as well as quaint. This is from a fair translation of his work by Dr. Walter Harris (1686):—

"Magistery of Bismuth is a tinn glass dissolved and precipitated in a very white powder. Dissolve in a Matrass, an ounce of Bismuth, grosly powdered with 3 ounces of Spirit of Niter,‡ pour the Dissolution into a clear Whiteware Vessel, and pour upon it 5 or 6 pints of Fountain water, in which you shall have dissolved beforehand an ounce of sea salt,§ you'l see a white powder precipitate at the bottom. Pour off the water by Inclination, and wash this Magistery several times, then dry it in the shade. It is an excellent Cosmetick, called Spanish White, that serves to whiten the complexion. It is either mixed in Pomatum (ʒi to ℥i), or Lillie water (ʒi to ℥iv)."

"*Remarks.*—You must use a large Bolt-head to dissolve the Bismuth in, because the great Ebullition that happens

* Read at a Meeting of the Association, November 8, 1882.

* Dr. J. H. Pott, 'Observationum et Animadversionum Chymicarum, præcipue circa Sal Commune, Acidum Salis Vinosum, et Wismuthum Versantium, Collectio Prima.' Berolini, 1739.

† This was a wonderful production by Lemery. Immediately after it was published it was received with general approbation and applause, and passed through numerous editions. Indeed, seldom had a work on a subject of science been so popular. Fontenelle said 'it sold like a satire.' New editions fol owed year by year, and it was translated into Latin and into various modern languages.

‡ "Spirits of niter" was prepared i Lemery's ay by mixing together 2 pounds salt-peter and 6 pounds of Potter's earth, dried, placed into an earthen or glass retort, luted and heated in a reverberatory furnace until nothing more would pass over.

§ J. H. Pott, 1739, shows in his work, previously referred to, that the sea salt is unnecessary.

as soon as spirits of niter is cast upon it requires room to move in. You must likewise have a care, as much as you can, of receiving the Vapours at your nose or mouth, for they are very offensive to the breast. This quick and violent ebullition proceeds from the acid's immediate penetration of the large pores of the Bismuth, so soon as thrown upon it, and the acid violently divides all that opposes its motion. It happens also that the Bolt-head grows so hot that a man can't endure the hand on it because the points of the Menstruum do chafe against the solid body of Bismuth with such force that you may observe from thence much the same heat as when two solids are rub'd against one another, add to this, that the great store of igneous particles contained in Spirits of Niter, may much increase this heat. If the Dissolution becomes turbid through some impurities in the Bismuth, you must pour into it about twice as much water and filter it, for if you should go to filter it without water, it would coagulate like salt in the filter and not pass through. This Coagulation proceeds from the acid Spirits of Niter that are included in the particles of Bismuth, which finding too little liquid to swim in and disperse do gather together into Crystals when the Dissolution is cold. The impurity which commonly swims upon the Solution of Bismuth is a fat or bituminous matter, which will not dissolve in the Spirit of Niter.* This Magistery may be made by pouring into great quantity of Fountain water without any salt, and the Precipitation is the better because salt does encounter and break some of the acids that pure water alone was not able to weaken sufficiently. Now some difficulty appears in conceiving how plain water alone comes to precipitate Bismuth, Lead and Antimony, which the acid has dissolved, and yet can do nothing at all to the precipitating Gold, Silver or Mercury, without the assistance of some salt or other body. I do imagine that the former having larger Pores the acids cannot stick so close in them, but that water is able to force them out; but Gold, Silver and Mercury having finer pores in comparison than the other, do retain the acids so very closely, that the weak impulses of water alone can make no separation: some more active body is required to do it.

"The augmention which happens to Bismuth when made into a Magistery, does proceed from some part of the Spirit of Niter that remains still in it notwithstanding the precipitation and lotion."

The following are the principal official processes for the preparation of subnitrate of bismuth:—

B.P.—Purified bismuth in small pieces 2 ounces av., nitric acid (1·420) 4 fluid ounces, distilled water a sufficiency. The acid mixed with 3 ounces of distilled water and bismuth gradually added. When effervescence has ceased, heat to nearly ebullition is applied for ten minutes and the clear solution decanted very carefully from the insoluble portion which may be present. Evaporate the clear solution to 2 fluid ounces and pour it into ½ gallon of distilled water. Let the precipitate subside, decant the clear supernatant liquid, add ½ gallon distilled water to the precipitate, stir well and after two hours decant off liquid, collect and drain the precipitate in calico filter, press with the hands and drain it at a temperature not exceeding 150° F.

Heavy white powder in minute crystalline scales, blackened by sulphuretted hydrogen, insoluble in water, but soluble in nitric acid mixed with half its volume of distilled water, forming a clear solution which poured into much water gives a white precipitate. It forms with sulphuric acid diluted with an equal volume of water a solution which is blackened by sulphate of iron. The nitric acid solution gives no precipitate with diluted sulphuric acid nor with solution of nitrate of silver.

U.S.P. (1882).—This, which was published November 1, does not describe the process for the preparation of this substance, the reason being given in negative form in the Preface to the work, viz., that in the case of those chemical preparations where different processes yield different results, the process to be followed in each case is described in detail; it is therefore presumed that bismuth subnitrate, however prepared, should be uniform in composition.

U.S.P. (1872, *i.e.*, 5th Decennial Revision).—Bismuth in pieces, 2 troy ounces, nitric acid (1·42), carbonate sodium, each 10 ounces, water of ammonia (·960), 6 fluid ounces, distilled water q.s. Mix 4½ troy ounces of the nitric acid with four fluid ounces of distilled water in a capacious glass vessel, and having added the bismuth, set the whole aside for twenty-four hours. Dilute the resulting solution with 10 fluid ounces of distilled water, stir thoroughly and at the end of twenty-four hours filter through paper. Dissolve the carbonate of sodium in 12 fluid ounces of distilled water with the aid of heat and filter the solution through paper. To this, when cold slowly add the solution of nitrate of bismuth with constant stirring. Transfer the whole to a strainer, and after the precipitate has been drained wash it with distilled water until the washings pass tasteless and drain again as completely as possible. Then place the moist precipitate in a capacious vessel, gradually add the remainder of the nitric acid and afterwards 4 fluid ounces of distilled water and set the solution aside. After twenty-four hours filter through paper, and to the filtered liquid previously diluted with 4 pints of distilled water, slowly add the water of ammonia with constant stirring. Transfer the whole to a strainer and after the precipitate has been drained, wash it with 2 pints of distilled water and drain it again. Lastly, dry it upon bibulous paper with a gentle heat and rub it into powder.

French Codex.—Purified bismuth, 200 grams; nitric acid (1·42), 450 grams; distilled water, 150 grams; mix the acid and water in a flask, add the metal in coarse powder gradually to prevent excessive action. When effervescence has ceased, heat to ebullition to complete the solution; decant clear liquid after a little rest, and evaporate in a porcelain capsule to two-thirds and then pour into 40–50 times its weight of distilled water with constant agitation. Let precipitate settle, decant supernatant liquid and wash several times by decantation, collect on a filter, drain and dry.

German P. (1882).—Bismuth, 2 parts; nitrate of sodium, 1 part; distilled water, 5 parts; solution of caustic soda, 3 parts (15 per cent. and S.G. 1·159–1·163); warm nitric acid (1·185) 8 parts. The metal is treated in an iron crucible with the nitrate of sodium in very much the same way as our Pharmacopœia directs, and the resulting mass treated with the water and solution of sodium hydrate, mixed together, boiled for a short time, and the insoluble portion collected on a filter, and washed until free from alkali. The dried residue is then dissolved in the nitric acid gradually, and after the solution has been kept for a short time at a temperature between 80°-90° C. it is filtered through asbestos and the clear solution evaporated until reduced to 6 parts. One part of the crystals which will form on cooling is washed several times with water acidulated with a little nitric acid, and then rubbed down smoothly with 4 parts of water, transferred to a vessel containing 21 parts of boiling distilled water and stirred. The sediment is allowed to subside and the supernatant liquor while still warm is removed and the precipitate collected on a filter. Then, as soon as filtration has ceased, wash with an equal volume of cold water and dry at 30° C. (86° F.).

German (1872).—Pure nitric acid (1·185), 9 parts; coarsely powdered bismuth, 2 parts; towards end of action apply gentle heat. When nitrous fumes cease to be evolved, add a quantity of distilled water equal to half the amount of liquid, or until a white precipitate begins to form. Let the liquid remain until precipitate has subsided, and pour off clear liquid and evaporate

* That bismuth did neither contain fat nor bitumen was shown by Pott in his work previously cited.

until it begins to crystallize or until the weight of the solution is three times the weight of the metal used. One part of these crystals, washed with a little water acidulated with a little nitric acid, is mixed with 4 parts distilled water and the mixture poured into a vessel containing 21 parts of boiling water and thoroughly stirred. The precipitate thus formed, after the whole has cooled, is poured on to a filter, and washed with a very small quantity of water (*ne nimis*) and dried at a temperature not exceeding 30° C.

Of the above methods which are official, three are in the main identical, viz., B.P., Codex and German, being solution in nitric acid and precipitation by means of water, washing by decantation and drying at a low temperature. The dilution of the acid is essential to prevent too violent action, with consequent development of much heat, and loss by spirting and evaporation.

The B.P. method orders too much acid and therefore when solution of the metal is effected the resulting solution is evaporated with loss of acid. Perhaps it would be better to add the bismuth to the acid until a point is reached when it ceases to dissolve the metal and then a small and definite quantity of the acid could be added to bring the product to the proper strength for producing the B.P. article. The residue, which varies in quantity and colour according to the purity of the metal used, is, after the solution has been boiled, decanted or diluted until it would not act on paper, and filtered, or better, filtered through powdered glass, glass wool, or gun cotton. Evaporation should not be carried too far, for crystals form and cake and are then difficult to wash. When, after pouring into the *stated* quantity of water and washed as directed, it is placed on calico filter and drained, it would shorten the drying process if the precipitate were strongly pressed under a wooden press, as is done when phosphate of iron is made. The drying may be conducted at 120° F. in air closet, the result being a *white* powder not too dense and not acid to litmus paper when moistened with cold water. The supernatant liquors must in every case be preserved, for they contain varying amounts of bismuth which is held in solution by excess of HNO_3. Care is to be taken that distilled water only be used, for some waters contain solids which are very liable to be carried down when the nitric acid solution is poured into the water. To obtain uniformity in results the method adopted, whichever it may be, must always be carried out strictly in accordance with the recipe; even different amounts of water used in washing, difference in strength of acid used, and temperature at which the product is dried, tend to alter the nature of the preparation. It should not be allowed to remain in contact with the calico longer than is absolutely necessary, for this is said to darken the product from contact with the small particles on the surface of the calico when exposed to light. Drying may be done by placing in flat glass dishes as clock dials, etc.

The United States method of 1872 was quite different to the methods which had been used for a long time, in fact since the substance was known. The difference consisted in the use of carbonate of sodium and the liquid ammonia.

Before the 1864 edition of the U.S.P. the process was the usual one, but in their fourth decennial revision in that year the 1872 process was first authorized. It was devised with the intention of removing all the arsenic which might exist in the metal. The arsenic becoming arsenic acid, and by the dilution process arseniate of bismuth being sparingly soluble in the liquid so diluted is deposited in the time stated and was then removed by filtration. Addition of filtrate to the excess of carbonate solution caused precipitation of bismuth as subcarbonate, together with other metals except arsenic, nearly the whole of which remaining in solution as arseniate of sodium and was removed by filtration and washing the precipitate with water. The bismuth subcarbonate, or rather oxycarbonate, by solution in HNO_3 became again nitrate, and this solution was again set aside for twenty-four hours to permit any more arseniate of Bi which might have escaped previous treatment to be deposited. The filtered liquid was then mixed with water, which gave the subnitrate free from arsenic. As the liberated nitric acid retained some bismuth in solution, the water of ammonia was used to nearly neutralize the acid, which caused the precipitation of more bismuthous nitrate. This operation required great care, for the least excess of ammonia water would cause the precipitation of other metals which might be present, and to redissolve them again would be a difficult and unsafe way of rectifying the possible source of much impurity by the excess of precipitant. The advantage of the B.P. process over this is now easily seen, and would impress the practical man more if he carelessly made his preparation by the U.S.P. method. The supernatant liquors are never thrown away, for there are other compounds of bismuth used in pharmacy and the arts besides the one under consideration, and these can be made from them, when required, so that it is a mistaken notion to suppose than any bismuth will be lost by the British process; the supernatant liquors could be precipitated by carbonate of sodium, and the precipitate washed, dissolved in HNO_3 and reprecipitated by water. Many methods have been described to prepare this compound, so that it shall be more constant in composition, and contain less impurities. A few may be briefly mentioned here, excluding the many methods for purification of metal.

Lalieu (1878).—Treatment of well-washed and still moist oxide obtained from 200 grams of the metal (by means of AmHO, wash, add NaHO, put on water-bath for short time), with nitric acid equal to 48·5 grams of nitric anhydride, adding it in small quantities, and then heating the mixture until it becomes limpid and white; after the addition of a little water the subnitrate is thrown upon a filter, washed with twice its bulk of water, expressed and dried; the yield is 265 grams.

Huskisson's Method (*P.J.*, 1860).—This, something like the German process, is, it is said, adopted by manufacturers, viz., evaporation of nitric solution until it begins to crystallize, set aside and removing supernatant mother-liquor and wash crystals with a little acidulated water and using these only. This process can be repeated as often as necessary to ensure perfect absence of impurity. This would certainly remove much silver, copper, lead and arsenic, if present.

Brownen suggests, for removal of copper, precipitation from nitric solution by means of carbonate of ammonium (its best precipitant); wash with liquor ammonia and reduce to metal or dissolve at once in nitric acid and proceed as usual.

Umney, during a discussion at one of the Pharmaceutical Society's meetings some years ago, suggested the use of bismuth oxide prepared by precipitation by caustic alkali, and although he spoke of it as applicable to the preparation of the "Liquor" yet it may with considerable advantage be used for the other compounds, especially when copper, silver, etc., are absent.

Julius Löwe recommends the washing water to be made of 1 part of nitrate of ammonium with 500 of distilled water. Fresenius adopts this suggestion in his 'Quantitative Analysis.'

Schneider (as also Duflos) recommends solution of 2 kilogrammes of Bi in 10 kilogrammes HNO_3, *hot*, and after solution decant from sediment which contains the arsenic; on evaporation, the crystals, which separate, are free from arsenic. Bismuth arseniate is formed, which is insoluble in strong solution of nitrate of bismuth, although more soluble in water. A safe method consists in the examination of the metal, and if any impurities are present, to reject the sample, and, as Professor Redwood said some years ago could be done, viz., seek and pay for good and pure metal.

(*To be continued.*)

Review.

THERAPEUTICAL REMEMBRANCER, PRESENTING IN DETAIL ALL MEDICAMENTS ACCREDITED BY THE BRITISH PHARMACOPŒIA, with copious supplementary tables, etc. By J. MAYNE, M.D., L.R.C.S.E., L.S.A. Second Edition, revised. London: J. and A. Churchill.

It is difficult to decide what to say concerning this little book. It only deserves notice from the fact that of the many similar compilations we have the misfortune to see, this is the most badly arranged, the most erroneous, the most useless. One cannot understand how it could possibly have reached a second edition, unless the first consisted chiefly of presentation copies.

The various drugs are arranged according to their therapeutic action, and the whole concludes with a few notes on poisons and their antidotes. Some curious things which we suppose are meant to be prescriptions are, without a word of explanation, tacked on to some pages. We select a few specimens;—

On page 5—

H. Subchlor.
Tr. Cinchonæ.
Solve. (A teaspoonful dose.)

Again on page 6.

℞ Pil. H.
Ext. Colcynth. co.
Ipecacuanhæ pulv.
Saponis.
F. massa in pil. div.
Liqu. H. perchlor.

On page 18—

℞ Cambogiæ.
Potassæ carb.
Theriacæ. q.s.
M. pro. re. nata.
M. take.

And on page 22—

℞ Hellebori.
Ext. aloes barb.
Ferri et ammoniæ cit.
Colocinth.
Opii pulv.
M. f. pil.

We admire the author's ingenuity in working so many errors into the following three lines:—

Chalk (calcis chloridum)
Use. To prepare the following
Liq. Calcis chloratæ.

According to Dr. Mayne, white marble is synonymous with creta, and is a valuable antacid for intestinal disorders; æther purus and spiritus ætheris are the same substances. Sabadilla is derived from *Veratrum Sabadilla*; saccharated *carbonate* of lime is an antidote. Pix Burgundica is the tar exudings from spruce fir and *Pinus sylvestris*. Sinapis is the seeds of *S. nigra* only; galls are *nuts* or excrescences; syrupus ferri iodidi contains 4·3 grs. *oxide* of iron in fluid drachm; phosphorus is *never* given *in the solid form* (author's italics); pareira root is of course still derived from *Cissampelos Pareira*; and the following is a full description given by the author:—"Canna (the tous-le-mois, not well authenticated)." The following is the formula given for Fowler's solution:—"Arsen. acid, powder, powdered carb. potash aa—grs. 80, tr. lavand. co., drachms V., aqua distil, q.s." This is all, but the reader naturally would like to know what the quantum may be. In this revised second edition we find such gross errors in orthography as antimonium sulphuretum, sp. ætherus, colcynth, colocinth, lequ (we presume this is meant for liquor), syrupus ramni, rincing, zinzib, strobules. We find such expressions as acid solution of nitrate of H., solution of perchlor. H., and we are fairly puzzled by the following:—"Iodum (emmenagoges)," "sodæ (sodæ acetas)," "rosa centifolia (*i.e.*, aqua rosæ)," and "cardamomum (capsules of Malabar [elettaria] dried)."

It seems scarcely credible that such drugs as the following should be omitted from a therapeutic remembrancer, but we have failed to find them mentioned:—Ergot, chloral hydrate, bismuth salts, areca, nitrite of amyl, pepsin, hypophosphites, chloroform; and all the notice of cinchonas, on page 78, is "cinchonæ (var.)."

It is not our province to criticise this extraordinary production in its medical aspect, but we notice that galls are not mentioned as being used externally; that sp. æth. nit. is said to have the same action as æther, and, therefore, according to the author, to be useful in tetanus, epilepsy, hysteria, asthma and other spasmi; that dulcamara is good for gout, rheumatism, eruptions of long standing, jaundice and scrofula (on another page it is stated that it is "*perhaps* serviceable to form an infusion);" and that veratria is given as an *errhine* in gout. We should think an hour or two's continuous sneezing would be calculated to exert a very soothing influence upon a patient suffering from an acute attack. Tonics are described simply as "those medicines which have power of enhancing the quality of tonicity in muscular fibre," and buchu is described as being "scarcely ever selected even as infusion or vehicle."

In the so-called index, which is miserably insufficient, there is no drug mentioned, although throughout the book the reader is constantly referred for the properties of one drug to the description of another—thus: "Alcohol (v. Vinum Xericum)," "Calomel (v. hydrarg. subchlor)." We have devoted this amount of space to this wretched book to indicate to our readers its absolutely worthless character. To be frank, we are surprised that an M.D., L.R.C.S.E., L.S.A., should publish such a thing with such a title page, and we hope that when the *cacoethes scribendi* next seizes him, he will turn his attention to some subject other than medicine or pharmacy.

BOOK RECEIVED.

THE BREWER, DISTILLER AND WINE MANUFACTURER, giving full Directions for the Manufacture of Beers, Spirits, Wines, Liqueurs, etc. [Churchill's Technological Handbooks.] London: J. and A. Churchill. 1883. From the Publishers.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

"*Wilton*" (who is requested to comply in future with the regulations as to anonymous communications).—(1) Any person whose name is on the Register of Chemists and Druggists may legally carry on the business of a chemist and druggist, whether he is connected with the Pharmaceutical Society or not, (2) Consult the indexes of this Journal.

J. Finch.—Our views as to the rights of chemists to prescribe have been expressed in this Journal in numerous articles, to which we must refer you for the information you require.

J. Gould.—We do not feel at liberty to ask for assistance in imitating a particular proprietary preparation.

C. Ellison.—The following recipe for "Pick-me-up" tonic has been published before in this Journal:—Cardamoms, 5 parts; caraways, 2; cochineal, 2; cinnamon, 10; raisins, 80; orange-peel, 56; ginger, 14; gentian root, 3; wormwood, 2; quassia, 1; alcohol (·838), 750; water, 750. Macerate for fourteen days, filter, and add syrup, 200 parts.

Nemo.—We cannot.

J. Ward.—We are unable, after the lapse of time, to comply with your request. Please address future communications direct to the Editor, 17, Bloomsbury Square, in accordance with the notice on p. 533.

Ajax.—We have been unable to obtain the information.

Junior.—The formulæ has been asked for on several occasions without success.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Short, Dyer, Scruton, and Incognito.

The Pharmaceutical Journal.

SATURDAY, JANUARY 6, 1883.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed " Pharm. Journ."*

1882.

THE year that has just closed has not, in its pharmaceutical aspect, been marked by any very stirring events. But even in this it may be said to have had an advantage over its predecessor; for if it has brought no International Congress, neither has it seen the retirement of honoured leaders or the frustration of carefully elaborated schemes for the improvement of the conditions under which pharmacy is practised in this country. On the contrary there has been a decided improvement in the general position, and the close of the year finds the Council engaged, at the request of the Government, in formulating its views as to amended legislation in the interests of pharmacy as well as of the public.

The Council of the Pharmaceutical Society, which may fairly claim to be by far the most important executive body in relation to all that pertains to pharmacy in this country, has not undergone any change in respect to its members during the past year. The fourteen gentlemen who, according to the bye-laws, retired from the Council in May were nominated for re-election, and were all returned by considerable majorities. At the first meeting of the new Council in June, the choice of officers for the ensuing year was made. Mr. THOMAS GREENISH, who for two years had filled the post of President with a success indicated by the fact that at the end of each year he had headed the poll in the election of members of the Council, retired from the chair, and his place was taken by Mr. MICHAEL CARTEIGHE. Mr. GEORGE FREDERICK SCHACHT, who for three successive years had been chosen Vice-President, gave up that post to Mr. SAMUEL RALPH ATKINS; whilst Mr. JOHN ROBBINS was again requested to act as Treasurer.

The Registrar's Report, which was presented as usual to the Council in February, showed an increase of 193 in the number of names on the Register of Chemists and Druggists. In contrast to this there was a decrease of 29 in the total number of persons connected with the Pharmaceutical Society as members and associates. This retrogression, and the fact that it was mainly due to a decrease in the class of Pharmaceutical Chemist Members, naturally formed the topic of some conversation at the Council, and it gave rise outside to some ill-concealed jubilation as to "the decay of the Pharmaceutical Society." That this assumption was somewhat premature is shown by the fact that the gross number of members and associates still reached 4607, a total that had only been exceeded in the previous year.

Amongst the earliest business that came before the Council last year was a motion of Mr. RICHARDSON to rescind some regulations passed in 1879, as to the conditions under which reporters should be allowed to attend the meetings of the Council. The general effect of the motion was to place all press reporters who might attend upon an equal footing, and to remove a somewhat anomalous distinction which had its origin in a desire to confer upon the representatives of another journal privileges we were erroneously supposed to enjoy. The Council also resumed the right to allow its own reporter to be present for the purpose of taking notes during the transaction of private business in committee, a right which, as Mr. RICHARDSON frankly admitted, had been relinquished under the temporary misapprehension that this reporter attended on behalf of the *Pharmaceutical Journal.* The fact is, as has been stated many times, the reports of the Council proceedings published in this Journal are the official reports, supplied under the authority of the Council itself. After the experience of the last three years it may be fairly assumed that they correctly represent all that portion of the business which the Council feels at liberty to transact in public. In addition to this, the Council, at its meeting in May, on the motion of Mr. RADLEY, passed a resolution authorizing the President for the time being to publish in the Society's Journal and Transactions so much of the proceedings of the General Purposes Committee as he might deem desirable.

Notwithstanding the wide-spread discontent that exists among those legally entitled to carry on the business of chemist and druggist, and their almost unanimous agreement that the emoluments arising from it are insufficient to repay the expenditure of time and money involved in securing the necessary qualification, there does not yet appear to be any indication of a falling off in the number of persons desirous of acquiring the right to practise pharmacy. The total number of candidates who came up at the different examinations during the year amounted to 2030, being 73 in excess of those of the previous year, and 13 more than in 1880. Taking first the initiatory stage, the number of candidates at the four Preliminary examinations reached 1269 against 1187 in the previous year. Of these 629 were successful; this represents 49·5 per cent. of passes, which is a result more satisfactory than in the previous year when only 512 or 43·1 per cent. passed. The number of certificates received in lieu of the Society's examination was only 50, showing a falling off as compared with the year 1880; but the net result was that 679 apprentices were registered, being 82 more than in the previous year. The number of candidates for the Minor examination was 650, or exactly the same number as in 1881, and two less than in 1880, so that very little variation is manifest in the numbers coming up for the qualifying examination. There has been, however, a very considerable falling off in the percentage of passes in this examination, for whereas in 1881 they equalled exactly 50 per cent., last year they only amounted to 286 or 44 per cent., showing a larger proportion of failures than has occurred in any year except 1874 since the passing of the Pharmacy Act in 1868. The number of candidates who presented themselves for the Major examination also was almost the same as in 1881, having been 103 against 107; but of these, too, a much larger proportion failed and only 40, or 38·8 per cent., passed and became entitled to registration as pharmaceutical chemists. Only 8 persons presented themselves for the Modified examination, and of these 5 passed.

The examinations and their relation to pharmaceutical education have again occupied a large share of the attention of the Council. The very large proportion of failures in the Preliminary examination in January induced Mr. Borland to raise the inquiry whether the questions in arithmetic had not been more difficult than usual, and Mr. Young suggested whether it might not become desirable to appoint a committee to watch the examination papers with a view to checking undue stringency. Undoubtedly the large proportion of failures in arithmetic which occur in the Preliminary examination, and which in 1881 nearly quadrupled the proportion of failures in Latin, is a very remarkable feature; but as the questions are always published, and this particular subject is one that does not admit of much variation of opinion in awarding marks, any person interested in the subject has an opportunity of forming his own judgment upon the subject. Still, we think that there will be a general agreement with an opinion expressed by Mr. Walter Hills, at the Council meeting in October, that the arithmetical questions set are not of such a nature as to explain this result, and that in a pharmacist's daily business questions quite as difficult often occur, so that a person unable to obtain 40 per cent. of marks in arithmetic in this examination would scarcely be qualified to dispense prescriptions. Unfortunately there can be little doubt that Dr. Greenhow, in his report to the Privy Council, correctly attributed the large number of rejections to the very inadequate early education of the majority of the candidates; it is to be hoped, therefore, that in an increasing proportion of cases this test may be applied before pupils have wasted some years of their lives in a calling for which they do not possess the elementary scholastic qualification. Evidently, however, there exists some difference of opinion among chemists and druggists as to the standard that should be adopted for this examination, and the Society may be congratulated that the questions are now set by an impartial body like the College of Preceptors. From this point of view interest attaches to a communication which was received in August from the honorary secretaries to the Oxford and Cambridge Schools Examination Board, in reference to an examination which it is intended to institute in connection with schools throughout the country, and asking if certificates granted in respect to it would be received in lieu of the Preliminary examination. Some points in the scheme gave rise to objection, but the general spirit of it was approved by the Council, and there is no doubt that the establishment by such unimpeachable authority of a standard that shall represent what may be considered a fair test of a sound middle-class education would be a great boon.

In December the subject of the Preliminary examination came again under the consideration of the Council in connection with a special recommendation contained in a report from the Board of Examiners in England. It was to the effect that the time allowed should be extended from one hour to one hour and a half for each of the three subjects, with an interval of one hour between the second and the third; also that instead of the examiners being limited to the first book of Cæsar for their selection of one passage for Latin translation, they should be at liberty to set two passages, one from one of the first two books of Cæsar's 'De Bello Gallico,' and the other from one of the first two of Virgil's 'Æneid,' the candidate only to be required to translate one of the passages, and notice to be given a year in advance as to the books from which the selections would be made. An objection was raised, however, representing the views of the Board of Examiners in Scotland, that the extension of the ground of selection to two books of each author would have the effect of unduly increasing the difficulty of the examination. Accepting the suggestion as to the increase in time allowed, the Scotch Board desired that in respect to Cæsar the examination should be still limited to the first book, and that, if Virgil were introduced, only the first book of that author should be used. After a discussion, an amendment in accordance with the views of the Scotch Board was carried by a bare majority of the Council, and future candidates for the Preliminary who have studied Virgil rather than Cæsar will, therefore, have an easier task and a longer time to perform it in.

But the interest of the Council in the examinations has been by no means confined to the Preliminary, and it appears probable that one of the results of the past year's labour has been to bring more clearly within the range of probability the establishment of a curriculum to be followed as an indispensable portion of the education of pharmacists in the not very remote future. In March a Special Committee on the relation to each other of pharmaceutical education and the pharmaceutical examinations, to which a preliminary report had been referred for the working out of details, laid the result of its labours before the Council. The fresh report fully endorsed the first two recommendations of the previous one, to the effect that candidates for the qualifying examination should be required to produce evidence of apprenticeship or pupilage of not less than three years, and that the Preliminary examination or its equivalent should be passed before the time spent in such pupilage should be allowed to count. The third recommendation, that the candidate should be required to produce evidence that he had attended since the date of his Preliminary examination a course of lectures on chemistry, one on botany, and one on materia medica, was also endorsed and a syllabus of the course of lectures on each subject was submitted. With respect to the authoritative recognition of such lectures and teaching the Committee recommended that the Council should, at its discretion, recognize and accept certificates from those public schools of science, the responsible authorities of which shall satisfy it that their scope of teaching includes the points enumerated in the syllabuses, or certificates from other schools in which it is shown that the teaching is of sufficient excellence and of the nature required. With respect to the fourth recommendation the Committee recommended an important modification of that in the previous report. It was still proposed that the Minor examination should be divided into two parts, between which it was suggested there should be an interval of not less than six months; but it was now recommended that the first portion, including the translation of prescriptions, pharmacy and theoretical chemistry, should be entirely a written examination and should be conducted under suitable regulations in London, Edinburgh, and certain provincial centres to be agreed upon by the Council. It was recommended that persons passing this portion of the examination should not receive a certificate, but should be entitled to present themselves, after an interval of not less than six months, for the second portion of the examination, which should be essentially *vivâ voce* and experimental, conducted in London and Edinburgh only, and consist of chemistry and practical chemistry, botany, materia medica and practical dispensing. Finally it was recommended that these regulations should come into operation on the 1st of January, 1886. The discussion of the report was postponed until the meeting in the following month, and a copy was ordered to be supplied to each member of the Council for consideration meanwhile.

In April, accordingly, the subject was brought formally under the consideration of the Council, upon a motion made by Mr. SCHACHT, and seconded by Dr. SYMES, that the recommendations of the Committee should be approved. The first three recommendations, as to pupilage, the Preliminary examination, and a curriculum, were again endorsed with great unanimity; but the modifications introduced into the fourth were sharply criticized. Granting the desirability of the division of the Minor examination into two parts, Mr. HAMPSON opposed the suggestion that there should be an interval of six months between them, as well as the rearrangement of subjects, and especially the proposition that the first portion should be conducted at provincial centres. In one or other of these objections he was supported by a majority of the members of Council, among whom were the President (Mr. GREENISH), Mr. WILLIAMS, Mr. BOTTLE, Mr. YOUNG and Mr. BORLAND. On the other hand the report was defended by the Vice-President (Mr. SCHACHT), Mr. CARTEIGHE, Dr. SYMES, Mr. ATKINS and others, it being argued that the interval and the local examinations were advisable in the interest of the candidates, whilst the placing of the theoretical subjects before the technical was the logical course, since after a candidate had satisfied the examiners as to his practical ability the prolongation of his scientific studies could not be so well demanded in the interest of the public. After a long debate an amendment to adopt the first three recommendations was carried unanimously, but a motion to adopt the fourth recommendation was lost by a majority of one. The fifth recommendation, as to the time when the new scheme should come into force, was therefore necessarily dropped; indeed it almost seemed as if some of the chief advocates of the scheme, in seeking to secure a minor point, had brought the whole movement to a dead-lock.

At the second meeting of the new Council, in July, however, the recommendations again underwent a long discussion. Mr. SCHACHT moved that a Committee should be appointed to consider and report upon the best method of giving effect to the resolution of the Council in April, and he pointed out that one of the first duties of such a Committee would be to inquire how far the present legislative power would enable the Council to carry it out. But the motion also included an instruction to the Committee to report any suggestions it might desire to advance as the result of its deliberations, which provoked considerable opposition, and Mr. HAMPSON moved its omission on the ground that it would probably reopen the question upon which the Council had already come to a decision. On the other side it was argued that the manner in which the Minor examination should be conducted would necessarily have to be considered by the Committee in connection with the third recommendation, which had been adopted, and that even without such an instruction the rejection of one plan would not have precluded the Committee from suggesting another; it was also pointed out by the President, Mr. CARTEIGHE, that the striking out of the instruction after it had been inserted might be construed as an indication that the Council wished to fetter the Committee in its deliberations. So evenly were opinions balanced upon this point that upon a division an equal number voted on each side, and the President having given his casting vote against the amendment, the motion of Mr. SCHACHT was afterwards carried by a majority of one.

It may be safely said that besides the prominent position this future of the qualifying examination has occupied in the deliberations of the Council it has given rise to more talking and writing than any other pharmaceutical topic during the year. Besides being discussed at the General Meeting of the Society, it has permeated presidential addresses, been the occasion of several meetings in the provinces, called forth special memorials to the Council, and provoked a mass of correspondence. Of course there has been diversity of opinion manifested, but the preponderance has been decidedly in favour of the establishment of a curriculum, which denotes a healthy recognition of the fact that such a course would not make the qualifying examination more stringent, but would lessen the proportion of rejections by promoting the better education of those who are to be examined. Among the expressions of opinion to which adventitious circumstances lend an additional importance, is that of Dr. GREENHOW, the Government Visitor at the examinations, who, in his last official report, whilst deferring detailed comments on the scheme as a whole, expressed his decided approval of the first two recommendations. Another occurred in a letter from Dr. W. B. CARPENTER, who, after many years' experience as Registrar at the University of London, considers that the regulation under which the attainment of medical degrees at that University is made exceptional by restrictions as to the mode in which candidates shall study is a wise one, and that a similar course should be followed with respect to candidates for a qualification to practise pharmacy. Again, Mr. ALEXANDER NAPIER, speaking as President of the North British Branch, two months ago, said, that no one could doubt that a course of compulsory and systematic instruction in theoretical chemistry, botany and materia medica, with practical instruction in chemistry, would be the best means of insuring thoroughly intelligent agents for the practice of pharmacy, and that the time must come when pharmaceutical students will have to devote a certain period exclusively to scientific education, since the present system, or no-system, of having an engagement in a pharmacy and attending lectures and studying in bye hours, is unsatisfactory to both employers and students. But perhaps one of the most encouraging expressions of opinion on the subject, outside the Council, took place at the Annual Meeting of the Trade Association, when a motion to the effect that at the present time it is not desirable to establish a curriculum was rejected by a majority of nearly three to one. It therefore appears evident that there has been recently a considerable development of opinion in favour of the adoption of a compulsory curriculum as a means of ensuring the systematic education of intending pharmacists, and it does not seem unreasonable to attribute this, in part at least, to the stimulus received through contact with pharmacists of other countries during the International Pharmaceutical Congress in 1880. Be that as it may, the hands of the Council will be strengthened by the knowledge that it has the support of the majority of pharmacists in respect to the principles laid down, and in working out the details it will no doubt bear in mind all the pecuniary and other interests involved, in which its own members are as much concerned as any.

Many circumstances combined early in the year to concentrate more public attention than usual upon the regulations under which dealings in poisons and preparations containing poisonous medicines are conducted. Especially some circumstances attending a case of criminal poisoning by means of aconitine, and representations made by coroners as to the numerous fatalities resulting from the use of preparations containing poisons which are now so widely sold under the cover of the patent medicine stamp, compelled the Government to take some action in deference to public opinion. Towards the end of January, the Director of Public Prosecutions took legal proceedings against the proprietor of one of the most notorious of these preparations, on the charge of having sold "solution of chloral" without affixing a poison label to the bottle in which it was contained. The case rested on the sale of two bottles of the solution, one of them containing equal to 284 grains, and the other 88 grains of chloral hydrate, and it was deposed that a dose of 30 grains—which would be exceeded in a teaspoonful and a half of the solution—had been known to prove fatal. On the part of the prosecution, it was argued that the exemption contained in the sixteenth section of the Pharmacy Act, 1868, in favour of "the making or dealing in patent medicines," only applied to the provisions "hereinbefore contained"—*i.e.*, the first fifteen sections of the Act—which restrict dealings in poisons to registered chemists and druggists, and that it does not relieve any seller of a scheduled poison from the necessity of complying with the provisions as to labelling, etc., in the seventeenth section. For the defence it was broadly contended that by the words in the sixteenth section, patent medicines are entirely withdrawn from the operation of the statute, and that this reading had the sanction of custom. The magistrate, however, decided against the defendant, though somewhat ambiguously, "on the larger word 'poison,'" because he thought the solution was a poison on the medical evidence, and he imposed a penalty of 40*s.* and costs. Notice of appeal was given at once; but it is instructive to note that it has never been carried out, neither has the Public Prosecutor shown any signs of following up his success by further proceedings in the same direction.

Before turning to the subject of projects for fresh legislation in respect to the sale of poisons, mention must be made of a signal failure in an attempt to extend the scope of the present law. It will be remembered that in the parliamentary session of 1881 a Bill was introduced to amend the law as to the sale of poisons, especially in relation to their administration to animals, which, if passed, would have caused much inconvenience and added largely to the list of scheduled poisons. The Bill was, however, withdrawn in deference to the wish of the Council of the Pharmaceutical Society, to give an opportunity for conference with the promoters. As a result, in February last, the Council resolved to exercise its statutory powers, and to recommend to the Privy Council the addition to the second part of the poison schedule of sulphuric, hydrochloric and nitric acids, butter of antimony, carbolic acid, hellebore, nux vomica and its preparations, and vermin killers containing phosphorus. After an unusually long interval, probably taken up in communicating with representatives of classes that would be affected by such a course, a communication was received in August from the Privy Council Office, containing a copy of an Order in Council by which nux vomica and its preparations were added to the second part of the schedule of poisons, and intimating that, pending the consideration of the expediency of further legislation with respect to the sale of poisons, their Lordships did not deem it desirable to add to the restrictions on the sale of the acids and other articles mentioned in the resolutions of the Council.

In March, in accordance with a promise made in reply to a question put in the House of Commons, the Home Secretary caused a communication to be sent inquiring whether the Pharmaceutical Society had any suggestion to make for the amendment of the law relating to the sale of poisons. In reply, and after consultation, the President (Mr. GREENISH) forwarded to the Home Secretary three definite suggestions as embodying the opinion of the Council. These were to the effect (1) that further restrictions on the sale of medicine containing poison, dispensed from ordinary prescriptions, are not necessary or practicable; (2) that the sale by wholesale of certain virulent poisons,—such as the poisonous vegetable alkaloids,—might with advantage be placed under greater restrictions; and (3) that the sale of patent medicines containing poisons should be placed under the same restrictions as the sale of other medicines containing poisons. It was also mentioned that the amendment of other sections of the existing Acts seemed desirable. In compliance with a wish expressed by Sir WILLIAM HARCOURT at an interview which took place subsequently between himself and the President and other members of the Council, these suggestions were afterwards amplified. The restriction on wholesale transactions proposed was that sales of poisons in the first part of the schedule should be recorded as to name of poison, quantity, name and address of purchaser and date of sale, and that the record should be kept twelve months. With respect to patent medicines, it was proposed that so much of section 16 of the Pharmacy Act, 1868, should be repealed as allows patent medicines to be sold without restriction, and to enact that all such medicines containing poisons should bear a notice to that effect and a warning that they should be used with care. The propriety of enforcing a certain course of technical education and training, prior to the qualifying examination of persons who are to be registered as authorized to sell and dispense poisons and poisonous medicines, was also urged in regard to the safety of the public. It would appear most probable, however, that any legislation on this subject undertaken by the Government will emanate from the Privy Council, and it is satisfactory to find that the postponement of the additions to the poison schedule proposed by the Privy Council "pending the consideration" of the subject was not meant as an empty phrase. Immediately after the summer vacation a request was transmitted from the Lord President that the Pharmaceutical Society would submit its views in regard to the sale of poisons, for the consideration of the Lords of the Council, in the form of a draft Bill for amending the existing law, and it will be seen from the report on another page that the Law and Parliamentary Committee is at present busily engaged on the work.

The Royal Commission on the Medical Acts, the appointment of which last year was the occasion of considerable discussion, if not anxiety, amongst pharmaceutical politicians, was published in June, but so far from presenting any features of special interest to pharmacists, such topics were only remarkable by their absence.

In August the subject of reciprocity in the recognition of certificates of qualification granted by colonial pharmacy boards was revived by the reception of a letter from the Pharmacy Board of Victoria. In this communication, it was stated that the course of study required by the Victorian Pharmacy Act is nearly identical with that required for the Major examination in this country, and it was urged that since the exemption from examination of holders of the British qualification is especially provided for in the Colonial Act, it would be equitable that there should be some recognition of the Victorian certificate in this country. The evident feeling of the Council in respect to this application was that at present it has no power to accept such certificates of qualification and that the time has not yet come when it would be justified in applying to Parliament for such power, since it would be difficult to draw the distinction between one colony and another. A significant commentary upon this decision has been furnished by the resolution of the Pharmacy Board of Victoria itself not to recognize the certificates of qualification issued by the Pharmacy Board of the neighbouring colony of New Zealand, and some of the incidents arising out of the resulting controversy between the two colonial Boards have not been devoid of the humorous element.

The disposition of different Government departments to consult the Council of the Pharmaceutical Society upon subjects connected with the practice of pharmacy in all parts of the British empire is evidently increasing. Besides the communications from the Home Office and the Privy Council Office, before referred to, there was in May transmitted to the Council a copy of an Ordinance of the Legislature of St. Lucia, for the regulation of the sale and dispensing of drugs and poisons in that colony, asking that it might be considered, and that the Secretary of State for the Colonies might be furnished with the views of the Council respecting it. The request was complied with and some alterations were suggested.

It may be here mentioned that, mainly through the efforts of Mr. Crossley, an Associate of the Pharmaceutical Society, two Ordinances have been passed regulating the dispensing of medicines and the dealing in poisons in the Island of Guernsey, by which the practice of pharmacy in that island, after saving the rights of those engaged in business at the time, is confined to persons holding the diploma of the Pharmaceutical Society of Great Britain or of one of the French faculties.

At the meeting of the Council in November the subject of the public sale in London by auction of spurious and worthless drugs was brought forward by Mr. Williams, who moved that a Committee should be appointed to consider the question and report to the Council what steps, if any, should be taken to check this practice. There was a decided feeling amongst the members of Council as to the necessity for caution in dealing with this subject, and a disinclination to assume the position that pharmacists are incapable of protecting themselves and the public from those practices without State aid. A similar feeling was manifested at the Evening Meeting in December, when the subject was brought forward in a paper read by Mr. E. M. Holmes. The Committee was appointed, but has not yet made a report.

Whatever else in connection with pharmacy may have been sluggish during the year benevolence has been active, and notwithstanding that pharmacists number among themselves a large share of the poor they have nobly striven to render to them adequate aid. Early in the year there were some indications of a falling off in the number of subscribers and that the Council would be left with a diminished income to meet increasing requirements. The subject was, however, taken up vigorously in the Council, and a resolution was passed expressing an opinion that the number of subscriptions would be much increased if a personal canvass were made by each Local Secretary, accompanied by one or more members of the trade. It was also resolved that with a view to facilitate this work a complete list of all the subscribers should be published annually in this Journal and that a copy of the number containing the list should be sent to every person whose name is on the Register of Chemists and Druggists. The response from Local Secretaries and others interested throughout the country has been very satisfactory, and as a result the year's subscriptions amounted to the sum of £1568, being £383 in excess of the sum received in 1881; besides which the unusually large amount of £388 was received in donations. Of the donations the sum of £100 was given by the Treasurer, Mr. Robbins, to be invested in gas shares, on the condition that the dividends should be applied in paying £5 each year to the annuitant who has contributed the largest amount to the Benevolent Fund. Donations of £50 each were also given by Mr. J. Richardson and Mr. E. N. Butt. There was a further accession to the Fund in the shape of three legacies of £100 each, under the wills of Mr. Arthur Lloyd, of Camden Square, Mr. Robert Howden, of Gracechurch Street, and Mr. Charles James Pearson, of Swansea. On the other hand the expenditure in the shape of annuities amounted to £1187 10s., and in casual grants to £461. Last month six fresh annuitants were elected, which brought the number up to forty-two, involving an expenditure of £1360 per annum.

Great attention has been paid during the year to the Library and Museum by the Committee charged with the task of keeping them in a state of efficiency. About 500 books and pamphlets have been added to the Library, and it is satisfactory to find that evidence of the esteem in which it is held has been afforded by a considerable increase in the number of persons using it both in the day-time and in the evening, the numbers having been, day, 4218, evening, 1510, against 3447 and 1249 in the previous year. This may be partially attributable to the increased number of students in the School of Pharmacy, but it is also noticeable that the circulation of books has been almost the same as in 1881, although that the Library was closed during the whole of September for cleansing purposes.

The Herbarium has been increased by a valuable series of medicinal plants from the Botanical Gardens at Ceylon; also by an excellent set of specimens of various species of aconite and by specimens of the plants yielding damiana and Japanese oil of peppermint. The collection of materia medica has been enriched by numerous contributions, notably by specimens of new alkaloids from Messrs. Merck, by a tolerably complete series of the cuprea barks from various donors, by a number of Madagascar drugs collected by Dr. G. W. Parker, the Physician to the Queen of that island, and by the scarce and not easily obtainable Dyak poison of Borneo. The catalogue of the Hanbury Collection has been prepared for the press, and has now only to be enriched by additional notes from the private MSS. of the late Mr. Daniel Hanbury before being published. The number of visitors to the Museum has shown a small increase, and many duplicate specimens have been distributed to local associations or lent for scientific purposes.

The Annual Meeting of the Pharmaceutical Society was held, as usual, on the third Wednesday in May, and was well attended. The address delivered on that occasion by the President, Mr. Greenish, was not wanting in plain speaking. Referring to the "deep and general discontent" prevailing throughout the country with regard to the condition of the chemist and druggist, he attributed it, firstly, to the state of trade generally, and, secondly, to excessive competition. Much of this competition he said was due to young men of deficient education being lured into an over-crowded trade; instead of being educated pupils, articled to learn a trade, they were admitted from a low social scale, with deficient early education and small premiums, mainly for the sake of their manual labour, the desire to obtain this chiefly being greater than is consistent with a due regard to the advancement of pharmacy. Another cause mentioned was that some pharmacists lend their names and influence to the flooding of the trade and harrying of the medical profession with secret nostrums. If this "negation of true pharmacy" be followed to its logical issue, Mr. Greenish thinks the result will be that "the medical profession will order medicines "by numbers and prescribe nostrums with obscure "names; prescriptions and pharmacists will disappear together, and the ordinary huckster may keep "a supply—a 'line' of remedies—on his shelves, and "sell them to the public just as he now sells Bath "bricks and hearth-stones." In the Report presented the Council enumerated the different subjects which had engaged its attention during the year, many of which have already been referred to elsewhere in a previous summary and the remainder in the present one. The Financial Statement showed that, although there had been a slight decrease in the receipts in subscriptions and examination fees, the income had exceeded the expenditure by more than eleven hundred pounds. In the discussion that followed several speakers expressed their agreement with the spirit of the Presidential Address, and although some of the points touched upon in the Report elicited a brisk criticism, this did not prevent the meeting from adopting it unanimously.

The usual number of Evening Meetings have been held, and whilst these have been only moderately well supplied with papers the proceedings have always been sufficiently interesting to well repay those who attended them. The following are the titles of the papers read:—"Does Cod Liver Oil contain ·05 per cent. of Iodine?" by Mr. M. M. Bird; "Iodine-yielding Algæ," by Mr. J. Wheeler; "Further Contributions to the Chemistry of the Rhizome of Zingiber Officinale," by Dr. J. C. Thresh; "Note on the Extract of Aconite and on the Alkaloid of Aconitum Paniculatum," by Messrs. E. L. Cleaver and M. W. Williams; "The Orchard Alum Spring," by Dr. J. C. Thresh; "Note upon the Use of Oxalic Acid as a Test for Arseniates in Alkaline Salts," by Mr. C. Patrouillard; "Note on Tinctura Camphoræ Composita," by Mr. J. Bland; "The Crystalline Constituent of Jafferabad Aloes," by Mr. W. A. Shenstone; "The Sale by Public Auction of Spurious and Worthless Drugs," by Mr. E. M. Holmes; "Further Observations on Arsenic," by Messrs. W. A. H. Naylor and J. O. Braithwaite. In addition to the foregoing, at the February meeting, Dr. Parker, Physician to the Queen of Madagascar, exhibited a series of specimens of the Malagasy materia medica and furnished some interesting information concerning them.

At the Evening Meeting in October the Professors, as usual, made their reports as to the doings of the students in the previous session of the School of Pharmacy. *Il va sans dire* that these reports were favourable, and it is some proof of the good work done in the School that the Pereira Medal,—the Blue Ribbon of Pharmacy, which is open to all who have passed the Major examination during the year, wherever they may have studied,—was once more won by one of its students, who had also distinguished himself by carrying off the three silver medals of the School. After the distribution of the prizes an admirable address was delivered to the students by Mr. Joseph Ince.

The Annual Meeting of the North British Branch was held in May, in the Society's rooms in Edinburgh, under the presidency of Mr. J. B. Stephenson. The Report presented was a favourable one, the operations of the Branch having been carried out with a gratifying amount of success. Many donations to the library and museum were acknowledged, and the attendance in the Society's rooms for the purpose of study was stated to be on the increase. Mention was made of the large proportion of failures—60 per cent.—in the Preliminary examination, among students who during the year had sat at the Scotch centres, as likely to draw attention to the elementary education of the younger members of the calling, and an opinion was also expressed that the curriculum scheme is fraught with issues of the greatest importance to the future of pharmacy in this country. The arrangement under which the duties formerly performed by the late Honorary Secretary, Mr. JOHN MACKAY, are now divided between an Honorary Treasurer, appointed by the Council in London, and the ordinary Secretary to the Branch, were reported to be working smoothly and satisfactorily. After the Annual Meeting the newly elected executive chose Mr. ALEXANDER NAPIER, President, and Mr. JOHN NESBIT, Vice-President, for the ensuing year.

The Chemists and Druggists' Trade Association of Great Britain held its Annual Meeting in London in May. The Report recounted a considerable amount of work done by the Association in the defence of some of its members, also in the prosecution of offenders under the seventeenth section of the Pharmacy Act, and in various other ways; but the balance sheet showed that notwithstanding this the receipts had been insufficient to meet the current expenses by about two hundred pounds. As no statistics are given as to membership, it is not quite clear whether this resulted from a falling off in the number of members or from the failure of members to pay their subscriptions promptly, which it was said by one of the speakers had reduced the income that should have been derived from this source by about 60 per cent. Suggestions were made as to the best means of increasing the number of members, and the more efficient collection of subscriptions. It is to be hoped that these measures may be successful, or else the Executive of the Association will become seriously cramped in the carrying out of the good work for which it is peculiarly fitted, if, indeed, the Association itself does not come within measurable distance of collapse. Last month the Association organized a meeting in London to give the chemists and druggists of the Metropolis an opportunity of conferring together on trade matters, but it cannot be said that the attendance was sufficiently numerous or the discussion of such a nature as to encourage the Executive to repeat the experiment.

The Annual Meeting in May and the presence of many members and friends of the Pharmaceutical Society in London at that time again afforded the occasion for a Conversazione in the South Kensington Museum and a Dinner at the Freemasons' Tavern. These festive meetings were as usual preceded by a "Chemists' Ball," in January. But last year the junior members of the calling also organized a Ball and a Dinner, with a success that warrants a repetition. Are these multiplied junketings, to say nothing of the "scientific outing" in connection with the British Pharmaceutical Conference, to be deemed signs of the times, and if so what may they be supposed to indicate in relation to the "deep and general discontent" spoken of by the late President? Certainly, according to the statistical abstract published in *Kemp's Mercantile Gazette*, only just over half as many chemists and druggists failed in business in 1882 as failed in 1881.

The proceedings of the Council of the Pharmaceutical Society of Ireland have been regularly reported in this Journal. This Society, like its sister Society in Great Britain, has had to regret a slight decrease in the number of its members, though unfortunately it is yet too young to be so well able to spare them. The attention of the Council has been devoted principally to the consideration of desirable amendments in the Pharmacy Act, Ireland,—especially with respect to the registration of "druggists," who are allowed to sell poisons but not to compound medicines,—and the nature and extent of the practical experience to be required from candidates for the examination. The Annual Meeting was held in October, when Professor TICHBORNE was unanimously re-elected President, Dr. AQUILLA SMITH, Vice-President, and Mr. HODGSON, Treasurer. Before the meeting broke up a committee was appointed to report on the best means of making the Society more attractive and of inducing licentiates to become members.

The British Pharmaceutical Conference met in Southampton at the end of August, under the presidency of Professor ATTFIELD, when a report was presented showing some falling off in the number of members, which, however, it was believed would prove to be only temporary. About the usual number of papers were read, most of which will be referred to elsewhere. But the feature of the meeting was undoubtedly an exceptionally able address delivered by the President, having for its subject the collection, preparation, and distribution of drugs. As usual, in the same week the British Association met in the same town, with Dr. C. W. SIEMENS as its President, whilst earlier in the same month the British Medical Association held its jubilee meeting in the city of Worcester. The German Pharmaceutical Association met in Berlin in the first days of September, under the guidance of its popular President, Dr. C. BRUNNENGRÄBER, and the meeting was attended by the President of the International Pharmacopœia Commission, Herr A. von WALDHEIM, who made a very satisfactory statement as to the progress of that work. Then, a few days later, the American Pharmaceutical Association held a successful meeting at Niagara Falls, its two Presidents being Professor P. W. Bedford and Mr. C. Heinitsh. Lastly, almost simultaneously, the Austrian Pharmaceutical Association met at Agram.

A large number of prosecutions for offences under the Pharmacy Act have been instituted during the past year. Those for a breach of the fifteenth section by the illegal assumption of a protected title were, of course, carried out in the name of the Registrar, acting under the instructions of the Council of the Pharmaceutical Society. Most of the prosecutions under the seventeenth section, for the offence of insufficient labelling of poisons, were undertaken by the Executive of the Trade Association, and only a few of them were initiated by the police. It is very desirable, however, as pointed out by Mr. Greenish at the Annual Meeting, it should be more generally understood that the provisions of the Act of Parliament do not throw upon the Pharmaceutical—or any other—Society the onus of prosecutions under the seventeenth section, since these can be instituted by any member of the public, and might, with advantage, be undertaken more frequently by the Public Prosecutor or the police.

The cases of death by poisoning during the year do not call for any particular remark, except that as usual several have been due to narcotic preparations, and a number more than usual to one or other of the poisons which the Privy Council has recently declined to include within the Schedule.

There have been a few cases of excise proceedings worthy of being mentioned briefly. One of the most noticeable of these was a prosecution by the Inland Revenue authorities of a person carrying on the business of a "Drug and General Supply Association," on the charge of having sold laudanum, a preparation capable of being used internally as a medicine, in the making of which methylated spirit had been used. The defence offered was the remarkable one that the laudanum had been made with duty-paid proof spirit, to which wood spirit had been added to make it clear and to give it the particular flavour preferred by the people of the district. The magistrates considered the case doubtful, and gave the defendant the benefit of the doubt. In another Excise prosecution for the sale of paregoric made with methylated spirit the offence was attributed to a mistake, but a modified penalty was inflicted. Another important Excise prosecution was for the several offences of using a still, compounding spirits in the preparation of "essences," and the separation of gum resin from methylated "finish." A conviction was obtained, and the penalties imposed amounted altogether to £1275.

The history of the sciences upon which the practice of pharmacy is based bears also the character of a quiet year. Many new remedies have been proposed, old ones have received new applications, discoveries of new principles have crowned chemical research, and numerous suggestions have been published having a bearing upon practical pharmacy; but there has been no one subject of greatly predominating importance, and, probably, no very momentous addition has been made to the materials previously in use for combating disease. Perhaps the most interesting fact of the year has been the reduction to a certainty of what had before been only a suspicion, that the barks which under the name of "cuprea" have, during the last two or three years, attained such importance as a source of quinine, are not derived from plants belonging to the genus *Cinchona*. This was first announced in a paper published in this Journal in April, the fact having been determined by the celebrated quinologist, Dr. Triana, as the result of an examination of specimens of the plants yielding the barks received from Columbia, which proved to belong to two species of *Remijia*. There appear to be at least three different varieties of bark which have been imported under the name of "cuprea." But the best known of these, and probably the richest in quinine, is that which was first introduced as coming from Bucaramanga, in the north of Columbia; this is said to be derived from plants growing in the mountainous regions of La Paz, which have been referred by Dr. Triana to *Remijia Purdieana*. Two other varieties derived from plants growing in a district further south, beyond Bogota, in the Orinoco basin, have been referred to *R. pedunculata*. The importance of this determination depends upon the fact that a new series of plants, which are said to be more hardy and easily cultivated than cinchonas, have been rendered available as a source of the important febrifugal alkaloids which had been previously supposed to be confined to that genus. Some interesting observations by M. Arnaud show that all these cuprea barks have a greater density than any of the cinchona barks, varying from 1·128 to 1·320, whilst the greatest specific gravity noticed in a cinchona bark was 1·077. According to analyses made by M. Arnaud, the Orinoco cupreas do not as a rule equal Bucaramanga bark in the quantity of quinine they contain; but all these barks are remarkable for the proportion of quinidine present, and the absence of cinchonidine. Amongst the bark from Bucaramanga a very dense variety is sometimes met with, which is nevertheless considered by Dr. Triana to be the product of the same species growing under different conditions. It is noteworthy, however, that it is from this variety that M. Arnaud claims to have separated a peculiar alkaloid which he has described under the name of cinchonamine. It may be here mentioned that the alkaloid, which under the names of "homoquinine" and "ultraquinine" was described simultaneously by three sets of observers at the close of last year, has been the subject of an investigation by Dr. HESSE, who has described its physical properties more minutely and attributed to it the formula, when dried at 120° C., of $C_{19}H_{22}N_2O_2$. The neutral sulphate is described as crystallizing with six molecules of water in short prisms. As homoquinine sulphate resembles quinine sulphate in its sparing solubility in water, Dr. HESSE thinks it is probably frequently present in the commercial salt; but "homoquinine" is markedly distinguished from quinine by its sparing solubility in ether. Herr KÖRNER has made the curious observation that during the manufacture of sulphate of quinine from cuprea bark a notable quantity of caffeic acid is formed, evidently as the product of the breaking up of a complex substance existing in the bark together with the alkaloid, and this is found in the mother-liquor in the state of caffeate of quinine. The genera *Cinchona* and *Coffea* both belong to the same natural order, although not to the same tribe, and this chemical confirmation of botanical relationship has its counterpart in a previous observation of quinic acid in the coffee plant.

One plant that promises to come into use is the well-known "lily of the valley," *Convallaria majalis*. It is said to exercise an action upon the heart similar to that of digitalis and also to be one of the most powerful diuretics known. From experiments made by M. LANGLEBERT it would appear that the best cardiac results are obtained with an aqueous extract prepared from the flowers and stalks with the addition of a third of their weight of the roots and leaves. The diuretic results appear to depend upon a resinous principle which is taken up in an alcoholic extract. Probably, however, the form in which this medicine will be most frequently administered will be by using "convallamarin," one of two glucosides present in the plant and which appears to be its active cardiac principle. Another plant yielding a glucosidal principle described as having an action similar to digitalin, but far more powerful, is the *Adonis vernalis*. The glucoside has been separated and described under the name of "adonidin" by Dr. CERVELLO, who claims for it that it has the advantage of not being cumulative.

The uncertain nature of preparations of aconite has been the subject of several papers. At the Evening Meeting in March, Messrs. CLEAVER and WILLIAMS called attention to an extract prepared from *Aconitum paniculatum* which failed to produce on the tongue the peculiar tingling sensation characteristic of the official extract, and contained a small amount of a very bitter alkaloidal substance, which they were disposed to think might be identical with the non-poisonous picraconitine observed on one occasion by Mr. GROVES. Mr. HOLMES afterwards referred to the non-production of the tingling sensation by varieties closely resembling the official aconite in a paper read before the Pharmaceutical Conference, and having expressed the opinion that the description of the official plant in the Pharmacopœia is insufficient, proposed to limit the official drug to home-grown aconite flowering in May and June and gathered when the plant is in flower. Dr. SQUIBB also looks upon the tingling indication as valuable and has suggested a rough standard for the strength of aconite preparations, based upon the time which elapses before it is produced by aqueous dilutions of them. The varying potency of different alkaloidal substances supplied under the name "aconitine" has also been illustrated by physiological experiments in connection with a legal inquiry in Holland, in which one preparation was estimated to be one hundred and seventy times more powerful than another. Some experiments made by Dr. SQUIBB also point in the same direction, and to this consideration no doubt is to be attributed the omission of aconitine from the new editions of the German and United States Pharmacopœias.

Mr. GERRARD has contributed further information as to the alkaloidal value of belladonna plants at different periods of their growth. His experiments with wild plants seemed to indicate that the development of alkaloid is favoured by a chalky soil, but that very little is formed in the first year. Those with the cultivated plant appeared to show that the greatest development of alkaloid takes place simultaneously in the root and the leaf at the flowering period and is maintained during the fruiting. The substitution of the root of *Medicago sativa* for belladonna root has been observed by Mr. HOLMES.

Under the name of "tambor," specimens of a tree growing in Central America were received by the late Mr. HANBURY with the information that its fruit yields by pressure a large quantity of a very fine oil, resembling castor-oil in its purgative effect, but rather pleasant to the taste, and with the advantage that it does not gripe. The herbarium specimens have now been described by Mr. HEMSLEY as belonging to a new species, to which he has given the name *Omphalea oleifera*. Another plant which has been identified as the source of a fragrant volatile oil, said to come from Jamaica under the name of "tobacco-bush oil," and may eventually be utilized, is the *Hedyosmum nutans*. The plant itself is popularly known as the "headache weed," and is said to be generally used by the natives for making tea and binding round their heads when in pain, whilst a preparation of the leaves and flowers is said to be used as a stomachic and spasmodic. An interesting description of the manufacture on a large scale of an essential oil from an American species of birch, the *Betula lenta*, has been given by Mr. G. W. KENNEDY. The whole plant is used for distillation, and the oil is sold as "oil of wintergreen," which it closely resembles. The production of peppermint oil on the large scale in New York State has been also described. It is said that this oil, as exported from Wayne county, is colourless and resembles the English oil, except that its odour and taste are somewhat less pungent and penetrating. With respect to the source of Chinese and Japanese peppermint oil, Mr. HOLMES, having made a curious observation that typical specimens of *Mentha arvensis*, var. *Javanica*, from which plant it has been said to be derived, had not the taste of peppermint, but a flavour similar to that of *M. viridis*, took the trouble to obtain from China and Japan specimens of the peppermint plants of those countries. Both plants were found to possess most of the characters of *M. arvensis*, but the Chinese plant was found to more closely resemble and indeed to be identical with *M. canadensis*, var. *glabrata*, specimens of which, obtained from different localities in the United States, were found to possess the flavour of peppermint in a feeble degree. As the chief point in which the Japanese plant differs from *M. arvensis* is in its flavour, Mr. HOLMES proposes to name it *Mentha arvensis*, var. *piperascens*. Mr. HOLMES raises the question whether these variations in the essential oil are dependent on development, climate, soil or sex, and whether the oil in each case is a mixture in which one ingredient is present in variable proportions in different plants. The increasing demand for a preparation known as "bay rum," which is made by the distillation of the leaves and berries of the bayberry tree (*Myrcia acris*) with rum, has directed some attention to other members of the Myrtaceæ yielding aromatic volatile oils, and an exhaustive enumeration of them has been supplied by Professor MAISCH. The botanical source of another essential oil, oil of cassia, would appear now to be satisfactorily cleared up. Herbarium specimens in flower, derived from the districts in China in which the cassia tree is cultivated, show that the plant is the *Cinnamomum Cassia*, and, as far as can be ascertained, "cassia lignea," cassia buds, and the leaves from which oil of cassia is distilled, are obtained from this tree only. It may be mentioned here that, according to a report presented by Mr. A. H. JACKSON to the Conference, although the oils of cinnamon and cassia may be distinguished from each other by their odour and taste, they have no other very characteristic physical property in which they differ, and a chemical examination indicated that any constituents in which they might differ from each other are present only in extremely small proportion.

One of those thorough investigations of crude drugs with which the name of Dr. HESSE is associated, has been carried out by him in respect to the barks and wood coming from the Argentine Republic under the name of Quebracho. From the bark derived from one of the Apocynaceæ, *Aspidosperma Quebracho*, besides the alkaloid aspidospermine, separated by FRAUDE, he obtained five other alkaloids, which he named aspidospermatine, aspidosamine, hypoquebrachine, quebrachine and quebrachamine, as well as a neutral substance which he called quebrachol. In the Quebracho wood from *Loxopterygium Lorentzii*, a terebinthaceous plant, which has been used in medicine, he could find no alkaloid at all, but in the bark of this wood he found indications of two alkaloids, one of which he named loxopterygine. The *Aspidosperma* alkaloids appear to have a physiological action similar to that of the *Strychnos* bases, but less powerful. Messrs. HECKEL and SCHLAGDENHAUFFEN have made a thorough investigation of "m'boundu," the Gaboon ordeal poison, which has been said to contain two special alkaloids, but they have come to the conclusion that strychnine, which is present in the root bark, stem bark and leaves, is its sole alkaloid and active principle. Another crude product, said to have an action similar to curare, and called "guachamacha," has been introduced from South America; it consists of an aqueous extract derived from one of the oleanders. Box-tree bark has been alleged to contain alkaloidal substances which are capable of being used as substitutes for quinine. The subject has been thoroughly investigated chemically by Mr. ALESSANDRI, who found that the *Buxus sempervirens* contains three special and distinct alkaloids, namely, buxine in the bark, buxeine in the leaves, and parabuxine in both the bark and the leaves. Buxine has been stated to be identical with bibeerine and also with pareirine and paricine; this point, however, and the physiological action remain yet unsettled. It may be mentioned here that Mr. ALESSANDRI used oxalic acid as a means of separating these alkaloids, and he has also applied the method to the separation of the cinchona and other bases.

A great deal of other interesting work was done last year in connection with the alkaloids. Revising the statements of previous experimenters, Mr. DOTT came to the conclusion that Dr. HESSE was mistaken in supposing that the methyl-morphine obtained by M. GRIMAUX in acting with methyl-iodide on morphine dissolved in alcoholic solution of soda was isomeric, but not identical with codeine. This was practically admitted by Dr. HESSE in a subsequent communication, he having apparently been misled by the formation at the same time of a di-methyl compound. Mr. DOTT has also done some very valuable work towards clearing up the confusion which existed respecting the solubility of salts of morphine, and in respect to this alkaloid he has further illustrated the untrustworthiness of many of the so-called colour reactions. Herr FISCHER, starting with xanthine has succeeded in introducing two methyl groups into it to produce theobromine, and this by the introduction of another methyl group has been converted into caffeine. M. Tanret has provided a convenient method of obtaining caffeine in solution by forming very soluble double salts with benzoate, cinnamate or salicylate of soda. Atropine has yielded two new bases by treatment with nitric acid, one by the loss of the elements of water, called "apoatropine," which is crystalline and forms crystalline salts, but does not cause dilation of the pupil; the other, called "nitroatropine," not forming crystalline salts, but dilating the pupil of the eye. Herr Ladenburg has made further progress towards the synthesis of atropine, starting from pyridine, whilst on the other hand the products obtained in the decomposition of atropine, of brucine, and other alkaloids, have given some confirmation to the suggestion of Dr. Königs that the pyridic nucleus should be considered analogous to the benzoic nucleus, and that under the name "alkaloid" should be understood organic vegetable bases which are pyridic derivatives. Erythrophleine, the alkaloid of sassy bark, has been found by Messrs. Gallois and Hardy to break up in a manner analogous to atropine into an acid and another base. Some further experiments by Mr. Shenstone on the nux vomica alkaloids appear to show that brucine is strychnine in which two atoms of hydrogen are replaced by two methoxyl groups. Dr. Hoffman has shown that the formula for coniine wanted amending by the addition of two atoms of hydrogen, and that it is correctly represented as $C_8H_{17}N$; consequently conydrine is not a hydrate of it as supposed.

Besides the investigation in respect to homoquinine, before referred to, Dr. Hesse has given further information respecting some of the more uncommon cinchona alkaloids, and has described a new one, which is liquid, volatile and odorous, and which he thinks may possibly play some part in the formation of quinine; this he has named "cincholine." Dr. de Vrij has defended from attack his process for the quantitative estimation of quinine by means of iodosulphate of quinoidine, and has brought forward strong evidence to show that the herapathite formed under the conditions laid down is very constant in composition. He has also described a modification of Prollius's process for the estimation of the total alkaloids of cinchona bark, in which a mixture of ether, spirit and ammonia is used to extract the bark. In a paper read by Mr. Giles before the British Pharmaceutical Conference, another process for the estimation of the total alkaloids, recommended by Dr. de Vrij, was described, in which the bark is exhausted with dilute hydrochloric acid. In the same paper Mr. Giles put forward a plea for a return to the use of pharmaceutical preparations of the bark. Quinine iodate and bromate have been recommended for therapeutic use by Dr. Cameron, and some attention has been paid to the preparation of a "tasteless" tannate. Among the substitutes for quinine, chinoline continues to hold a place, as well as its tartrate and salicylate; but early in the year Mr. Ekin gave some reasons that the substance supplied at that time as "pure chinoline" was more or less a mixture of homologous bodies. Being sceptical as to chinoline representing all the characteristic properties of quinine, Messrs. Fischer and Königs prepared for physiological experiment a number of compounds by the introduction of various hydroxyl and other groups into the chinoline molecule. It was found that the antipyretic property is possessed to the greatest degree by compounds in which the nitrogen atom is joined with two atoms of carbon in the chinoline ring and an atom of carbon in a methyl or other alcohol group. This occurs in three known compounds, but the most convenient for preparation is oxychinolinmethylhydride, which has been named more briefly "kairine."

Several new vegetable principles, besides those already mentioned, have been isolated during the year. Among the alkaloids are "oxyacanthine," which accompanies berberine in the root of the *Berberis aquifolium*; "sapotine," separated from the astringent and febrifuge bark of the West Indian sapotilla tree (*Sapota Achras*); "macleyine," from a Japanese papaveraceous plant (*Macleya cordata*); "nupharine," from the rhizome of the yellow water lily (*Nuphar luteum*); and an unnamed alkaloid from the bark of the white ash (*Fraxinus Americana*). A new poisonous glucoside has been observed in the *Thevetia nereifolia*; a poisonous neutral principle has been isolated from the Japanese ericaceous plant, *Andromeda japonica*, and named "asebotoxin," and quassiin has been found to be present in very variable quantities in the wood of both *Quassia amara* and *Picræna excelsa*. Salicylic acid has been found to be present in all parts of *Viola syrtica* and *V. tricolor*. Dr. Wormley has negatived the assertion that gelsemic acid is identical with æsculin. Mr. Shenstone has examined Jafferabad aloes and obtained an aloin from it apparently identical with the aloin from Zanzibar aloes, and Dr. Lenz has shown that what is known as Bornträger's test for aloes is untrustworthy, as the reaction is common to bodies containing chrysophanic acid. Herr Singer has found that lignin is a complex body, of which vanillin is an invariable constituent, and that probably this principle is present in minute quantity in all woody tissue. Lastly, the chemistry of bast fibres has been studied by Messrs. Cross and Bevan, who have not only rendered a service to science by explaining some of the causes of the tendency of jute goods to spoil, but have worked out the history of a number of new compounds formed by the action of chemical reagents upon vegetable fibre.

Synthetical chemistry has also made some progress during the year, perhaps the most interesting step being the very recent synthesis of uric acid from urea and glycocoll by Dr. HORBACZEWSKI. Thymol has been built up partially, starting with cuminol, the principal constituent of the essential oil of cumin. Lactic acid has been prepared artificially by heating dextrose with a caustic alkali, neutralizing with sulphuric acid and removing the sulphate by means of alcohol. Succinic acid has been produced by the fermentation of tartaric acid set up by a few drops of a fermenting solution of ammonium tartrate. Bromochloral, chlorobromal, and their hydrates and alcoholates, and bromochloroform and chlorobromoform, are the names of a number of allied compounds that have been produced by the action of bromine and chlorine upon alcohol. Here also may be mentioned an able paper on terpene hydrate read by Mr. R. H. PARKER before the Pharmaceutical Conference.

Turning to another class of chemical subjects, reference must be made to the masterly papers of Messrs. NAYLOR and BRAITHWAITE, which have disposed of a misstatement in chemical manuals and shown that neither oxalic acid nor oxalates exercise a reducing action upon arsenic acid or arsenates. Professor TICHBORNE has suggested a new method of making soap solution for testing the hardness of water, and also a new form of apparatus for preventing contamination from atmospheric impurities during the estimation of ammonia in water. The colour reaction between gallic acid and nitrous acid has been utilized by Dr. DAVY in the determination of nitrites in water. A method of preparing bismuth subnitrate free from arsenic has been recommended by Mr. SCHNEIDER, based upon the insolubility of bismuth arsenate in a concentrated neutral solution of bismuth nitrate. Mr. FLETCHER has observed a new very basic iodide of bismuth, simulating iodide of lead, and four salicylates of mercury have been described by Mr. LAJOUX.

Recently the hypophosphites have come much into use, and Mr. GIBSON has done useful service in working out and publishing a process for the preparation of the compound solution, which, although it has been subject to criticism, will probably yield a product sufficiently satisfactory to most prescribers. A useful formula for a soluble saccharate of iron has also been worked out by Dr. BRUNNENGRÄBER. Other pharmacists have furnished formulæ for ferrated albumen, albuminated ferrous borotartrate, and mercurial peptones. Ammoniated preparations of ergot have recently assumed some prominence, and a formula has been furnished by Mr. GERRARD. It has been suggested that the definite salts should be used in making preparations of the oleates, but Dr. SQUIBB has given reasons for preferring a solution of the oleate in oleic acid, based on the facility with which oleic acid is absorbed by the skin. Cotton seed oil has been recommended for pharmaceutical use in the preparation of lead plaster and different liniments. Chlorinated oil is a preparation that has been reported to be coming into use in the United States for chronic affections of the skin. The use of the heavier paraffins derived from petroleum has now received official sanction by the admission of a "petrolatum" into the United States Pharmacopœia; a considerable amount of information has been published respecting the melting points of these semi-solid hydrocarbons, and in the above work two melting points, 104° F. and 125° F. have been adopted. Mr. T. E. GREENISH has pointed out that if petroleum spirit be used to remove fat from nux vomica, it will carry with it also a considerable portion of the alkaloids, but that percolation with coal-tar benzol does not remove any. The influence of gum arabic in retarding certain chemical reactions has been described by M. LEFORT, and is evidently a property that can be utilized in the pharmacy. Gregory's powder has been the subject of further discussion in Scotland. Mr. MACPHERSON has arrived at the conclusion that the chief cause of immiscibility is added fatty matter, and Mr. NESBIT, who has examined samples of rhubarb for fixed oil, is of opinion that the practice of adding oil prevails to a considerable extent. Dr. CLARK, too, has found as much as 7 per cent. in one sample, and is of opinion that the presence of oil is the chief cause of the non-miscibility of Gregory's powder, but that even when it occurs in the powder exposure to moisture or the original presence of moisture is a necessity to the production of this condition. Apart from these interesting observations it may be mentioned that it has been pointed out that the immiscibility of Gregory's powder may be easily overcome by shaking it briskly with water in a bottle. Another pharmaceutical subject that has been brought before the North British Branch is the confection of sulphur, and Mr. PETER BOA has shown that the separation which takes place may be obviated by the addition of two grains of gum tragacanth in powder to the ounce. Mr. MACKENZIE also has suggested the use of a petrolatum in the preparation of cold cream, and his opinion has been confirmed by the experience of Mr. W. H. SYMONS. Mr. BLAND has recorded the observation that he has obtained better results in preparing tinct. camphoræ co. with the oil of *Pimpenella anisatum* than with the oil of star-anise. Lastly, Mr. A. C. ABRAHAM has pointed out the extent to which the preparation of lime water may be affected by temperature.

A great deal of interesting work has been done in investigations of the physiological effects of different ferments and micro-organisms, but although these may exercise much influence on the future of pharmacy they can only be mentioned here with the utmost brevity. The discovery by Dr. KOCH of the bacillus supposed to be the cause of phthisis, and the means of detecting it in the sputa; the researches as to the minute organism alleged to be the cause of paludal disease; the recent discovery by M. PASTEUR of the microbes which are supposed to produce rabies in dogs and pneumo-enteritis in pigs, are all full of promise in respect to the future treatment of disease. Many interesting contributions have also been made to the history of pepsine, diastase and similar ferments, and what has been observed as to the part which bacteria and similar organisms may play in the formation of peptones reveals a wide field of research. Nor is the subject wanting in technical interest, as is shown by the researches on the work done by ferments in the formation of nitrates or in their reduction to nitrites and in the communication of special properties to cheese.

The field of physics is a wide one and workers have been busy therein, but the predominant interest during the year has been devoted to subjects connected with the development, storage and application of electric energy. The magnificent exhibition of electrical apparatus at the Crystal Palace in the spring furnished the pretext for a series of articles in this Journal, in which the chief underlying principles were described with sufficient fulness to render further notice here unnecessary. Other subjects connected with physics have been referred to in "The Month," as they arose. Excuse may, however, perhaps be found for special mention of the interesting address on atoms and molecules, which Mr. B. S. PROCTOR recently delivered before the Newcastle-on-Tyne Chemical Society, on the ground that it was the effort of a well-known practical pharmacist.

The year that has seen the publication of two such important works as the new editions of the Pharmacopœias of Germany and the United States cannot be said to be poor in the production of books interesting to pharmacists. Besides this there have been Dr. WHITLA's little work on the 'Elements of Pharmacy, Materia Medica and Therapeutics,' numberless manuals of chemistry, good, bad and indifferent, and a new edition of BENTLEY's 'Manual of Botany.' Mr. ALLEN has supplied another volume of his important work on 'Commercial Analysis,' and Dr. PHILLIPS another of his 'Materia Medica.' Then, too, Dr. QUAIN's 'Dictionary of Medicine' is a book that will find its way to the bookshelves of some of our readers. Cinchona culture, also, is accumulating a literature of its own, and within the last few days we have received an English translation of a handbook on the subject, written by Mr. VAN GORKOM. Finally another 'Year-Book' is even now making its way into circulation.

The death roll of the year contains some names that lovers of science in succeeding generations will long hold in reverence. Greatest among them all stands that of our own countryman, CHARLES DARWIN, who has left such a mighty impress upon the study of natural history. Another name is that of ANTOINE BUSSY, whose researches upon sulphurous and sulphuric acids must remain a part of their history, and who for many years conducted the most important pharmaceutical journal in France. Germany contributes the name of FRIEDRICH WÖHLER, who by his synthesis of urea obliterated the distinction that had been set up between organic and inorganic compounds. America has lost the two DRAPERS, father and son, but not before each had won a niche in the Temple of Fame. Turning to men who have been more particularly lost to British pharmacy, place must be given to DANIEL BELL HANBURY, honoured for his own services as well as for the sake of those of his son. Sir ROBERT CHRISTISON, also, is a name of which Scotchmen are justifiably proud, bringing to memory good and sympathetic work done in the early days of the Pharmaceutical Society, of which he was an Honorary Member. The North British Branch has also lost in GEORGE BLANSHARD one of its former Presidents. In the North, too, at Leeds, TITUS BENNETT STEAD passed away whilst still holding office as President of the local association. In London the Board of Examiners has lost the genial presence of ALFRED ALLCHIN. Then among other names that will occur to memory are GEORGE HENRY THWAITES, the botanist, A. FREIRE-MARRECO, of Newcastle, SAMUEL URWICK JONES, of Leamington, and ROBERT HOWDEN.

Once more our yearly task is at an end. The subjects enumerated in our review will suffice to show that if pharmacy in Great Britain did not make any demonstrative progress last year it was not asleep. On the threshold of another year, which promises to raise issues of unusual importance to the pharmaceutical community, we venture to offer our wishes that they may be decided in accordance with its prosperity.

THE PROPERTY IN PRESCRIPTIONS.

IN the *Lancet* last week a case is put by a patient who received a prescription from his doctor, with an intimation that it could only be made up at a certain establishment. Some time afterwards, considering himself to be in need of the same medicine, he took the prescription to the same chemist, who, however, refused to make it up on the ground that he had been told by the doctor not to dispense it without his sanction, and this statement was confirmed on communicating with the medical man. The patient contends that the prescription is his property and that he is free to have it made up every day if he chooses, and asks the opinion of the Editor of the *Lancet* on the point. The answer given, which at any rate cannot be said to be wanting in "lucidity," is as follows:—"A medical "man is at liberty to make his own terms as to "attendance, but the system described in our cor- "respondent's letter is not generally practised or "approved. A medical man either dispenses or "prescribes. If he prescribes, the prescription "ought to be the property of the patient, to be "used when and how he pleases, and ought to be "written so that it may be compounded by any "legally qualified chemist."

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, January 3, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, W. Hills, Radley, Richardson, Robbins, Savage, Schacht, P. W. Squire, Symes, Williams and Woolley.

PUBLICATION OF THE LIST OF SUBSCRIBERS TO THE BENEVOLENT FUND.

The minutes of the previous meeting were read and confirmed, as also the minutes of the meeting of Subscribers to the Benevolent Fund for the election of annuitants.

Mr. SYMES drew attention to what he considered to be an omission from the minutes, as published in the Journal, viz., that after reading the Benevolent Fund minutes it was announced that the resolution of the Council passed in October or November was to some extent set aside. He then suggested that, as the date of publishing the list of subscribers to the Benevolent Fund had been postponed for the convenience of the office, some notice should be taken of it, in order that those who had seen the former resolution and were expecting the list might understand why it did not appear at the time named. He did not find any notice of the matter in the Journal, which appeared to him a little discourteous to the subscribers.

Mr. RICHARDSON said another matter of regret in connection with this subject was that no notice had been given to the publishers, Messrs. Churchill, that such publication was about to be carried out; and he feared some loss might accrue in consequence, as an extra number of advertisements might be expected for such special number, had due notice been given.

The PRESIDENT remarked that until the recommendations of the Committee were approved by the Council no formal notice of the matter could be given to the publishers. As soon as the Council had sanctioned the issue notice was given. With regard to Mr. Symes's remarks, the fact of the postponement was stated in the Journal in the report of the Library, Museum, Laboratory and House Committee to the Council last month.

Mr. SYMES, having referred to the report, said he found the matter was mentioned there, but he had overlooked it, having expected to find it after the report of the Benevolent Fund Committee.

THE BOARD OF EXAMINERS.

The SECRETARY read a letter which had been received from the Privy Council, approving the appointment of Examiners as reported last month.

DIPLOMAS.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Burton, Walter.
Fowler, George.
Marshall, Joseph Jewison.
Nichol, Anthony.
Richards, Thomas.
Williams, William Jesse.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Jones, John ....London.
Knight, William Tomkinson ...Peterborough.
Thornley, Frederick...............London.
Williams, William Jesse.........Gloucester.

Chemists and Druggists.

The following registered chemists and druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Gilbert, Charles Edwin ....Dawley.
Kearnes, Robert Henry ....Bilston.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Buckley, James Julian ....London.
Lawrence, Samuel ....Oban.
Llewellyn, Lewis Herbert ......Bridgwater.
Milner, Thomas ....Consett.
Willet, John Algernon ....Port Elizabeth.

Modified.

Evans, Charles Edward ....Moretonhampstead.
Gooseman, William ....Grimsby.
Pooley, John Dingley S..........Wimbledon.

ASSOCIATES.

The following, having passed the Minor examination and tendered their subscriptions for the current year, were elected "Associates" of the Society:—

Cardwell, Augustus ....Derby.
Chater, Arthur Brand ....Elmdon.
Collins, Herbert Sleight ....Bradford.
Deacon, Frederick George ......Frome.
East, William Alfred ....Princes Risbro.
Fleming, Ebenezer ....Castle Douglas.
Jenkin, William John..... ......Plymouth.
Lambert, John Thomas ....Hoyland.
Langley, Frank Collins ....Ashford.
Luxmoore, Charles Mann ......Bristol.
Miller, William Philip F. ......Folkestone.
Pask, Thomas Edward ....Newark.
Perkins, Charles Lynham ..... Plymouth.
Pridmore, Sydney Spencer ......Hinckley.
Ridgley, Cromwell ....Huntingdon.
Sharpe, William Cecil............Madeley.
Whiffin, Henry.......................Market Harboro.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Baxter, William ....Bromley.
Bennet, Andrew Russell.........Uphall.
Black, Hugh Milner ....London.
Borthwick, Robert Waddell .. Bathgate.
Brett, William George ....Grantham.
Burnby, John James ....Bardney.
Clark, Alfred Turner Sims......London.
Cock, John Frederick .. ..Southsea.
Corder, Edward ....Norwich.
Crockett, Henry ....East Grinstead.
Dodd, Richard Jefferson.........Sunderland.
Dymond, Thomas Southall......Bristol.
Elliott, Stephen James ....Preston.
Foster, William ....Dewsbury.
Granger, Harold ....Nottingham.
Hendry, Robert Love ....Edinburgh.
Herbert, Sydney Reeves.........Cockermouth.
Hersant, Milton ....London.
Hine, Alfred Ernest...............Beaminster.
Howell, Alfred.......................St. Clears.

Jackson, Herbert .... Horncastle.
Lees, James .... Manchester.
Lewis, Alfred Wheatcroft ...... Swansea.
Lomax, William Henry .... Over Darwen.
McDonald, James .... Lochee.
McEwan, Donald................. Dunfermline.
Mack, George Henry .... Holt.
Marsh, Charles David .... Devizes.
Marsh, William Henry .... Old Catton.
Mason, John Henry............... Wirksworth.
Mathias, James Russell Hy. ... Tenby.
Midgley, Walter .... Keighley.
Morris, David Henry M.......... Sunbury.
Munkman, Robert Allen......... Boston.
Pickering, Charles Edward...... Stockton-on-Tees.
Pidgeon, Alfred .... London.
Porter, Caleb Thomas George... London.
Pottage, John Wm. Dick ...... Edinburgh.
Rees, David .... Newcastle Emlyn.
Roberts, James Frederick ...... London.
Rudd, Henry Bulmer .... Bradford.
Sowden, Joseph .... Bowling.
Sugden, William Allen .... Waterfoot.
Thompson, Abraham Lewis ... Birmingham.
Tilley, Joseph .... Chelmsford.
Wilkes, Thomas .... Shrewsbury.
Wilson, Richard .... Kidderminster.
Wright, William Charles ...... Stockport.
Zusman, Harry...................... Wolverhampton.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The names of the following persons, who had made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

Andrew Duncanson, 4, East Thomas Street, Edinburgh.

John Wilkins Hodgson, 28, Mariner Street, Swansea.

Reports of Committees.

LAW AND PARLIAMENTARY.

Draft Pharmacy Bill.

The Council went into committee to receive the report of this Committee and to discuss in detail a draft Pharmacy Bill which it had prepared. The discussion having lasted several hours,

The Council resumed, when the following resolution was adopted:—

"That the report of the Law and Parliamentary Committee of November 22, December 18 and December 28, be received and that the draft Pharmacy Bill be again referred to the Committee with power to confer with the Privy Council thereon."

Mr. Schacht said he must now ask that his name might be withdrawn from the Committee, as he should not be able to take any further part in its proceedings.

The President suggested that Mr. Schacht should defer this matter for another month.

Mr. Schacht said he could not allow the matter to be postponed. It was no spasmodic action on his part. He had resolved some time ago that if there were a definite expression of opinion on the part of the Council in favour of two particular clauses in the draft Bill, he could not continue to act on the Committee.

FINANCE.

The report of this Committee was received and adopted, and sundry accounts were ordered to be paid.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to a former member, suffering from chronic disease, who has had eight previous grants of like amount.

£10 to the widow of a pharmaceutical chemist, who has had a previous grant.

£10 to the widow of a chemist and druggist and former member, and subscriber to the Fund.

£15 to the widow of a chemist and druggist, having six children dependent on her, who has had one previous grant.

£5 to the widow of a registered chemist and druggist, who has had three previous grants.

£10 to the widow of a registered chemist and druggist, who has had two previous grants of like amount.

£10 to the widow, aged 75, of a registered chemist and druggist.

One application which had been deferred twice for further information had been now definitely refused.

The gentleman who has charge of two of the Isherwood orphans (boys) had had an interview with the Committee, and had been requested to make some suggestion at an early date with regard to some employment for the elder boy, now in his fourteenth year.

The report and recommendations of the Committee were unanimously adopted.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

	Attendance.	Total.	Highest.	Lowest.	Average
November .	Day . . .	627	33	19	24
	Evening . .	243	19	6	11

	No. of Entries.		
Circulation of books.	Town.	Country.	Total.
	196	146	342

Carriage paid, £1 15*s.* 11½*d.*

The following donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Allgemeiner österreichischer Apotheker-Verein, Zeitschrift, 1882. From the Verein.

Alumni Association of the Philadelphia College of Pharmacy, Eighteenth annual report, 1882. From the Association.

American Journal of Pharmacy, 1882. From the Philadelphia College of Pharmacy.

American Pharmaceutical Association, Proceedings, vol. 29. From the Association.

Analyst, 1882. From the Editors.

Annuaire des Spécialités médicales et pharmaceutiques, 1882. From the Publishers.

Archiv for Pharmaci og technisk Chemi, 1882. From the Publishers.

Botanical Society [of Edinburgh], Transactions, vol. 14, part 2. From the Society.

Canadian Pharmaceutical Journal, 1882. From the Ontario College of Pharmacy.

Chemical News, 1882. From the Editor.

Chemical Society of London, Journal, 1882. From the Society.

Chemist and Druggist, 1882.

Chemists' and Druggists' Diary, 1883. From the Proprietors.

Chemists and Druggists' Trade Association, Sixth annual report, 1882. From the Association.

Chemists' Journal, 1882. From the Editor.

College of Preceptors, Educational Times, 1882. From the College.

Ephemeris of Materia Medica, Pharmacy, Therapeutics, etc., 1882. From Dr. Squibb.

Guy's Hospital, Reports, vol. 25, 1881. From the Hospital.

Imperatorskie S.-Peterburgskie Botanetsheskie. Sad, Acta horti petropolitani, tom. 7, fasc. 2. From the Sad.

Institute of Actuaries, Journal, and Assurance Magazine, 1882. From the Institute.

Institute of Chemistry, Register of Fellows and Associates, 1882. From the Institute.

Iowa State Pharmaceutical Association, Proceedings, 1881. From the ASSOCIATION.
Kaiserliche Akademie der Wissenschaften in Wien, Anzeiger, mathematisch - naturwissenschaftliche Classe, 1882. From the AKADEMIE.
Linnean Society of London, Journal, 1882.
— List, 1882. From the SOCIETY.
Liversidge (A.), Minerals of New South Wales, 2nd ed. From the AUTHOR, through the Royal Society of New South Wales.
Mason Science College, Calendar, 1882. From the COLLEGE.
Massachusetts Pharmaceutical Association, Proceedings, 1882. From the ASSOCIATION.
Medical News, 1881–2. From the PUBLISHER.
New Remedies, 1882. From the EDITORS.
Newcastle-upon-Tyne Chemical Society, Transactions, vol. 5, nos. 6–11. From the SOCIETY.
New South Wales, Department of Mines, Annual reports for 1880–81. From the DEPARTMENT, through the Royal Society of New South Wales.
Nieuw Tijdschrift voor de Pharmacie in Nederland, 1881. From Dr. J. MOREL.
Ny pharmaceutisk Tidende, 1882. From the PUBLISHERS.
Owens College, Manchester, Calendar, 1882. From the COLLEGE.
Pharmaceutical Society of Ireland, Calendar, 1882. From the SOCIETY.
Pharmaceutical Society of Victoria, Australasian supplement to the Chemist and Druggist, 1882. From the SOCIETY.
Philosophical Society of Glasgow, Proceedings, vol. 13, part 2. From the SOCIETY.
Photographic Society of Great Britain, Journal and transactions, 1882. From the SOCIETY.
Radcliffe Library, Catalogue of books added during 1881. From the LIBRARY.
Royal College of Physicians of London, List of fellows, etc., 1882. From the COLLEGE.
Royal College of Surgeons of England, Calendar, 1882. From the COLLEGE.
Royal College of Veterinary Surgeons, Register, 1882. From the COLLEGE.
Royal Dublin Society, Scientific proceedings, vol. 2, part 7; vol. 3, parts 1–4.
— Scientific transactions, vol. 1, parts 13–14. From the SOCIETY.
Royal Institution of Great Britain, Notices of the Proceedings, no. 74.
— List of Members, Report, etc., 1882.
— Catalogue of the Library, 1882, vol. 2. From the INSTITUTION.
Royal Medical and Chirurgical Society of London, Medico-chirurgical transactions, vol. 65.
— Proceedings. nos. 54–5. From the SOCIETY.
Royal Society of Edinburgh, Proceedings, nos. 108–9. From the SOCIETY.
Royal Society of London, Proceedings, nos. 216–21. From the SOCIETY.
Royal Society of New South Wales, Journal and proceedings, vol. 15.
Richards (T.), New South Wales in 1881. From the ROYAL SOCIETY OF NEW SOUTH WALES.
St. Bartholomew's Hospital, Reports, vol. 17.
— Statistical Tables, 1881–82. From the HOSPITAL.
St. Thomas's Hospital. Reports, new series, vol. 11.
— Medical School Calendar and Prospectus for 1882–3. From the HOSPITAL.
School of Pharmacy Students' Association, Papers, 1880–81, vol. 7, MS. From the ASSOCIATION.
Smithsonian Institution, Annual report for 1880. From the INSTITUTION.
Société botanique de France, Bulletin, 1882. From the SOCIÉTÉ.
Société des Pharmaciens de l'Eure, Bulletin, 1881. From the SOCIÉTÉ.
University College, London, Calendar, 1882. From the COLLEGE.
University of Durham, Calendar, 1882. From the UNIVERSITY.
University of Edinburgh, Calendar, 1882. From the UNIVERSITY.
University of Glasgow, Calendar, 1882. From the UNIVERSITY.
University of London, Calendar, 1882. From H. M. GOVERNMENT.
Victoria, Pharmaceutical Register for 1881. From the PHARMACY BOARD OF VICTORIA.
Victoria University, Manchester, Calendar, 1882. From the OWENS COLLEGE.
Yorkshire College, Calendar, 1882. From the COLLEGE.
Herlant (A.), Caractères microscopiques de quelques Graines officinales, 1882. From the AUTHOR.
Malosse (T.), Propriétés optiques des Liquides et leur application à l'Analyse, 1882. From the AUTHOR.
Meyer (H.), Zur quantitativen Bestimmung der gesammten Alkaloïde der Chinarinde, 1882. From the AUTHOR
Ralfs (J.), British Phænogamous Plants and Ferns 1839. From Mr. C. B. ALLEN
Schuppe (N.), Beiträge zur Chemie des Holzgewebes 1882.
Separat-Abzug aus den Sitzungsberichten der Dorpater Naturforscher-Gesellschaft, 1882. 2 pamphlets. From Professor DRAGENDORFF.

The Committee recommended the purchase of the undermentioned works:—
British Homœopathic Pharmacopœia, 3rd ed., 1882.
Darwin (C.), The Movements and Habits of Climbing Plants, 1882.
Luerssen (C.), Medicinisch-pharmaceutische Botanik, 1879–82, 2 Bände.
Quain (R.), Dictionary of Medicine, 1882.
Stocken (J.), Elements of Dental Materia Medica and Therapeutics, with Pharmacopœia, 3rd ed., 1882.
Townsend (F.), Flora of Hampshire.
United States Pharmacopœia, 1882. 2 *copies.*
Journal of the Chemical Society. Sundry numbers to complete.

An application for the loan of microscopic slides having been laid before the Committee, it was decided that it is not advisable that slides should be lent out of the Society's building.

Curator's Report.

The Curator had reported the average attendance in the Museum during November to have been:—

	Total.	Highest.	Lowest.	Average.
Morning .	395	26	2	15
Evening .	104	13	0	5

The attendance during the year 1882 showed a slight increase over that of the previous year:—

	1881.	1882.
Morning	3071	3089
Evening	774	894
	3845	3983

The following donations to the Museum had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—
Leaves of *Croton balsamiferum.* From Mr. EADE.
Unusually fine specimens of Orris Root, China Root and Zanzibar Amine. From M. CHANTRE.
Specimen of Spurious Opium found mixed with the genuine. From Mr. J. R. YOUNG.
Three specimens of *Endogenites erosa* from the Sussex Wealden. From Mr. G. A. KEYWORTH

Herbarium specimens of *Erigeron Philadelphicum*.

From the DIRECTOR OF THE ROYAL GARDENS, KEW.

Specimen of Aloin and Tribromo-Aloin from Jafferabad Aloes.

Crystalline mass of Xanthate of Potassium.

From Mr. F. H. ALCOCK.

The Professors had reported satisfactorily of their respective classes.

The Secretary had reported that he had written to the India Office asking that further specimens of Cinchona barks grown in India might be forwarded to the Museum, and had received a reply stating that his request had been forwarded to India with the desire that it might be complied with as fully as possible.

It was also reported that the President had been in correspondence with the Colonial Office respecting the forwarding of drugs, colonial products, and papers relating thereto, to the Museum of the Society, and had received a promise that it should be done.

The Committee had ordered the Library and Museum be closed for the usual period during the Christmas vacation.

The report was received and adopted unanimously.

GENERAL PURPOSES.

This report, which was taken in committee, consisted merely of the usual letter from the Solicitor respecting cases which had been placed in his hands. He reported that—

R. Preston, Bury, had paid the penalty and costs.

Thomas McCreath, Newton Stewart, had paid a penalty and costs; and

John Lawson, Newton Stewart, had also paid a penalty and costs.

The report was received and adopted.

CORRESPONDING MEMBERS.

The PRESIDENT then moved the following resolution:—

"That it is desirable to institute a class, limited in number, of Corresponding Members, to consist of such persons as have distinguished themselves in pharmacy, or any of the branches of knowledge embraced in the educational objects of the Society.

"The class of Corresponding Members shall consist of persons who reside permanently *outside* the limits of the United Kingdom.

"The election of Corresponding Members shall take place annually in the same manner and under the same conditions as Honorary Members.

"That it be referred to the Library, Museum, Laboratory and House Committee, to consider and report what limit should be fixed as the number of such Corresponding Members, and as to the best way of carrying out the foregoing resolutions."

He said he would remind the Council that in almost all societies interested in the advancement of science and knowledge generally there are two classes of non-paying members, men whom it is desired by the Executive of such societies to have within their fold, but who are not liable to pay the subscriptions of ordinary members. They are honorary members in the one case, and corresponding members in the other. Honorary members are men distinguished either at home or abroad, whilst corresponding members are drawn from countries outside that in which the society has its existence. The Pharmaceutical Society, at different times, had received very great encouragement from distinguished pharmacists abroad, some of whom were also eminent chemists, physicists and botanists, but it had been out of its power hitherto, except in a few cases, to show its appreciation of their interest in British pharmacy by conferring upon them any title. He felt sure that this resolution, which proposed to allow the Council the opportunity of doing so, would commend itself, not only to his colleagues, but to the Society at large. There were many distinguished men who had worked for pharmacy and sent papers to the Journal, and some of whom had actually come to the Society's house and taken part in the deliberations for the advancement of pharmacy, but who resided on the Continent, in the United States, India, Australia and other places. There were many, also, who correspond with the Society's officers, and who show generally an active interest in the efforts of the Society, and he felt that their co-operation would be fittingly acknowledged by enrolling them as corresponding members. To many of these distinguished men the privilege of an honorary member would be practically unavailable, but the status of a corresponding member would be applicable to a large number of them. Having regard to these facts, and also to the fact that the byelaws evidently contemplated the formation of this class, he begged to move the resolution standing in his name.

The VICE-PRESIDENT, in seconding the motion, said that as the list of honorary members was necessarily very restricted it became impossible to recognize the services of all the distinguished men whom the Society would like to honour. There were many gentlemen around the table and other members outside who had been recognized by continental and other societies, and it seemed to be only right for this Society to take the subject into consideration. He wished to know if it were intended to send any stamped document or diploma to the gentlemen elected—something beyond a mere letter of recognition from the office.

The PRESIDENT said the third paragraph of the motion was intended to convey that corresponding members would receive the same sort of respect as the honorary members and be furnished with a diploma, so that they would have a permanent record of the honour conferred upon them.

Mr. BUTT asked if it were proposed to restrict the number.

The PRESIDENT replied that a number would probably be fixed from time to time.

Mr. GREENISH said the motion met with his hearty approval, for he felt it was a movement in the right direction. Hitherto the two titles of honorary and corresponding members had been combined; but it was usual with foreign societies to confer honorary membership on some gentlemen and corresponding membership on others, and he was quite sure that a large number of foreigners, scientific gentlemen who had supported the Museum and the Society generally, would be gratified at having this title conferred upon them. He had a letter in his pocket from one resident in Belgium who had sent a large number of works from time to time to the Society, and such were the men on whom the corresponding membership should be conferred. It was perhaps unfortunate that the honorary membership should be limited to fifty, but it was certainly not desirable that the list should be too large. A few years ago it was almost entirely filled up, so that the Council could only elect additional honorary members as those already on the list died off. Just at the present time, when the Society had been honoured by the presence at the International Congress of so many gentlemen from abroad, it was particularly desirable that something of this kind should be done.

Mr. WILLIAMS said he had not the slightest doubt about the desirability of this resolution, but hitherto in electing honorary members the two titles had been united, and it was a question in his mind whether it would not be wiser to enlarge the number of honorary members and have only one list. He did not at all oppose the proposition that the number of honorary or corresponding members should be very much extended, but he thought it might be preferable to keep to one grade of honorary members.

Mr. BOTTLE asked if it were proposed that these corresponding members should be honorary members.

The PRESIDENT said they would not pay any subscription.

Mr. Bottle said in that case they would be honorary members. They must come within the category of those mentioned in the bye-laws as honorary and corresponding members.

The President said as he read the bye-laws he took them to be two separate classes, although it had been the practice hitherto to consider them as one.

Mr. Bottle said in one place in the charter they were spoken of as honorary or corresponding members, but everywhere else they were spoken of as honorary and corresponding members. He did not wish to oppose the motion in any way, but it appeared to him the fair construction of the bye-laws was that they applied to one class only.

The President said that in the diploma the title "honorary member" alone was used. Of course all corresponding members might be said to be honorary, and some of them might eventually be elected to the class of honorary members.

The motion was put and carried unanimously.

Report of Examinations.

December, 1882.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major (13th)	6	2	4
„ (14th)	7	4	3
	— 13	— 6	— 7
Minor (13th)	12	7	12
„ (14th)	18	7	11
„ (19th)	24	12	12
„ (20th)	24	14	10
„ (21st)	24	9	15
	—109	—49	—60
	122	55	67

Preliminary Examination.

Ten certificates were received in lieu of the Society's examination:—

4 College of Preceptors.
1 Faculty of Physicians and Surgeons of Glasgow.
1 Royal College of Surgeons in Ireland.
2 University of Cambridge.
1 „ Edinburgh.
1 „ Oxford.

Sale of Patent Medicines.

The President reported that a communication had been received from the Honorary Secretary of the Nottingham and Notts Chemists' Association, enclosing a resolution passed at a meeting, held December 19, in favour of procuring a repeal of that portion of the Pharmacy Act which excluded stamped proprietary articles from the operation of the poison regulations.

Parliamentary and Law Proceedings.

Poisoning by "Syrup of Chloral Hydrate."

An inquest was held last week at Saxonbury Lodge, Ryde, on the body of Lady Petre, widow of the late Hon. Arthur Petre, and daughter of the late Earl and Countess of Wicklow. The deceased lady retired to rest on Wednesday evening in her usual good health. As she did not rise at her accustomed hour the governess went into her room and found her in a convulsed attitude on the bed. By her side was a bottle of chloral, which had been fetched for the deceased the day after Christmas Day, and from which no less than sixteen teaspoonfuls had been taken in two days. The bottle was labelled "Syrup of chloral hydrate, dose one teaspoonful."

The deceased lady's son-in-law, Mr. J. S. Powell, of Hamberton Park, Maryborough, Queen's County, said he was aware that Lady Petre took chloral for sleeplessness, but did not know whether she had been ordered to do so by a medical man. He did not think she was at all likely to commit suicide.

Mr. Rich, surgeon, Ryde, said he thought her ladyship died from heart disease while under the influence of chloral. Of course he could not say that was so without a *post-mortem* examination. He pointed out that people began with small doses of chloral, which they kept increasing till they could take as much as 80 grains, and that the practice of taking chloral to induce sleep weakened the heart.

The Coroner said he would order a *post-mortem* if the jury wished it, but he thought it unnecessary. It was, in his opinion, clear that the deceased took the chloral inadvertently.

In this view the Jury concurred, and returned a verdict to that effect, and expressed an opinion that the bottle ought to have been labelled "Poison."

Poisoning by Prussic Acid.

On Saturday, Dec. 30, the Coroner for Central Middlesex held an inquiry as to the death of John Maplestone, aged 51, which was supposed to have resulted from poisoning by prussic acid. It appeared from the evidence that deceased obtained from a medical friend some prussic acid in a bottle with the object of poisoning a cat. Some time after he was found in the pantry, lying on his back on the floor, as if he had fainted, whilst a cat was in the room in a very excited state. On medical aid being obtained he was found to be dead. There was a saucer on the table, which had contained sardine oil and prussic acid. The cat was known to be exceedingly fond of sardine oil, and it was subsequently discovered by the vomit about the floor that the sardine oil and prussic acid had been administered to the cat. On the shelf was the bottle which had contained the prussic acid. It was therefore suggested that if the death of the deceased was due to prussic acid it must have resulted from some misadventure, as he had no cause to destroy himself, but on the contrary, every reason why he should desire to live. He was on excellent terms with everyone.

Mr. Rayner, the summoning officer, stated that he had searched deceased's property and papers, and could find nothing to throw light on the matter.

The Coroner remarked that there was no doubt of the fact that deceased's death was from taking prussic acid, but what caused him to do so was a mystery. He had frequently held inquests where persons had committed suicide without any assignable cause.

The Jury ultimately returned a verdict "That the deceased died from the effects of prussic acid poisoning self-administered, but whether with the intention of suicide or otherwise there was not sufficient evidence to show."

Review.

The Year-Book of Pharmacy. Comprising Abstracts of Papers relating to Pharmacy, Materia Medica and Chemistry contributed to British and Foreign Journals from July 1, 1881 to June 30, 1882, with the Transactions of the British Pharmaceutical Conference at the Nineteenth Annual Meeting held at Southampton, August, 1882. London: J. and A. Churchill.

Not an unimportant measure of the success enjoyed by the British Pharmaceutical Conference is without doubt attributable to the annual publication of a Year-Book of Pharmacy, and its free distribution among its members. The reflex influence resulting from this act would alone form a necessary factor in any estimate of the numerical strength of the body. On the other hand the eagerness manifested on the part of its members to possess themselves of this work at an early date may surely be regarded as an indication of their appreciation of its worth.

In size, the present volume is within six pages of last year's issue, which it further resembles, both in regard to the subjects into which it is divided and the manner of their arrangement. The conventional sixteen pages at its commencement, though less closely printed than usual, take the form of an introduction. Although this constitutes mainly a connected summary of the scope of the work, it is perhaps the more valuable as affording a means by which the reader is enabled to judge of the advance which pharmacy and its allied branches have made during the past year.

The subject of "Chemistry," Part I., embraces one hundred and twenty-five pages. Here we are pleased to note the space which has been devoted a careful digest of the physiology and chemistry of chinoline and its compounds. No less than five abstracts, taken from the papers of eminent English and continental investigators, appear on this newly discovered medicament. Information not less helpful to the pharmacist will be found under pilocarpine, emetine, etc. The man, too, of more purely scientific tendencies will find his tastes gratified and a field for revelry in the contemplation of such products as monochlormethylnoropianic acid, a derivative of opianic acid, and pyroguajacol, a product of the dry distillation of guaiacum. The chemistry of the cinchona bases and the various products derivable therefrom also receive a large share of attention, and the results of the several workers will probably be studied with unabated interest by specialists.

Not a few, too, of the analytical methods which have been published during the year are here presented in a succinct form.

Part II. comprises "Materia Medica and Pharmacy," and is contained within the more moderate bounds of ninety-six pages. It is more particularly this section and the succeeding one on "Notes and Formulæ" that renders this book an indispensable desk companion to the busy pharmacist. As a work of reference we note with satisfaction that its usefulness has not been sacrificed by overloading it with *minutiæ* of detail pertaining to methods having reference to the extraction of plant principles. The results of the proximate analysis of plants are clearly expressed, while the processes employed are stated in general terms. We would suggest that to a description of those drugs more recently introduced into medicine should be appended a note upon their therapeutical action and dose.

Part IV. is entitled "Bibliography," comprising titles of books, pamphlets, etc., on chemistry, botany, materia medica, pharmacy and allied subjects, published between July, 1881, and June, 1882. This section, which now appears for the second time, undoubtedly supplies a demand, but it occurs to us that it might give the desired information without occupying a space of equal dimensions with materia medica and pharmacy. Adverting to the transactions, we have here given, in alphabetical order, the names and addresses of all the members of the Conference, but we nowhere find any mention of the exact number. From the report of the executive committee we learn that fifty-seven gentlemen have been elected members since the last year. It is gratifying to be told that as the result of an invitation issued to colonial pharmacists to become members, twenty have applied in the affirmative. The comparative freedom from clerical errors which characterizes the transactions is a continued proof of the great care with which it is edited; but on p. 446, four lines from the bottom, the word *not* is omitted in the sentence "there would be an equivalent quantity of iodine liberated," and again, on p. 471, the abbreviation *per cent.* is left out in the sentence reading "8 solution of caustic soda."

Obituary.

Notice has been received of the death of the following:—

On the 19th of December, Mr. William Hardcastle, Chemist and Druggist, Stockton-on-Tees. Aged 72 years.

On the 22nd of December, Mr. Alfred Driver, Chemist and Druggist, Royal York Crescent, Clifton. Aged 35 years.

On the 28th of December, at Sheffield, Mr. Edward Wilson, Pharmaceutical Chemist. Aged 57 years. Mr. Wilson joined the Pharmaceutical Society in 1853, and continued a Member up to the time of his retirement from business in the year 1877. He generously supported and took great interest in the Benevolent Fund.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Preliminary Examination.

Sir,—Although outside the pharmaceutical world, I frequently read your paper. I am a B.A. and L.C.P., and having been a tutor for many years I claim your indulgence in allowing me just a small space to make a few remarks on the Preliminary examination. My experience as a tutor is by no means limited, having followed my profession for nearly twenty years, during which time I have had scores of youths to prepare for the Preliminary examination. I contend that the fact of a boy passing the Preliminary is by no means a test that he has been properly educated, and especially in the Latin subject, and the only way by which this may be remedied is to adopt the plan used by the examiners for the legal profession, that is change the subjects twice yearly (the Latin authors). I have had a boy who could translate the first book of Cæsar well,—indeed, you need only give him the beginning of a chapter and he would say the rest off by heart,—still, if I were to ask him the simplest question about the grammatical construction of a sentence, he would be completely dumbfounded. On December 9, at a meeting of the Pharmaceutical Council, a gentleman remarked that the Preliminary examination of the College of Surgeons contemplated one Latin author only. This is true, but the examination is altogether different from the pharmaceutical, inasmuch as the 'Anab.' of Xenophon, Book I., has to be translated into English, or a passage from a French work into English, besides English into French, algebra, Euclid (books I., II.), geography and history, so that the two examinations cannot be well compared as regards severity. If, as suggested, the first book of the 'Æneid' were added, even then the examination would be far below the standard of the Oxford and Cambridge locals. It appears to me that the Council wish to make it equal to the two latter examinations, and I must express my entire concurrence, for any well-educated schoolboy should pass the Oxford or Cambridge examinations with ease. Taking into consideration that there is no French, German, or Greek to be learnt, as for the medical and legal examinations, I think two Latin authors should be taken at least, say—

January . . . . July	Cornelius Nepos. Cæsar D. B. G. Lib. I.
April . . . . . October	Cæsar D. B. G. Book II. Virg. Æneid, Lib. I.

And a wider range of arithmetic to compensate for the Euclid and algebra. A boy well up in his Latin grammar would be able to get up any two of the above books in eight or nine weeks. A good examination in analysis should be added to the English paper.

A. W. S.

Communications, Letters, etc., have been received from Messrs. Dewson, Radley, Sangster, Lime Juice, Sanitas, S. G., A. W. S.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 505.)

In commenting more in detail upon the articles contained in the two Pharmacopœias it is proposed to deal first with the animal and vegetable materia medica, then with chemicals and their preparations, and lastly with the galenical preparations. As a rule an alphabetical arrangement will be followed, and for convenience the sequence will be according to the actual name of the drug, as in the U.S.P., instead of according to that of the part used, as in the P.G. Exceptions to this rule, however, will be made in the cases of the balsams and essential oils.

I. Animal and Vegetable Materia Medica.

Absinthii, Herba, P.G.—The use of the cultivated as well as the wild herb is allowed. The time of collection is now omitted.

Aconitum, U.S.P., Tubera Aconiti, P.G.—The tuberous root is alone official, the leaves being omitted from the U.S.P. This is an advantage, since the leaves vary greatly in strength at different periods of their growth. The description now given in the U.S.P. permits the use of those roots only which are whitish internally and enclose a pith having about seven rays. This should ensure the rejection of horny and hollow roots, of which many are of uncertain value and doubtful botanical origin. The Japanese aconite (*Pharm. Journ.*, [3], xi., 1042), which is white and starchy internally, is also excluded, since the pith is not usually seven-rayed, but is surrounded by an irregular circle of vessels; even in the comparatively few specimens in which the pith is five-rayed, and which probably belong to a plant nearly allied to *A. variegatum* (the root of which has a five-rayed pith) the number of the rays and the smooth, plump appearance and more conical shape, will serve to distinguish it. Possibly it is with the view of excluding Japanese aconite, on account of its containing a distinct alkaloid and being more poisonous than the root of *A. Napellus*, that the P.G. now describes aconite as "tubera rapiformia," not "obconica" as formerly. The use of tubers that are brownish and hollow internally and of unequal size, which was permissible under the description given in the last edition, is now excluded by the simple statement that the roots are "farinosa vel granulosa" internally. In neither Pharmacopœia is it stated at what time of year the tubers should be collected, nor whether cultivated or wild plants should be used (*Pharm. Journ.*, [3], xiii., 234). It therefore remains for private enterprise to cultivate and supply a root which shall present the required characters, such being the exception rather than the rule in commerce at the present time.

Aconitine is omitted from both Pharmacopœias, possibly in consequence of the extreme variability in strength of the alkaloid as procurable in commerce, and of the deplorable results that have followed the use of a substance of which some samples are one hundred and seventy times as strong as others (*Pharm. Journ.*, [3], xi., 51; xii., 683). It may be hoped that the medical profession will also permit the alkaloid to drop out of use in this country and that thus the heavy responsibility which at present rests on the chemists who dispense it may be removed.

Adeps.—In the U.S.P. this is now directed to be kept in vessels impervious to fats, and directions are given for testing its freedom from alkalies, starch, common salt and water. In the P.G. the description is much longer than in the previous edition and directions are given for ascertaining its characters. The U.S.P. gives data as to the solubility of lard in benzine, ether and bisulphide of carbon. The P.G. directs that its character should be ascertained by the preparation with caustic potash of a soft soap, which should be soluble in 40 parts of warm water and in 10 parts of alcohol. The unguentum benzoini of the last edition of the U.S.P. is now placed under the better-known name of "adeps benzoinatus." Instead of being made with the tincture of benzoin it is now prepared of a strength and in a manner very similar to that of the British and Russian Pharmacopœias, the temperature not being allowed to rise above 60° C. (140° F.) during the process.

Allium, U.S.P.—A description of the bulbs is now given, followed by a sentence which is almost Irish in its incongruity, viz.:—"It should be preserved in a dry place and only used in the fresh state."

Aloe and Aloe Purificata, U.S.P.; Aloe, P.G.—Socotrine aloes is now the only kind official in the U.S.P., Barbadoes and Cape aloes having been discarded. It appears to have escaped the notice of the editors that Socotrine aloes is not produced, as was formerly supposed, by *A. Socotrina*, but by *A. Perryi*, Baker (*Pharm. Journ.*, [3], xi., 747). Socotrine aloes, as met with in commerce, varies so much, containing sometimes half its weight of mineral matter and sometimes as much as 25 to 30 per cent. of "resin," that the introduction of "aloe purificata" for use in the various preparations cannot be too highly commended as a step in the right direction, which might well be followed in the next edition of the British Pharmacopœia. The mode in which the purification is effected is, however, probably open to improvement, both as to the solvent and the temperature employed (*Pharm. Journ.*, [3], xii., 501). In the P.G., Cape aloes is still the only official kind. The tests now given are that a solution of 5 parts in 10 of boiling water, when cooled, should not yield more than 3 parts of deposit, that no colour should be given to boiling chloroform, and only a yellowish tint to ether. It should also be so free from moisture that it only softens, but does not melt at 100° C.

Althæa, U.S.P.—A description is now appended, from which it is evident that only the decorticated root is official. Marshmallow root is very apt to become mouldy and undergo change if kept in a damp atmosphere; directions to keep it in a dry place might, therefore, have been added with advantage.

Ammoniacum, U.S.P. and P.G.—In the P.G. the wording of the description has been altered. Specimens of a brown colour are not objected to. Two chemical tests are given, one with liquor sodæ, which should give a yellow and then a brown coloration to the aqueous emulsion, and the other with hydrochloric acid, which should not change the colour. The latter test distinguishes ammoniacum from galbanum, with which it gives a blue colour, but the former test might well be replaced by solution of chlorinated soda, which colours true ammoniacum but does not affect the African kind.

Amygdala amara and A. dulcis, U.S.P.; Amygdalæ amaræ and A. dulces, P.G.—The sweet almonds are now limited in the P.G. by given measurements, which seem to apply to Valencia rather than to Malaga almonds; but in neither Pharmacopœia is any commercial variety specified.

AMYLUM, U.S.P.; AMYLUM TRITICI, P.G.—The description given in the U.S.P. applies to wheat starch in its pseudo-crystalline state, and permits of the use of starch which forms a white jelly having a bluish tinge, but provides against the presence of acids or alkalies. The P.G. orders powdered starch, but enters more minutely than before into its microscopical appearance, describing the different aspect of the granules when examined in water or alcohol, and the means by which potato starch may be recognized if mixed with that of wheat. The mucilage is required to be free from taste and odour. It is difficult to understand why potato starch should alone have been specified, since maize and rice starch are quite as likely to be mixed with it or substituted for it. Mineral substances, as heavy spar, etc., are detected by estimating the ash, which should not exceed 1 per cent. This is a tolerably difficult process, which might, with advantage, be replaced by that of heating with dilute sulphuric acid and boiling and adding an equal volume of alcohol to a portion of the clear solution, which should not become turbid.

AMYLUM IODATUM occurs only in the U.S.P., and is of 5 per cent. strength, being thus only half that of the Belgian formula, and one quarter of the strength of that given by Dr. Buchanan in the *British Medical Journal* (May 1, 1880). According to Stillé and Maisch (U.S. Disp., p. 173), iodide of starch contains "not over 7·5 per cent. of iodine," and the formula now given is, therefore, safer for internal use for those unusually susceptible to the action of iodine. A distinction is made in the U.S.P. between the Latin name for starch and that of amyl nitrite by making the word amyl indeclinable, and in the P.G. by adopting the form amylium.

ANGELICÆ, RADIX, P.G.—Although placed under "*Radix*" the description now begins with the words *Rhizoma breve.* As other rhizomes are placed under "*Rhizoma*," it is difficult to understand why this is placed under "*Radix*." The measurement and description are now made more exact, by which the root of *A. sylvestris*, L., is excluded, being smaller than the dimensions given. For this reason, probably, it is not now alluded to. The directions to collect the drug in the spring of the second year of its growth, to reject specimens injured by insects, and to preserve it well dried in closed vessels, are now omitted.

ANISUM, U.S.P.; FRUCTUS ANISI VULGARIS, P.G.—In the last P.G. the fruit was described as about 2 millimetres long, which applies only to Russian anise. It is now directed to be 3 millimetres long and 3 broad, a description which admits only of the use of German and Maltese anise. The U.S.P. states that the fruit should be 4 millimetres long, which applies to the Alicant kind. It gives directions how to distinguish anise from conium fruit. As conium fruit rarely exceeds 3 millimetres in length, the official sort could not well be confounded with any but the Russian aniseed.

ANTHEMIS, U.S.P.—A description is now added by which the flower-heads may be distinguished from those of *Matricaria Chamomilla*, which was included in the secondary list of the last edition, and is retained probably in consequence of its preference by the German element of the population. The U.S.P. points out how the flower-heads may be distinguished from those of *A. arvensis* and *A. Cotula*, but the P.G., while mentioning neither these nor the two similar species, *Anthemis arvensis* and *Pyrethrum inodorum*, remarks that *M. Chamomilla* is distinguished from all the nearly allied plants by its hollow conical receptacle, the measurement of which it gives. (See "*Chamomillæ, Flores.*")

APOCYNUM, U.S.P.—This root is another remov from the secondary list and is now distinguished by the vernacular name of Canadian hemp, instead of Indian hemp as in the last edition, a precaution which will prevent confusion between this plant and *Cannabis indica.* It is undoubtedly a more active plant than *A. androsæmifolium*, which is no longer official, and, which moreover, is difficult to obtain in commerce in the United States, although easily procurable in Canada (*Amer. Journ. Pharm.*, [4], xi., 554.

ARNICA FLORES, U.S.P.; FLORES ARNICÆ, P.G.—The description in the P.G. now gives the measurement of the receptacle, of the fruit, and of the pappus, and a more full description of the flower, by which it may easily be distinguished from that of other Compositæ likely to be mixed with it. That given in the U.S.P. is not sufficiently definite to prevent admixture passing undetected. The P.G. directs the involucre and receptacle to be removed. The width of the receptacle "ad sex millimetros" is rather beyond that generally found in commercial samples, which are in most cases only 4 millimetres broad. The hairiness of the receptacle and the ten-veined ligulate florets, in conjunction with other characters, serve to distinguish it from *Inula britanica.* The description of the root in the U.S.P., in which it is said to be internally whitish, having "a rather thick bark, containing a circle of resin-cells surrounding the short woody wedges and large spongy pith," leaves it open to conjecture whether there is a second circle of resin-cells surrounding the pith. A more correct description would be:—The thin bark is brown internally and contains a circle of resin cells, the woody portion is whitish and consists of a single circular row of woody bundles surrounding a proportionately large greyish spongy pith." The rootlets are whitish internally, with a slender yellowish meditullium. The resin cells mentioned in the U.S.P. are not easily distinguished under an ordinary hand lens.

ASAFŒTIDA, U.S.P.; ASA FŒTIDA, P.G.—In both Pharmacopœias the names of the plants yielding it are changed to *Ferula Narthex* and *Ferula Scorodosma.* The U.S.P. states that 60 per cent. of the drug should be soluble in alcohol, and the P.G. directs that the ash should not exceed 10 per cent., that liquor sodæ should give a yellowish colour to it and that hydrochloric acid should not effervesce much nor become coloured when digested with it. Considering how frequently it is impure a strained preparation would be an improvement.

ASCLEPIAS, U.S.P.—This is one of the roots removed from the secondary list of the last edition. The reason for retaining *A. tuberosa* and discarding *A. syriaca* and *A. incarnata* is not very obvious, but is probably due to the properties of the former being better known and to popular prejudice in its favour. The vernacular synonym now adopted is "pleurisy root," instead of "butterfly weed," as in the last edition.

ASPIDIUM, U.S.P.; RHIZOMA FILICIS, P.G.—The name "aspidium" is now adopted in the U.S.P.

in preference to "*Filix mas*" and it includes also *A. marginale*, the rhizome of which is characterized by having six instead of about ten vascular bundles. The chaffy scales of the leaf-stalks and the dead portion of the rhizome and stipes are to be removed, the green portion only being used. In the P.G. the botanical name "*Aspidium*" is adopted instead of "*Polystichum*" as in the last edition, and the rhizome with the base of the leaves is to be collected towards the end of the year, the rootlets and "paleæ" being removed. The rhizome is not to be kept longer than a year and the transverse section of the leaf-bases should show a greenish colour, an angular outline and about eight vascular bundles, the number which appears to be most frequently present in *A. Filix-mas*.

Aurantii Amari Cortex, U.S.P.; Cortex Fructus Aurantii, P.G.—This is described in the U.S.P. as occurring either in thin bands or in quarters, the epidermis being of a dark brownish-green colour. The P.G. describes it as of a pale brown colour (subfusca), from which it would appear that it is not so carefully dried abroad as it is in this country. The Curaçoa kind rejected by the last edition is not now mentioned.

Aurantii Flores, U.S.P., are directed to be mixed with half their weight of chloride of sodium and preserved in a suitable jar in a cool place when it is desirable to keep them for some time.

Azedarach, U.S.P.—Removed from the secondary list. The description is apparently inaccurate in one part. In samples seen in this country the outer surface has not "blackish longitudinal *ridges*," but glossy patches of thin black epidermis more or less cracked and wrinkled.

(*To be continued.*)

THE SALT DEPOSITS OF DURHAM.*

People interested in the chemical trade in various parts of the United Kingdom will know that what may amount to a new departure in that very important industry has been taken on the north-east coast of England. About twenty years ago the late Mr. John Vaughan, of the firm of Messrs. Bolckow and Vaughan, the pioneers of the Cleveland iron trade, in boring for water at their Middlesbrough works, discovered an important bed of salt underlying their premises, close to the river Tees. A few years later Messrs. Bolckow and Vaughan converted their firm into a limited liability company, and shortly afterwards an attempt was made to win the salt by sinking a shaft. Unfortunately they met with insuperable obstacles in an abundant feeder of water, which caused them, after expending a very large sum of money, to abandon for the time their proposed salt pit, and for several years no further steps were taken in the matter. In the meantime the firm of Messrs. Bell Brothers (Limited), who had established iron works at Port Clarence, on the north bank of the Tees, opposite Middlesbrough, feeling that great inconvenience might arise to them if any one else were to become owners of the salt immediately adjoining their blast furnaces at Clarence, entered into negotiations with the owners of the minerals—the Crown and the Ecclesiastical Commissioners—for an extensive royalty, and began to consider in what way the salt could best be made available. The unfortunate experience of their neighbours Bolckow, Vaughan and Co., who had become large lessees of salt, partly from the Crown and partly from adjoining landowners, deterred Messrs. Bell Brothers from endeavouring to work the salt in the rock form, and induced them to seek some other method of winning the rich deposit. One of their partners, Mr. Thomas Bell, proposed a plan which was ultimately adopted. He suggested that a bore hole should be put down to the salt, that within this hole a tube should be inserted, and a pump placed at a proper depth, so that, availing themselves of the principle which governs the levels of liquids of different densities in tubes, it would only be necessary to pump the brine from such a depth as is represented by the difference between the specific gravity of water and fully-saturated brine.

On this suggestion being made to them Messrs. Bell Brothers proposed to inquire whether a similar plan had been carried out in any other region where salt is found, and speedily learned that in the eastern part of France, near the town of Nancy, a large bed of salt is so won, the only difference between the conditions of this deposit and that on the Tees being the much greater depth of the latter. They proceeded accordingly to sink a bore hole 16 inches in diameter to the salt, and for this purpose they availed themselves of the services of the Subaqueous Boring Company, who are the licensees of the well-known Beaumont boring machinery. Considerable difficulties of a practical character were met with in completing the bore hole, and it is impossible to award too great praise to the engineers of the boring company for the way in which they dealt with the various problems that arose. One instance was very interesting. It was found, for a variety of reasons, impossible to carry the hole down to its full depth, and the engineer of the company devised an instrument by which, after boring the hole 12 inches in diameter, he was able to bore it out to the full diameter of 16 inches, so that the lining tubes, which are essential to the carrying out of the plan, would follow the instrument to the bottom of the hole. The boring operations were begun on June 16, 1880, and completed on May 28, 1881. Simple pumping apparatus was then erected at the top of the bore hole, and on June 19, 1882, the first brine from the Middlesbrough salt pit was brought to the surface. It is peculiar that the salt is found at an entirely different geological horizon from that of the Cheshire beds, which occur at a much higher point in the strata than those at Middlesbrough. Although salt is a mineral of very wide distribution, it is chiefly found in the new red sandstone series. These rocks were probably deposited under conditions which caused the formation of large inland lakes, communicating, possibly, by narrow channels with the sea. It is surmised that those channels gradually became restricted, owing to the changes of levels, and the lakes thus formed full of salt water, by a process easily understood, in time became more and more concentrated. The Dead Sea is an instance of this geological change in our own time. No doubt the salt beds of Cheshire, as of Yorkshire, were formed in this way, the only difference between them being one of time, the Cheshire beds being created at a much later period than those of Yorkshire and Durham. It is interesting to note that the great German deposits are found at the same geological horizon as are the Middlesbrough beds.

Having won the brine on the banks of the Tees, the next question was how it should be utilized: The chief purpose for which salt is used in commerce is in the manufacture of alkali, and the main centres of this industry are Lancashire and the Tyne. The process at present in vogue in both these districts is known by the name of the great French chemist who invented it, Le Blanc, and is based upon the consideration that salt is decomposed by sulphuric acid to make sulphate of soda, which is subsequently treated so as to produce carbonate of soda. The most expensive and the most difficult part of this process consists in procuring sulphuric acid. This in olden days was got from native sulphur, but when the demand for this article became so great, a substitute had to be found, and pyrites or sulphide of iron was made to

* From the *Times*.

take its place. The immediate cause of chemical manufacturers seeking for another source of sulphur than the Sicilian mines was a great commercial blunder, committed by the Neapolitan Government some forty-five years ago. For a considerable sum of money they granted a monopoly for the export of the produce of the mines to a French company, who immediately used the power thus acquired to raise the price of sulphur to two or three times its former value. This continued for some little time until the British Government insisted upon the trade being relieved of such a burden. It was in operation, however, long enough to afford the soda makers of Great Britain an opportunity of finding a substitute in the mineral known as pyrites, which is a compound of sulphur and iron, from which the former element is easily separated as sulphurous acid by the heat evolved by its own combustion. Sulphur may be described as simply a vehicle to carry the metal sodium from the chloride with which it is found combined in common salt. The sulphate of soda obtained by the action of sulphuric acid on salt is subsequently decomposed, the sulphur becoming a waste product, by action of carbonate of lime and coal, when the soda, combining with the carbonic acid, affords the marketable article known as soda ash; pan and soda crystals are also produced. The sulphur, after having served its purpose, is all thrown away, and constitutes those unsightly heaps which are characteristic of alkali works all over the world. The salt required for the Le Blanc process must be in a solid form, and Messrs. Bell, looking to the Tyne as one of their chief markets, and believing by their favourable position that they can successfully compete with Cheshire, have erected pans to evaporate the brine and produce salt for the chemical manufacturers on the banks of the neighbouring river. The requirements of the Tyne amount to about 200,000 tons a year. It may be asked how it happens that an industry requiring so large an amount of material grew up at so great a distance from its source of supply. This is accounted for by the fact that at the time the Tyne became a great alkali producing place, small coals, which are largely used in the process, were exceedingly cheap. Indeed, the colliery owner was glad to have them taken off his hands, for it relieved him of the inconvenience of adding to the burning heap which was seen near every pit in the north, and the consumption of which subjected the coalowners to claims for damages from the neighbouring landholders. The changing circumstances of the coal trade, which have rendered small fuel a valuable article, have had a disastrous effect upon the soda trade of the Tyne. One establishment after another has been closed. While this has been going on, a new method of making soda has been introduced. Many years ago a plan was devised by Messrs. Heming and Dyar to take advantage of a well-known chemical reaction, by which, when a solution of common salt is mixed with bicarbonate of ammonia, decomposition takes place and bicarbonate of soda is precipitated. This reaction has been given a commercial value by Messrs. Solvay and Co., of Brussels, who are among the largest soda makers on the Continent, and, under licence from them, is employed by Messrs. Brunner, Mond and Co. (Limited), who have extensive works in Cheshire.

If the chemical trade of the Tyne is to be regarded to some extent as a dying industry the salt of the Tees must find another outlet. Salt as brine is requisite to the new process, and the alkali industry now located on the Tyne may have to migrate to the banks of the Tees, where it will find brine to its hand, or it will have to embark in an industry entirely different in character from that in which it is engaged at present. Probably it may be convenient that a half-way course should be adopted. A portion of the trade might remain where it is and continue to use salt in its solid form, drawing its supplies from Middlesbrough, and making either carbonate of soda as at present or sulphate of soda, which is extensively used in glass-making. This is likely to be so, as up to the present time no means has been discovered for obtaining chlorine cheaply by the ammonia process. This element is an active ingredient of the bleaching powder which is so largely used in many of our textile factories and mills. Chlorine is now procured from hydrochloric acid, produced by the action of sulphuric acid on salt in making sulphate of soda. It is that pungent destructive gas which renders the neighbourhood of chemical manufactories so distasteful to our senses of both sight and smell. The rest of the trade will, it may be predicted, migrate to the Tees, and, no doubt those who contemplate engaging in the salt industry will have to make arrangements for providing, not only the brine, but chemical works to absorb that product. We are able to state that Messrs. Bell Brothers, who are the pioneers in the salt trade of the Tees, which is of so much local and even national importance, intend to erect works near their salt pans for the manufacture of soda by the ammonia process. The royalty of salt held by Messrs. Bell Brothers extends over 2000 acres, half of which is from the Ecclesiastical Commissioners, and the other half from the Crown, the latter portion being situate under the bed and foreshore of the river.

The existing bore hole, which has attracted so much attention, is placed about the middle of the royalty held under the Ecclesiastical Commissioners, and is something like a mile distant from the banks of the Tees. The brine from the pumps runs in an underground conduit to a large reservoir, which holds about 500,000 gallons of brine, or, say, about 400 tons of salt. The reservoir, while serving as a place of storage in case of accident at the bore hole, collects any solid impurities which may have been carried into it by the water running through the pipes. By the aid of a pump the brine in the reservoir is delivered to the evaporating pans, which closely adjoin and are on a somewhat higher level. There are nine pans, all of which are of the form customary in Cheshire, each being about 65 feet long by 25 feet in width, and 18 inches in depth. Each pan is calculated to produce between 35 tons and 40 tons of salt per week. It will, therefore, be seen that Messrs. Bell Brothers (Limited) are already in a position to produce between 350 and 400 tons per week. Some very important experiments for utilizing the waste heat from the blast furnaces are being made by Messrs. Bell Brothers. They have erected experimental pans, and are producing over 20 tons of salt per week by using only the waste heat from the furnaces to accomplish the evaporation. The pans are so constructed that the number could easily be increased to twenty, which number would give a producing capacity of nearly 1000 tons per week. The salt from these works is being sent away by the North-Eastern Railway Company, whose lines immediately adjoin the pans, and close at hand is the river Tees, to which Messrs. Bell Brothers possess shipping access. The salt required for the chemical trade is somewhat coarse in the crystal, and is not usually employed for fish curing or ordinary culinary purposes. Should Messrs. Bell deem it advisable to embark in the manufacture of salt for other of its uses, they would require to make certain modifications in their present plant, but as long as the Tyne is in need of 4000 tons of salt per week, and while they are the only manufacturers on the Tees, it will not be necessary for them to look for any other market. The existing bore hole is sufficing for the present evaporating works, and they hope that, as the cavity formed by the solution of the salt obtained grows larger, they will get a greater quantity of brine from it. As the years of duration of such a bore hole are uncertain, they are about to put down another bore hole, and if the industry develops, as there is every reason to believe it will, they will put down a third and even a fourth hole. The site of the projected chemical works has been already determined upon, and is immediately adjoining the evaporating plant, where Messrs. Bell possess either as owners or lessees a large extent of land, and are, therefore, in a position to increase the size of the works to any dimensions that may be required.

It is almost needless to say that the success of Messrs. Bell Brothers has aroused a great deal of interest in the north of England, and the chemical manufacturers of the Tyne are on the alert and anxious to learn the results over a few months. Already one of the largest alkali manufacturers there is contemplating becoming the lessee of a royalty on the banks of the Tees. Messrs. Bolckow, Vaughan and Co., too, the iron and steel manufacturers at Middlesbrough have decided to put down a bore hole to win salt in the same way as that adopted by Messrs. Bell Brothers. The only chemical works at present on the banks of the Tees are those belonging to Colonel Sadler, at whose extensive premises at Middlesbrough are produced alkalies, oxalic acid, various tar products, potash, and Epsom salts. These works, unlike those on the Tyne, are exceedingly busy, and afford employment to many hundreds of workmen. The landowners, as might be expected, are very much interested in the new industry. Quite recently in *The Times* attention was drawn to the disastrous effects on the surface of Cheshire produced by salt winning, and some speculation as to the future of low-lying lands in North Yorkshire and South Durham in the salt district may not be out of place. At Middlesbrough the salt lies more than 1000 feet below the surface and is at least 100 feet thick. There are about 200,000 tons to every acre, and many years, perhaps even generations, may elapse before the salt works of the Tees produce any considerable effect. There can, however, be no doubt that ultimately an enormous cavity will be formed underneath Middlesbrough and its environs. Possibly this cavity will not occasion such disasters as have taken place in Cheshire, where the salt lies much nearer the surface. It is believed that at Middlesbrough the supercincumbent rocks will, in falling, pack themselves into the spaces left by the salt much less closely than that mineral, and possibly there may be a very slight subsidence on the surface. Whenever the surface subsides, the landowners will profit by their predécessors in Cheshire and make the best they can of the circumstances. We have said enough to show that there is opening out for the Tees an industry which, though it may not vie with that great iron trade which has grown to such gigantic proportions on its banks in so short a time, will, nevertheless, prove of enormous value in the development of that commercial centre. Probably nowhere in England are there to be found men more likely to take advantage of any circumstances which present themselves for the enlarging of the trade of Cleveland, or more able to cope with a new industry, than those who within a generation have created an iron trade which for extent and importance is not to be equalled in the United Kingdom.

BEE CULTURE IN INDIA.*

The following information respecting the bee industry in India, is gathered partly from the *Indian Agriculturist.* The details were obtained by Mr. John Douglas, Superintendent of Telegraphs, from Mr. Morgan, Deputy Conservator of Forests, and are noteworthy from the light they throw on the modes of collecting wild honey. The best honey-producing flower of Southern India is the strobilanthes, which not only forms the principal undergrowth of the *sholas*, both temperate and tropical, but spreads over the grassy slopes of the higher elevations. There are an immense number of species in this genus and they almost all flower once in seven years, dying down entirely, and afterwards a fresh growth springing up from seed. Whenever any species of strobilanthes flowers, colonies of bees migrate from all parts of the country to feast on the honey, and rear their young broods. At such times honey becomes plentiful and cheap, and as the strobilanthes honey is of the finest quality and flavour, even rivalling that from the famous Mount Hymettus, it is eagerly sought after by the Todas of the Neilgherry Hills, and in fact by all aboriginal tribes. The year 1879 was such a season for honey that it sold at the rate of 4 annas per imperial pint, whereas its usual price is from 8 to 10 annas. This honey, in the cold climate of the Neilgherries, crystallizes in from a fortnight to three weeks, when the flavour becomes richer and finer. In the Wynaad, as soon as the moon has waned sufficiently, great preparations are made to take the honey. Bamboo and rattan ladders are constructed, sometimes of astonishing length, and at nightfall, after 9 p.m.—for the bees do not go to bed till then, as you will find to your cost if you disturb them—the Jain (honey) Kurumbars proceed to the *burray*, and, having erected their ladders, if they have to climb upwards, or suspended their cane ladders, if downwards, arm themselves with torches and knives and sever the combs from the rock or branch. The drowsy bees meanwhile, roused by the glare of the torches, desert the combs, and buzz aimlessly about, even on the persons of those engaged in taking the combs, but never attempt to sting, unless crushed, or hurt. The combs are then lowered down in baskets, the Kurumbars feasting on the larvæ, which taste something like cream, while the fish, which swarm in thousands when the hives are built over a river, have a glorious feed on the grubs and bees that fall into the water and float helplessly down stream.

The Coorgs make some attempts at bee culture and practise the industry to a small extent in their own homes; the bees are domesticated, and the hives, which are of a very primitive description, made merely of the hollowed out trunks of trees, are placed near the houses. The Coorgs have, however, no notion of collecting the surplus honey by any of the contrivances, such as bell-glasses, supers, etc., in use in England in the different apiaries.

In Cuddapah wild honey is collected also from the cliffs and ravines of the district. The process adopted is both perilous and exciting, and the Yanadies alone are able to climb into the difficult and apparently inaccessible places over perpendicular cliffs, in some places from 100 to 200 feet in height. They do this by the aid of a plaited rope, made of young bamboos tied together. This rope sometimes gives way, the result being a terrible accident. It is a very nervous sight to watch the men climbing up these frail supports, and it reminds one of the egg-collecting process in northern latitudes. The men, from below, look like little babies hanging midway, the rope being fastened on the top of the cliff above, by means of a peg driven into the ground, or to the trunk of a tree, the man swinging midway with 100 feet or so above and below him, and armed with a stick and a leather basket. The Yanady first burns some grass or brushwood under the hive, by which the bees are driven out; he then swings the rope until it brings him close to the hive, which he pokes with his stick, holding out his basket at the same time to catch the detached portions of comb. When the basket is full, he shakes the rope, at which signal his comrades above draw him up. The bamboo ropes are left to hang, often for years, until they rot away, for a rope of this kind is never used twice, a fresh one being made on each occasion and at each place.

South Canara is also a great honey district. The honey and wax have, however, but little local value, a maund, about 25 lbs., only fetching R2 and R16. It is thought that much might be done to open up the industry by exporting the honey and wax to England, the latter being a valuable product and one for which there is always a demand. The trade at present in Indian honey is almost entirely confined to wild honey; but as the keeping of bees is an industry requiring little or no capital, it is especially adapted to the people of India.

* From the *Times.*

Should the returns obtained from the inquiries now made and set on foot by Mr. Douglas show that it is worth while to introduce this industry in a practical form, then Mr. Buck—the whole subject having been placed under his department—may possibly see his way to making a decided effort to interest the people in systematic bee culture with a view to the trade in honey and wax becoming ultimately a profitable one to the country.

ANTISEPTIC PROPERTIES OF CARBONIC ACID.*

BY PROFESSOR H. KOLBE.

Since 1874, when the author published his first experiments on the antiseptic action of salicylic acid, it has been his constant endeavour to find out a suitable method of its employment for preserving meat. Innumerable experiments, repeated under varied conditions, have convinced him that although meat impregnated with carbonic acid is, in fact, protected from decay, it acquires an unpleasant flavour after a few days, and when boiled or roasted it disseminates a disagreeable (but not putrid) odour. In spots where any decomposition was noticed, the meat no longer reacted acid, but alkaline.

This experience led to the conjecture that meat could be protected from spoiling by the acids in general, as well as by their gases, if it is thereby protected from the liberation of ammonia which accompanies decomposition, in the same manner as by putting it in vinegar.

The first experiment in this direction, made by putting a piece of beef on a plate under a glass bell jar of carbonic acid, was unsatisfactory. Before the end of the week, a putrid odour was perceptible, and the parts in contact with the plate, where no carbonic acid could reach them, showed an alkaline reaction.

The results were better when the meat was suspended so as to hang freely in a vessel filled with carbonic acid.

The experiment was repeated in apparatus of various sizes. The meat to be preserved was hung on a tinned iron hook that moved along a horizontal iron rod in a cylinder made of sheet tin. On the bottom of the cylinder was a porcelain dish to catch the dropping liquid from the meat, and in the side of the cylinder, just above the dish, a tubulus was soldered on air tight, and through it passed a short glass tube connected with a rubber tube for introducing the carbonic acid gas. The rubber tube could be closed quickly and tightly by means of a pinchcock. The cylinder also had a gutter around the top, into which the lid fitted, and which was half full of glycerine. A tubulus was also soldered into the top of the metallic cover, and provided with a glass tube like the lower one.

The glycerine acted like a water seal, and when the vessel was closed, carbonic acid from a Kipp's constant apparatus was passed in by the lower tubulus and expelled the air through the upper one, which was left open. When nearly all the air may be supposed to have been displaced by carbonic acid, the two rubber tubes are securely clamped.

The first series of experiments were made in winter, the second in the hot months of summer. The cylinder containing the meat stood in the warmest room of my laboratory, which, being on the south side, was exposed to the sun's rays for the greater part of the day, and at noon the temperature rose to 32° C. (90° F.). Pieces of freshly killed beef weighing from 2 to 5 kilos (4½ to 11 lb.), including bone and fat, were used.

A week after the beef had been put in the cylinder of carbonic acid, it could not be distinguished by appearance, colour, or odour from fresh meat. It reacted slightly but distinctly acid everywhere.

After being carefully washed off it was boiled in water. The broth made from it smelled and tasted just like that from fresh meat, and the meat itself, if not boiled too long, was soft and tender, not stringy.

Meat suspended in carbonic acid for two weeks had the same qualities as the other, except that it looked greyer, but within it was red and juicy. The broth made from it, as well as the meat itself, had a pleasant flavour, and only a very sensitive palate could distinguish a slight difference in the taste of this broth and that from fresh meat. In a few cases the meat as well as the soup had a slightly acid taste, which was completely removed by putting in a very small quantity of carbonate of potash. Meat kept in carbonic acid for three weeks was as good as that left there for two weeks, but was softer than fresh meat, and required less time to cook it, or to obtain good broth.

After being kept in carbonic acid for four or five weeks, the meat was still free from putrid smells, but the broth made from it did not taste as good as fresh *bouillon*. The experiments were not continued any longer.

From this it will be seen that *carbonic acid is an excellent preservative for beef*, which will retain its flavour in it for several weeks.

It is worthy of note that mutton acts quite differently, and after being kept in carbonic acid gas for a week it begins to have a putrid smell.

Veal does not keep as long as beef. No experiments have been made with game or fowls.

Fish, oysters and fruit only keep a short time.

This property of carbonic acid to preserve beef a long time will scarcely become of any great practical importance, but may find use where carbonic acid is given out in abundance from the earth. At the Nauheim baths there are dry wells in which almost unlimited quantities of carbonic acid stream forth and are pumped out to be used for making soda water, and for other purposes. It would be worth while to try how long beef could be kept fresh by hanging it on a rope in such a well.

The experiments described give rise to many other queries, such as whether light has any effect on the preservative power of carbonic acid.

The author does not propose to extend his experiments any further, and leaves the field free for others who wish to study the chemical and physiological changes and reactions.

* From the *Chemiker Zeitung*. Reprinted from the *Scientific American*.

NEGRO COFFEE.*

The following extract from a letter from Dr. Nicholls, of Dominica, shows that the use of the seeds of *Cassia occidentalis* as a coffee substitute is well known amongst the negro inhabitants of that island:—

"*Cassia occidentalis* is, I find, an excellent coffee substitute; it is called in Dominica by the following names, 'l'herbe puante,' 'café marron,' and 'wild coffee.' I have often heard of the negroes using the seeds of a native plant as coffee, but it is only lately that I have inquired into the subject. I collected some seeds and directed my cook to roast and grind them, so that I might taste the 'coffee.' Other matters engaging my attention I forgot the circumstance until several days afterwards, when one evening my wife inquired how I liked my after-dinner cup of coffee. I turned to her inquiringly, when she laughingly said, 'that is your wild coffee.' I was indeed surprised, for the coffee was undistinguishable from that made of the best Arabian beans, and we in Dominica are celebrated for our good coffee. Afterwards some of the seeds roasted and ground were brought to me, and the aroma was equal to that of the coffee ordinarily used in the island.

"The plant itself is used by the native 'doctors' medicinally in the form of a decoction, and it has the reputation of being a good diaphoretic. The weed is very common, so if it turns out to be valuable it can be obtained in large quantities."

* From the 'Report on the Royal Gardens at Kew.'

The Pharmaceutical Journal.

SATURDAY, JANUARY 13, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE MISUSE OF POISONS IN INDIA.

THE annual report of the work done in the Department of the Chemical Examiner to the Indian Government in Calcutta, a copy of which has been placed at our disposal by Dr. WARDEN, contains a considerable amount of information respecting the use and abuse of poisons in India. That country has long had an unfavourable reputation in respect to the use of poisons for criminal purposes, and the department was originally established in order to prevent irresponsible persons from interfering in toxicological investigations. The need for such a department is evidenced by the fact that out of 1900 analyses performed during the year, no less than 1157 were in connection with medico-legal cases. The number of human viscera examined was 225 and poison was detected in 93 cases. Opium and arsenic were the poisons most frequently found and aconite was detected in a few cases. Cattle-poisoning also seems to be on the increase, but for this purpose arsenic is the poison most used, and, indeed, it is the only one that was detected during the year. It is known, however, that other poisons are employed by the natives for the purpose, though at present they have not been sufficiently investigated to allow of their detection with certainty.

Besides the analyses in connection with cases where the death of men or animals was supposed to have resulted from poisoning, 652 suspected articles of food were examined and more than half of them were found to contain poison, the poisons most frequently occurring being arsenic, opium, datura, aconite and copper. Enormous quantities of arsenic were sometimes found in the parcels of suspected cattle poison sent for examination; in one case as much as one pound of white arsenic was found in two packets. Further, in consequence of the existence of rumours to the effect that the spirits manufactured in the country were sophisticated with nux vomica, datura, etc., a large number of samples were examined, but no poisonous vegetable adulterant was in any case detected.

The use of poison for criminal purposes has naturally commanded the attention of the Indian Government for some time past, and the advisability of imposing restrictions has been discussed. Three years ago the chemical examiner recommended that some restriction should be placed on the sale of strychnine on the grounds of its strong resemblance to santonin, and because these substances, which are largely used throughout the country, are sometimes mistaken for one another. As, however, not more than four deaths from strychnine were reported in 1878–79, and five in the following year, and only four of the nine were due to it being mistaken for santonin, the Lieutenant-Governor was of opinion that the number of accidents was too small to justify any such restriction as that proposed. It was, however, directed that a recommendation should be made to the medical store-keeper to colour strychnine with a view to the prevention of such mistakes. Last year the attention of the Lieutenant-Governor was again turned to the subject, as the improper use of strychnine, aconite, morphia, and mercury was becoming more common, whilst the returns of cases of poisoning by arsenic remained constant. After consideration, however, a similar conclusion was arrived at, that it was not desirable at that time to lay down stringent regulations for the sale of poisons, or to define the class of persons who should be permitted to sell poisonous drugs. In the present report Dr. WARDEN has once more referred to the subject, and suggests that if it be impracticable to restrict the sale of all poisons, the indiscriminate vending of arsenic at least might be diminished by levying on it a prohibitory tax which would place it beyond the reach of the masses.

Another description of valuable work done in the department has been the examination of potable waters, and in this report, together with a table showing results of analyses, Dr. WARDEN gives a short and interesting account of the quality of some of the kinds of Indian waters which he has analysed. Dr. WARDEN also draws attention to the prevailing neglect of simple precautions against the pollution of tanks, and makes some useful suggestions as to the best method of insuring the purity of the water contained in them. The report further refers to the work done by Dr. WARDEN in the chemical examination of indigenous drugs with a view to their substitution for imported drugs, some of the results of which have already been reported in this Journal. Amongst other things, reference is made to a solution of daturine, intended for ophthalmic purposes, which it is stated could be prepared on the large scale at about one shilling a pint. This solution has been submitted for medical trial, and although it is not considered strong enough and has been found occasionally to cause pain and irritation, it is spoken of as a very useful remedy which in certain cases of eye disease might be employed instead of atropine, with the advantage that it is far less costly. It may be hoped that, notwithstanding the multifarious labours which fall to this department, some time will be found to continue the work of chemical investigation in so promising a field as the native plants of India.

PHARMACY IN THE FRENCH ACADEMIES.

A visitor to the new School of Pharmacy in Paris will readily perceive that French pharmacists are by no means disposed to forget the past history of their art. Good reason have they indeed to be proud of the parts played in the world of science by their predecessors, and M. Lefort needs no justification for taking the opportunity afforded by a recent meeting of the Paris Pharmaceutical Society to call attention specially to the extent to which pharmacy has been represented in the scientific academies of France.

The first Academy of Sciences in France was founded in the year 1666, by Louis XIV., at the instigation of his famous finance minister, Colbert. It was intended to be devoted to practical science rather than to the reading of papers, and with this object laboratories were maintained at the royal expense at the place of meeting, in which experiments and observations were made and the results obtained were discussed by the members in common. Animal and vegetable products, minerals, and especially mineral waters, were submitted to such analysis as was then possible, and it was only natural that after a few years pharmacists should be called to take part in the work. The first pharmacist admitted into the Academy of Sciences, in 1686, was Moses Charras, the author of a 'Pharmacopée galénique et chimique,' and next, in 1699, came Nicolas Lémery, the author of the 'Cours de Chimie." Then followed Boulduc, Geoffroy, Rouelle and Cadet de Gassicourt. But the revolutionary wave that swept away men did not spare institutions, and a few months before Lavoisier was sent to the guillotine the academies in France were suppressed as useless. In 1795, however, the Convention established a new "Institut des Sciences et des Arts," which included all the academies as they now exist. In the new Academy of Sciences, as in the old, pharmacists have taken an honourable place, as will be seen from the following roll of names:—Bayen, the two Pelletiers, Vauquelin, Parmentier, Baumé, Deyeux, Proust, Serullas, Robiquet, Lesson, Gaudichaud, Balard, Bussy, Gerhardt, Lecoq, Planchon, Berthelot, Chatin, Girardin, and Milne-Edwards. Each of these men was a legally qualified pharmacist; but there have been others also who commenced their scientific career in a pharmacy, among whom may be mentioned, Dumas, Frémy, and Trecul.

The Academy of Medicine was founded in the year 1820, by a decree of Louis XVIII., and one of its duties was to be to reply to questions of the Government on all subjects affecting the public health, and particularly in respect to new and secret remedies, and natural and artificial mineral waters. Originally the Academy was divided into three sections, medicine, surgery and pharmacy, and the first nine nominations to the pharmacy section were —Boullay, Deyeux, Fabre, Henri, Laugier, Pelletier, Planche, Robiquet and Vauquelin. Amongst the earlier elections by the Academy itself were—Boudet, Derome, Caventou, Guibourt, Labarraque, Bussy, Chevallier, Derosne, Frémy and Serullas. Since the year 1829 the Academy of Medicine has been divided into sections, of which that devoted to pharmacy is the eleventh, but pharmacists frequently figure in other sections. The list, given by M. Lefort, of eminent pharmacists who have been connected with this Academy as members, associates or correspondents, is too long for quotation here, and this is the less necessary since it includes many names that have already been mentioned. At present there is only the one class of members, limited to one hundred, and amongst them are included many whose names have frequently appeared at the head of articles published in these pages.

THE RELATIONS BETWEEN MEDICINE AND PHARMACY.

A correspondent writing to the *British Medical Journal* last week sketches some clauses regulating the relations between medicine and pharmacy which he submits should be inserted in the proposed new Medical Bill. The first clause suggested would be a restriction upon medical practitioners, prohibiting them from supplying or dispensing medicines between 8 a.m. and 9 p.m., except in cases of emergency, if a pharmaceutical chemist were resident within half a mile or a mile. The second would most affect prescribers and patients, since it would provide that a prescription should not be dispensed more than once, unless ordered to the contrary, until it has been redated and resigned by a medical practitioner. The next would be restrictive upon chemists and patent medicine proprietors, for it would impose stringent regulations to prevent counter prescribing, prohibit the recommendation of proprietary preparations and patent medicines, and provide that the only statements on the wrappers and labels of patent medicines should be as to the ingredients and proportions of which they are composed, without any reference to their medical uses or effects. Although in the presence of actual facts these suggestions as a whole must certainly be looked upon as impracticable and chimerical, there is running through them a healthy recognition of the necessity for a more distinct separation of medicine and pharmacy, which is welcome. The writer also goes on to say that in consideration of the increased business which non-dispensing by medical men would give to pharmacists they would probably be induced to charge less for dispensing prescriptions, and be satisfied with 25 to 50 per cent. profit on the retail price of the drugs used. Although the charges for medicines are not likely ever to be regulated in this crude fashion, we think this question may be left to right itself, for pharmacy is not yet such a close preserve as to be free from the competition which in all other businesses influences so largely the rates of charge.

The Seventeenth Chemists' Ball, held at Willis's Rooms on Wednesday last, was attended by upwards of three hundred persons. The chair was taken by Mr. R. B. Warrick, who in proposing the single toast of "Success to the Chemists' Ball" referred to the increasing favour shown towards these annual gatherings, which he was well able to illustrate from his own experience as one of the earliest promoters of them. Great praise is due to the Honorary Secretary, Mr. J. F. Savory, for the admirable way in which the arrangements were carried out and the success of the Ball thus secured.

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The new edition of the United States Pharmacopœia is to be the subject of a communication which will be brought before the North British Branch of the Pharmaceutical Society, by Mr. William Gilmour, at the Evening Meeting on Wednesday next. A "Note on Pungent Tincture of Iodine" is also to be read at the same meeting by Mr. P. MacEwan.

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The Twelfth Annual Soirée of the Midland Counties Chemists' Association is to be held on Monday, the 22nd inst., in the Town Hall, Birmingham. Mr. Stokes Dewson is the Honorary Secretary.

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The Second Junior Pharmacy Ball is to take place at Willis's Rooms, on Wednesday the 24th inst. This year the Ball is under the patronage of Mr. Michael Carteighe, and Mr. W. H. Kerr is the Honorary Secretary.

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On another page will be found a paper on "Genius, Talent and Industry, and their Relation to Pharmaceutical Research," which Mr. R. W. Giles read before the School of Pharmacy Students' Association last week. The Association may be considered fortunate in receiving at the opening of a new session the stimulus of two papers relating to pharmaceutical research from such eminent men as Mr. Holmes and Mr. Giles, but it may be hoped that the potential investigators in the Association will not conceive the idea that because the reference to pharmaceutical research *per se* by the authors is somewhat limited the field is a small one.

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At the meeting of the School of Pharmacy Students' Association on Thursday next, a "Note on the Detection of Strontium" is to be read by Mr. F. Ransom; and Mr. W. Elborne, as Reporter on Materia Medica, will read a report upon "New Remedies."

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On Thursday, also, the Chemical Society holds its next meeting, when a paper will be read on "A New Method of Estimating the Halogens in Volatile Organic Compounds," by R. P. Plimpton, Ph.D., and E. E. Graves.

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With a view to collecting professional opinion as to the communicability of phthisis the Collective Investigation Committee of the British Medical Association has had enclosed in each copy of the *British Medical Journal* for last week a form, with a request that it should be torn out by the medical man receiving it and returned with a statement whether he has ever observed any case in which pulmonary phthisis appeared to be communicated from one person to another and other particulars.

* * * *

Commenting upon the medical treatment of M. Gambetta last week, the *Lancet* refers to the likelihood that the very means employed for his recovery retarded the object in view. Being a prominent man it was thought desirable to multiply the number of physicians and surgeons and to enjoin absolute rest, whilst if he had been a more obscure person, he would have been out in the garden in a week with his arm in a sling. The constipation resulting from the rest in bed is considered not improbably to have been the determining cause of the inflammation, but the *Lancet* thinks it "strange that amongst so many eminent members of the profession in attendance there was no one able to detect the irreparable mischief going on."

* * * *

According to some statistics recently presented by M. Pasteur to the French Academy, the mortality from charbon among eighty thousand vaccinated sheep in the department of Eure-et-Loire, where the average mortality of the previous ten years had been 9·01 per cent., fell last year to 0·65 per cent.

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The number of visitors to Kew Gardens during the year just completed is announced to have been 1,244,167, or 407,491 in excess of the number in 1881 as recently quoted in these columns.

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According to a statistical abstract of failures in the United Kingdom during the year 1882, which has appeared in *Kemp's Mercantile Gazette*, the total number of chemists and druggists who failed last year was 87, whilst in 1881 it was 168. There was also a falling off in the number of bills of sale registered from 351 in 1881 to 223 in 1882. The entire number of failures in Great Britain last year was 10,707, and in the previous year, 11,632.

* * * *

A correspondent in the Isle of Wight has forwarded us a cutting from the *Hampshire Independent*, in reference to the recent case of poisoning by chloral, from which it appears that the implied reflection upon the chemists who supplied the chloral hydrate syrup, conveyed by the remark of a juror at the inquest, had not any foundation in fact. We are informed that the bottle was duly labelled "poison," but that the purchaser afterwards removed this label. We are glad to be enabled to point out this fact, as showing that proper attention is paid to the provisions of the law, at least by those upon whom rests the responsible duty of supplying poisons to the public.

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An engraving of the medal recently presented to M. Dumas to celebrate the completion of the fiftieth anniversary of his election to the Academy of Sciences is given in *Nature* for the 4th inst. On the obverse is figured the head of the recipient, with the inscription, 'J. B. A. DUMAS SECRETAIRE PERPETUEL DE L'ACADEMIE DES SCIENCES." On the reverse are the words: "A. J. B. A. DUMAS: SES CONFRERES: SES ELEVES: SES AMIS: SES ADMIRATEURS: 1832–1882.

* * * *

Professor Bunsen, of Heidelberg, has been elected a Foreign Associate of the French Academy of Sciences, to fill the place rendered vacant by the death of the late Professor Wohler.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, January 3, at the College of Physicians, Kildare Street, Dublin, at 3 o'clock.

The President, Professor Charles Tichborne, in the chair.

The other members of the Council present were Messrs. Allen, Bennett, Brunker, Dr. Collins, Messrs. Doran, Draper, Grindley, Hayes, Hodgson, McIlwaine, Dr. Montgomery, Messrs. Payne, Pring, Simpson, Wells, and Dr. Whitaker.

Mr. Fennell, the Registrar, read a letter from Dr. John William Moore, stating that in his opinion it would be advisable for the Council to eliminate from the curriculum of the Society's Preliminary examination the subjects of chemistry and botany. His experience as an examiner of the Society for the past three years had led him to think that those subjects ought to be relegated to the final examination, first, because candidates were always fully examined in them; secondly, because the subjects could only be studied usefully in a practical manner; thirdly, because his experience of the answering at the Preliminary examination convinced him that the candidate in almost every instance learned off by heart as much of the text-books as would enable him to obtain a passing mark; and fourthly, because such a mode of study was, in his opinion, worse than useless and calculated to create a dislike in the mind of the student to the subsequent practical study of those sciences. He thought a thorough testing of the students in English, Latin, arithmetic, and weights and measures, would better fulfil the purposes of the Preliminary examination.

Mr. Brunker said the Council could not at present take such a step as that suggested. It would involve the rescinding of bye-laws.

Mr. Draper dissented from the recommendation of the letter. The sooner a student began to endeavour to acquire a knowledge of such important subjects as chemistry and botany the better. If he had merely learned by rote the examiner would see that. The argument that the student got a dislike to the subjects should not weigh for a moment.

Dr. Collins: In what other way can the student learn botany and chemistry at first save by rote?

Dr. Whitaker said no doubt they should attach some weight to Dr. Moore's letter, but in almost all the public schools botany and chemistry were now taught; botany certainly was. There was not one of his children who did not know the difference between the stamen and the pistil of a plant, and in fact the rest of the rudiments of botany, although they were all very young. The great thing was to instil the first principles as soon as possible. He therefore thought the examiners would exercise a wiser discretion in recommending even book knowledge of the elements of those sciences. His experience was quite the reverse of that of Dr. Moore.

The President said it was on his recommendation that botany and chemistry were introduced into the Preliminary examination; and he confessed he did not see anything in Dr. Moore's letter to induce him to change his opinion as regarded the desirability of including the rudiments of these subjects. They were introduced into the Preliminary examination in order that it might lead to their being taught in public schools. The Pharmaceutical Society was the first licensing body that took the step in question, and he thought it was a move in the right direction. No doubt it would lead to other licensing bodies adopting the same course. At the same time their examiners were aware that they did not think these sciences should be made an important point at the Preliminary examinations as the candidates were afterwards examined more fully.

Mr. Draper said that next to mathematics there was no better subject for training the mind than chemistry.

Mr. Grindley: Does Dr. Moore get sufficient time?

The President: There is no restriction in that respect. He can have as long as he likes.

Mr. Brunker said he believed the knowledge of botany possessed even by those who came up for the licence was very often little better than book cram.

The President maintained that it was a good basis of knowledge for the student to have a knowledge of the contents of two text-books on chemistry and botany.

Dr. Montgomery: At what period are we to commence instilling a knowledge of chemistry and botany if not at the Preliminary examination? If we were to remove those subjects from the Preliminary examination they might be totally neglected.

Mr. Payne said the candidate for the Preliminary examination must be sixteen years of age and he should know the rudiments of the sciences in question before that.

Mr. Draper: If he does not he will never know them.

Dr. Collins remarked that several members of the Royal Medical Commission were of opinion that botany and chemistry should be in the Preliminary examination, but that there should be only the one examination.

Mr. Brunker moved—

"That the Council do not see any practical disadvantage arising from the including of the rudiments of botany and chemistry in the Preliminary examination."

Mr. Bennett seconded the resolution, which was carried, *nem. con.*

The President: A letter should accompany the resolution to Dr. Moore in order to explain the views of the Council.

A letter was received from Mr. John P. Middleton, enclosing a declaration which he desired the Council to accept, instead of the usual certificate, as evidence of a competent knowledge of compounding. It stated that on June 1, 1877, he became the apprentice of Messrs. Brooks and Grindley, who were then partners, and served for five years, during which period he performed the usual duties of an apprentice to a pharmaceutical chemist, making most of the preparations in the Pharmacopœia. On October 10, 1882, the partnership was dissolved and Mr. Brooks ceased to practise as a pharmacist. Before Mr. Grindley left, he (Mr. Middleton) applied to him for a certificate, but he declined to give it on the ground that it would be rejected by the Council. Mr. Middleton stated that he believed Mr. Grindley gave a certificate to Mr. George Lane McCormack, in 1881, and also that the Council accepted a declaration from a Mr. Boyd, who was in a similar position to that which he occupied. He (Mr. Middleton) passed the Preliminary examination in October, 1879.

The President said the most desirable course would be to refer the application to the Certificate Committee.

Dr. Whitaker was of a similar opinion.

Mr. Hodgson, Mr. Allen and Mr. Brunker thought it would be better to discuss the matter now.

Mr. Grindley said he gave the certificate to Mr. McCormack before the new regulation relegating such matters to a certificate committee was adopted. He understood at the time that any such certificate given afterwards would not be accepted by the Council. He had no personal feeling whatever against Mr. Middleton.

Dr. Montgomery: If he served five years we have no authority to ask the gentleman whom he served. Was his time fully occupied in compounding?

The President (To Mr. Grindley): Was there any difference between the position of Mr. McCormack, to whom you gave the certificate, and that of this gentleman, as regards pharmacy?

Mr. Grindley: No, certainly not.

Dr. Whitaker moved—

"That the application be referred to the Certificate Committee, with a request to report upon it to the next meeting of the Council."

Mr. McIlwaine seconded the resolution.

Mr. Brunker remarked that the other gentleman mentioned by Mr. Middleton, namely, Mr. Boyd, worked with a gentleman who died; and that was why he could not get a certificate.

Mr. Grindley: I am prepared to give Mr. Middleton a certificate to-morrow, and then let him come with it to the Council.

The motion of Dr. Whitaker was put and carried.

A letter was read from Mr. James H. Haslett, of Belfast, asking whether candidates who passed their Preliminary examination on November 1, 1882, would come under the resolution requiring all candidates for the Final examination to have served four years.

As the answer to this letter depended upon the course taken with respect to subsequent resolutions, it was merely marked "Read."

A letter, dated December 1, 1882, was read from Dr. Kaye, Q.C., Secretary to the Privy Council, enclosing the resolution of the Council of November 1, in the form as amended by the law officers of the Crown. The original resolution was in the following terms:—

"That all candidates for the licence be required to produce a certificate signed by a pharmaceutical chemist or apothecary keeping open shop, stating that he has served a *bonâ fide* engagement with him as either apprentice or assistant in his sole employment for a term of four years. To come into force on January 1, 1884."

The resolution as amended was as follows:—

"That every candidate for the licence shall be required to produce a certificate signed by a pharmaceutical chemist or apothecary keeping open shop, stating that such candidate has served a *bonâ fide* engagement as apprentice or assistant with and in the sole employment of such pharmaceutical chemist or apothecary, or the firm of which he is a member, for a term of four years. To come into force on January 1, 1884."

Mr. Payne withdrew a resolution of which he had given notice on the subject, on his attention being called by the President to the fact that it differed only verbally with one of which Mr. Allen had given notice.

Mr. Allen moved—

"That every candidate for the licence who has not passed the Preliminary examination previous to January 3, 1883, shall be required to produce a certificate signed by a pharmaceutical chemist or apothecary keeping open shop, stating that such candidate has served a *bonâ fide* engagement for a term of four years as apprentice or assistant, with, and in the sole employment of, such pharmaceutical chemist or apothecary, or of a firm of legally qualified pharmaceutical chemists or apothecaries, of which aforesaid pharmaceutical chemist or apothecary is a member."

His object was to avoid the great injustice which would be done to candidates who had passed their Preliminary examination under the supposition that they had only two years to serve if the resolution prescribing the new term were brought into operation at an earlier date than January 3.

Mr. Pring seconded the motion.

Mr. Doran: Suppose a candidate is accidentally prevented from finishing the four years?

The President: If his employer died he would have to commence again.

Dr. Whitaker: That is not what is intended. The resolution is very well worded in other respects; but you might add a proviso to meet the case of death, or other exceptional cases.

Mr. Draper said it would be idle for him to repeat the views which he had already expressed on this subject, and which were absolutely unaltered. He saw no reason whatever for converting the period of two years prescribed in the 'Calendar,' at page 56, into what was virtually an apprenticeship for four years. He thought the step a retrogressive one. He was unable to see what was to be gained by four years instead of two. He moved by way of amendment—

"That the regulation as regards practical pharmacy remain as at present stated at page 56 of the 'Calendar.'"

Mr. Pring: I do not think that can be received as an amendment to the motion. The principle of having a period of four years has already passed the Privy Council.

The President said he was not an advocate for reopening the question, but the remark last made did not come with good taste from a Belfast member, who came and reversed a decision previously arrived at by the Council. He (the President) told them at the time that they were making a very bad precedent. The resolution under consideration had been merely sent back for amendment by the Privy Council; it was not yet sanctioned by that body. He would appeal to Mr. Draper to recognize in any amendment that he proposed the views arrived at by the majority of the Council.

Mr. Hodgson said he had great pleasure in seconding Mr. Draper's amendment. He had the strongest possible objection to altering the regulation contained in the 'Calendar.' It was quite understood at the time of the formation of the Pharmaceutical Society that the principle of apprenticeship was abolished, and that the period of service was to be two years, spent in practical pharmacy, the qualifications of the candidate to be afterwards ascertained by an examiner in pharmacy.

Mr. Draper said it was quite evident that the law officers of the Crown had not a very strong opinion as to the value of the Preliminary examination.

Mr. Brunker moved—

"That the resolution be amended by the insertion after the words 'Preliminary examination' of the following words:—'Of this Society, or such examination as is accepted as equivalent to same.'"

Dr. Whitaker seconded the amendment.

Mr. Payne said he entirely approved of making the resolution take effect from the 3rd of January in this year, and he had very much pleasure in supporting the motion.

Dr. Whitaker remarked that there was now no reopening of the question. It was settled. Mr. Pring and himself were the earliest reformers in pharmaceutical matters; and they were satisfied that no amount of teaching by lectures or otherwise could give the practical knowledge that a pharmacist should have. Five years' service from the age of sixteen was a very small hardship, and a young man could not be a pharmacist until after he was twenty-one. They only wished to uphold the honour and prestige of the Society and make it not second to the sister Society in England. He knew that it was very easy to fluke examinations, and that the best examiners were sometimes deceived.

The President: Does Mr. Draper press his amendment?

Mr. Draper said if he had the faintest chance of carrying it he would. He felt very strongly on the subject of the attempt to substitute an apprenticeship for the examination test. He held that the examination standard was far too low; and that a young man should not be withdrawn from study to an enforced apprenticeship of four years. The English Society had not yet found it advantageous to substitute four years for two.

The President: He is right. No apprenticeship is required.

Mr. Draper: Not the drudgery of an apprenticeship.

The President said it had been stated two or three times there that the Pharmaceutical Society of England insisted on a three years' apprenticeship. He had made inquiries and had found that that was not so. The test they used was employment for a given time in pharmacy.

Mr. Payne: For three years.

Dr. Montgomery was of opinion that the only way a young man could learn his business was behind the counter of a respectable pharmacist. If they wanted him to know his business, he should be kept to it.

The President put the amendment of Mr. Draper, which was negatived on the suggestion of the President.

Mr. Brunker moved another amendment in the following terms:—

"Such term may be made up of shorter terms, amounting in all to four years, in the sole employment of a duly qualified pharmaceutical chemist or apothecary keeping open shop."

Mr. Doran seconded the amendment.

The President said that in his opinion it would be better that the date from which the resolution was to take effect should be January, 1884. A great many young men had made their arrangements for this year, and it would not be fair to take them short.

Mr. Brunker maintained that if the arrangement was for the benefit of the members of the Society, the sooner it came into operation the better. The Council were not under obligations to any young man outside the Society until he had passed the Preliminary examination.

The President: You are, to a certain extent, making it retrospective if you do not give every young man who is apprenticed an opportunity of coming up for his Preliminary. I propose that the date be altered to January 3, 1884.

Mr. Draper said he had much pleasure in seconding the amendment of the President.

The amendment on being put was negatived.

The two amendments of Mr. Brunker were agreed to; and the motion, as amended by them, was then put and carried.

The following new members were elected:—Mr. Joseph Edmondson, Peafield, Blackrock; Mr. John McMurray, M.D., M.Ch., Warrenpoint; Mr. John James Gamble, Balieborough.

A report was received from the Examiners, stating that the following gentlemen had passed the examination for the licence as pharmaceutical chemist held on that day:—Mr. James Finlay, Nairview; Mr. William James Hunter, Castleblaney; Mr. William Pratt, Belfast; Mr. James North Hardy, Dublin; and Mr. Henry Forewell, Dublin.

On the motion of Mr. Payne the Examiners' report was adopted.

A report from the Law Committee was considered and adopted.

Mr. Hodgson observed that the expense of prosecutions was a very serious item, and, unless the members of the Society subscribed to recroup them, he did not see how they could be carried on.

The President thought the advisability might be considered of sending out a circular to the members of the Society, informing them that a considerable amount of illegal compounding was going on, and that funds were required in order to enable the Council to carry out prosecutions to stop it.

Some formal business having been isposed of, the Council adjourned.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, Jan. 4, Mr. H. G. Greenish, Vice-President, in the chair.

Mr. R. W. Giles read the following paper upon—

Genius, Talent and Industry, and their Relation to Pharmaceutical Research.

BY RICHARD W. GILES.

The words "genius" and "talent" denote qualities which differ not in degree but in kind; yet are they often used as though they expressed the same thing. This confusion of thought is not only to be met with in the deliberations of inferior institutions, such as social science congresses and legislative assemblies; it has even, once at least, intruded itself (doubtless by a slip of the tongue rather than by misconception of the brain) into the more classic sphere of this Association; and as this happened to be upon the last occasion of our meeting, to hear Mr. Holmes's paper upon 'Pharmaceutical Research,' it seems opportune in point of time to treat of it this evening, and fitting in point of method to consider it in connection with a third quality, viz., industry, and the relation of the three to pharmaceutical research.

In the first place let us see whether the dictionaries throw any light upon the true meaning of the words "genius" and "talent." For as to the word "industry" we all know the meaning of that. Happy are we if we "also practise what we know." Dr. Johnson in 1784, defined "genius" as—"1. The protecting or ruling power of men, places or things. 2. A man endowed with superior faculties. 3. The mental power or faculties. 4. A disposition of nature by which any one is qualified for some peculiar employment. 5. Nature or disposition."

I would have you notice that a hundred years ago the premier meaning assigned to the word "genius" was personal—a *divinity*, or a highly endowed *man*. It appears to have been only secondarily used to denote the *qualities* with which men are endowed. It will be interesting to observe how this order had become reversed seventy-five years later, and how "genius" in the sense of a divinity or a demon had become speciated from genius in the sense of a quality of the mind.

Thus Webster in 1858 defines "genius" (which he derives from γεννάω to beget, to produce, to create) as—

"1. The peculiar structure of mind which is given by nature to an individual, or that disposition or bent of mind which is peculiar to every man and which qualifies him for a particular study or course of life, as a genius for history, for poetry, for painting. 2. Strength of mind, uncommon powers of intellect, particularly the power of invention. In this sense we say 'Homer was a man of genius' and hence: 3. A man endowed with uncommon vigour of mind; a man of superior intellectual faculties, thus, 'Shakspeare was a rare genius.'"

Then follows:—

"Genius, pl. Genii, a spirit or demon; a tutelary deity."

"Genius loci, the presiding divinity of a place; hence the pervading spirit of a place or institution."

In this sense we might speak of the "genius loci" of this school; and having called him up for our convenience, we will wish him a happy new year and dismiss him to rejoin the company of the infernal gods; for we can scarcely suppose that the presiding genius of the laboratory is permitted to pollute with his odours the Asphodel meadows of the celestials.

We may venture to ignore our venerable friend Dr. Johnson, who contributes nothing to our knowledge of the matter in hand beyond the means of instituting the comparison already adverted to between the past and present meaning of the word, always an interesting point in philological inquiry, and we will proceed to extract what we can out of Webster.

First, then, Webster directs us to that most important element in ascertaining the true meaning of words, its derivation, which he ascribes to the Greek verb γεννάω to beget. It may be open to doubt whether "genius" is related to its root in its active sense as a thing which begets or creates, or in its passive sense as a thing begotten or created. I think the first is the most natural and most likely relation, and it agrees with that signification of the word "genius" for which I mean to contend, viz., that it is essentially a quality which creates, or as Webster put it, "particularly the power of invention." This is its distinctive characteristic, by which it differs from talent or cleverness, from industry or perseverance, almost from humanity, and approaches the divine; for, strictly speaking, creative power is the attribute of God alone, and it is only by some elasticity of language that we can say of "genius" that it creates. "There is nothing new under the sun," said the wise man of old, and even a new idea or new invention is but the grasping of some suggestion too subtle to be perceived by minds of ordinary mould.

The next thing to be noted in Webster's definition is the quality of *speciality*. Every illustration is characterized by the adjectives "peculiar," or "particular," or "uncommon."

Again, it is worthy of remark that the two examples of illustrious genius cited by Webster are respectively the greatest *poet* of antiquity and the greatest *poet* of modern times—Homer and Shakspeare. I need not remind you that our word "poet" (ποιητής of the Greeks) is derived from the Greek word ποιέω to make, and its primitive signification is "one who makes—a creator;" nor need I tell you that poetry has always been held to be the highest manifestation of the imaginative or creative faculty; but I may fairly deduce from the similar source of the word "genius" (from γεννάω) a similarity of meaning; and I do claim, on the ground of derivation and analogy, that genius always implies a special creative faculty, which is totally different from any amount of cleverness which may be properly designated as talent. The genius possesses another characteristic in common with the poet. It may be said of both with equal truth, "Nascitur non fit." In fact we may make use of our familiarity with the character and quality of the poet to rectify our conception of the word "genius," and we shall have a pretty good idea of its right meaning if we say that the poetical faculty is but one phase of a variety of faculties which are comprehended in the generic term "genius."

Webster suggests another thought when he says "Shakspere was a *rare* genius,"—genius is always *rare*. Nature cannot afford to be prodigal of geniuses; and it would be ill for the world and its everyday duties and necessities if she were. The speciality of genius has an obvious tendency to unfit its possessor for careers which may be open to him, and which offer better opportunities of personal advantage and even greater happiness than the strait and narrow path which he is compelled to tread by an impulse more powerful than self-interest. For it by no means follows that genius is a blessing to the possessor; it is often eccentric, Bohemian, not always moral; its domestic relations are not seldom infelicitous. As the fondest of mothers said of poor, crabbed, splenetic, unhappy Carlyle, "he was gay ill to live wi'." Shakspeare, whether the deer-stealing scandal be apocryphal or not, was certainly not conventional in other respects, and his marriage was an ill-assorted one. Goethe, who was undoubtedly a genius, a poet and something more than a poet, lived a life which set social laws at defiance, and blighted the happiness of many pure-minded women, at last marrying one who was in every way unworthy of his reputation, and not to be compared with those whose pure affection he had won and basely deserted. But at least he bore his degradation philosophically, and has left to the world the following recipe for securing domestic peace under matrimonial difficulties:—

"Use the woman tenderly, tenderly;
From a crooked rib God made her slenderly;
Straight and strong he could not make her,
So if you try to bend you'll break her;
But let her alone and have her own way,
She'll grow more crooked every day;
What's to be done with her, Adam, my boy?
Use her tenderly, that's what I say,
To break your own rib will bring you small joy."

It seems as if the genius which soars above the level of common humanity in intellectual exaltation could not brook the restraint of those social laws and conventionalities to which ordinary men yield a willing obedience, and hence those frequent eccentricities which have given rise to the line "Genius is to madness much allied."

Genius is a mighty trust given to one man for the good of all mankind; it is not a light which may be or which can be hidden under a bushel. No wonder then that genius is rare; and you, my friends, if you do not happen to possess this rare gift, be not discouraged, but bear your easier lot with Christian fortitude.

It will not be inappropriate at this place to read to you an extract from the address given by Mr. Ince at the beginning of the session, and which I hope you have not yet forgotten and will not soon forget. The speaker made a short and as it were parenthetical allusion to genius, and I claim his remarks as being altogether in harmony with the foregoing observations. He said:—"We read of genius—and in truth there is a species of divine intuition vouchsafed to a few. A street boy takes a piece of chalk and with it traces lines which command the admiration of the world; a rude miner in the bowels of the earth solves problems in mathematics; and an untaught lad makes music out of pots and pans—music destined to be the delight of after ages. For this there is no law—but next to genius there is something which marvellously simulates its effects, and that is uninterrupted perseverance. So great is its power that some have even mistaken its identity and declared that genius itself was but the faculty of unremitted application." Carlyle, whom I just now inadvertently grouped as a genius, which is by no means my real opinion, made this mistake when he said that "genius was only an infinite capacity for taking trouble," a faculty which he possessed to an extraordinary degree, but he could hardly have found more appropriate words to express what genius is *not*.

Parents sometimes unwisely complain that their boys show no inclination for any particular vocation in life, and will not assist them in the choice of a profession. It is because they have not that *peculiar bent of mind qualifying them for a particular course of life*, which is Webster's definition of genius. But they have what is better for the world at large and for their fathers in particular. They have (if they are good for anything) the *adaptability*, which is alien to genius, but which enables them to turn their hands and apply their minds to anything that comes in their way, and to fill with credit "that station in life to which it has pleased God to call them," with greater or less success, according to the talent with which they are endowed. It is rare that in their early years boys have a pronounced preference for any one pursuit. If they have they are dangerous, and likely to turn out sham geniuses (such counterfeits being more common than the genuine article) and to become a perplexity and trouble and ultimate disappointment to their friends. But if there be real genius, it may be safely left to work out its own deliverance, for it will not be controlled; it will "out," as sure as murder. I have known two instances of mechanical genius forcing its way through obstacles, in my own circle of acquaintance. The first was the son of a prosperous merchant who had every prudent reason for wishing his boy to succeed him, but it was hopeless; and the father at last reluctantly took him to a firm of engineers, where he introduced him thus, "Here is my boy; he *will* be an engineer, and I can't stop him." The boy justified his obstinacy by great success. Amongst other things he invented the oscillating steam engine. The other had similar tastes to which his friends would *not* yield. They apprenticed him twice or more to different trades, from which he always ran away at the end of about a fortnight, and after a time, I forget by what chance, he became a farmer, and pursued his mechanical hobby in the horse pond. There he matured the construction of the screw propeller, which revolutionized marine locomotion.

But for one such as these there are a dozen make-believes who, having neither genius, talent, nor industry, have a plentiful and impartial dislike to all kinds of honest work, for whom I recommend the fag end of Solomon's proverb, "A whip for the horse, a bridle for the ass and a rod for the fool's back."

Before passing from "genius" to "talent" I must make one observation which has the appearance of ungallantry, but is really not incompatible with the profoundest respect and admiration for the not inferior though dissimilar qualities of the gentler sex. It is an undeniable fact that "genius" in its highest manifestations has never been attained to by a woman. At first sight it may seem strange that the imaginative faculty, which seems to be closely allied to that emotional susceptibility which is undoubtedly most pronounced in women, has not developed a female *poet* of the highest order, though the sex are by no means deficient in facility of versification; still more remarkable that there has been no single example of a woman attaining to eminence as a musical composer. The fact is singularly at variance with the sentiment which has delighted to personify the Muses as a divine sisterhood, but it is a fact notwithstanding. If I may hazard an explanation I would suggest that the creative faculty which we call "genius," being the nearest approach which human intellect can make to divine intelligence, can only be produced by the highest development of the highest nature. We recognize something like this idea by the accepted phrase a "masculine intellect," which has become an accepted phrase because that which it denotes is common to men and exceptional in women, and that which is general in the one sex and exceptional in the other will naturally find its highest development in the first. But we do not mean to say that "genius" has no degrees, or that it is only to be found in such illustrious types as Shakspeare and his peers, if, indeed, he has any peers. It would not be easy to draw the line between "genius" and "talent," though we adhere to the dictum in our first sentence that the difference *is in* kind and not in degree. Certainly we do not mean to deny the possession of genius, and genius of a high order, to such remarkable women as the late Mrs. Cross (better known by her significantly selected *nom de plume* of George Eliot). As Mrs. Lewes she is understood to have been greatly indebted to Mr. George Henry Lewes for advice and assistance in the authorship of her best works. He probably had more learning, wider experience, more of all that can be acquired by study: but she had the *genius*, which no amount of study can give and no amount of teaching can convey.

And now we will deal much more briefly with talent, again having recourse to our dictionaries as a starting point.

Johnson here favours us with a derivation, which he says is from the Latin "talentum," a weight. This reminds one of the City gent, who said that "the word 'omnibus' was derived from the French 'omnibus,' signifying a public conveyance to accommodate twelve inside."

Johnson further defines "talent" thus—

"1. A talent signified so much weight, or a sum of money, the value differing according to the different ages and countries.

"2. Faculty, power, gift of nature. A metaphor borrowed from the talents in the holy writ. It is used sometimes seriously and sometimes lightly.

"3. Quality, disposition. An improper and mistaken use."

Webster, adverting to an earlier source, derives talent from the Greek ταλάω to bear, and adds that it originally signified a balance.

He says further that it was—

"1. A weight and denomination of money amongst the ancient Greeks, also amongst the Hebrews.

"2. Faculty, natural gift or endowment. A metaphorical use of the word derived from the parable of the talents."

There is not much to be got out of either of these definitions. They do not enter into philosophical or philological analyses; but one thing is in marked contrast with the definitions of genius previously quoted. There is here a total absence of reference to "speciality," "peculiarity," "particularity," "rarity," or even to "superiority." Nor is there any hint of a connection with inventive, imaginative, or creative powers.

For all that the dictionaries say "talent" may be (and no doubt *is* in greater or less degree) the common gift of all mankind. Here then we have a good broad distinction, which should suffice to prevent the two words "genius" and "talent" from being used synonymously or as though the difference between them was only one of degree. Let us follow out the thought and see if we cannot discover some other differences which will still further distinguish the two words and point to their relation with the quality of industry.

"Talent" is a quality which enables its possessor to acquire knowledge by learning from others and by unassisted study.

"Genius" on the other hand is characterized by a great independence of instruction: it takes its own course and originates new ideas and inventions never thought of before. It may of course enlarge its sphere of knowledge by reading, by observation, and by experiment; but it is by no means characteristic of genius to be apt to be taught; on the contrary embryo geniuses are often dull fellows at school and idle to boot. It rather dislikes to follow in the track of others, and rises superior to obstacles of circumstances and deficiencies of education. Genius may safely be left to hew a path for itself. Talent is greedy of instruction. Hence the two have very different relations to education, a subject upon which I should much like to dilate, but the length into which I have been unintentionally betrayed warns me to avoid the temptation.

Arkwright perfected his invention of the spinning frame in the uncongenial atmosphere of a barber's shop, in the teeth of a scolding wife who more than once broke up his models on the eve of completion, and who habitually upbraided him for neglecting the profitable occupation of "an easy shave for a penny," with the elegant apostrophe "Cuss the cheenery." I believe she lived to to be Lady Arkwright. Let us hope that she learnt to moderate the rancour of her tongue.

George Stephenson, inventor of the locomotive and the father of railways, developed his extraordinary engineering genius in the obscurity, physical and metaphorical, of a coal pit; eking out his slender earnings by mending the boots of his fellow workmen and occasionally a watch or clock.

Sir Humphrey Davy, who was described as an "idle and incorrigible schoolboy" was apprenticed to an obscure apothecary at Penzance; he afterwards became assistant in the laboratory of Dr. Beddoes, of the Hotwells, Bristol, well known to my father, who was then serving his apprenticeship at the same place, but I cannot discover that he knew anything of the doctor's more illustrious subordinate.

Faraday's father was a Yorkshire blacksmith, who migrated to London, presumably in search of work, and Faraday himself was apprenticed to a bookbinder. A chance attendance upon four lectures by Sir Humphrey Davy was the immediate cause of his directing his attention to science, and he was some time after introduced to the Laboratory of the Royal Institution through Davy's instrumentality.

Benjamin Franklin made his first entry into Philadelphia, a poor lad with all his possessions upon his back and a dollar in his pocket. As Mark Twain depreciatingly remarks "Anybody might have done that; the only difficulty is to have the dollar." But how few out of the millions who have begun life with a dollar or even with less, have arrived to be Franklins!

On the other hand it seems absolutely immaterial with what seemingly insuperable disadvantages genius may be oppressed; it *will* make its way to the surface and triumph over all.

Can industry then supply the place of genius? Emphatically, No! Industry may compensate for paucity of talent; for talent, as we have said, is a common heritage, and its presence or absence is a matter of degree, and whatever results are attributed to talent are the joint product of talent multiplied by industry.

Thus if T = talent and I = industry the following equation will correctly represent the results accomplished by two persons whose talent and whose industry differ in inverse ratios:—

$$T \times 10I = 10T \times I = 10TI.$$

If, therefore, any of you is conscious of an excess of talent,—say = 10 T,—let him glory in his good fortune, and in the assurance of the great results he may attain by multiplying his gift by a similarly high power of industry. For $10T \times 10I = 100TI$!!

If, on the other hand, there is anyone here who diffidently estimates his talent at something below par, let him not be disheartened; he has but to increase his industry and the results cannot fail to be respectable. Thus the zealous servants in the parable improved the talents committed to their charge, whether many or few, and received their reward; while he who hid his solitary talent in a napkin was visited with his lord's displeasure —not because it was but *one*, but because he slothfully neglected to turn that one to good account.

As for genius—whether you have it or not is no concern of mine—nor need it concern anyone, yourself included. It may safely be left to follow its bent, and to assert itself in due time; when the time has come it will ride you whither you know not, as remorselessly as ever witch rode 'to her Sabbath on a broomstick. In the meantime, and until it declares itself, it will be safer to assume that you have it not.

And now, just a few words upon the relation of these three qualities, genius, talent and industry, to pharmaceutical research. There can be no question of the absolute necessity of industry in order to acquire the knowledge upon which the higher qualities must work. There is as little doubt of the great advantage of talent, both to facilitate the acquisition of knowledge and to apply it judiciously under new circumstances from which discovery must be sought. Is there any room for genius? Yes! there is room, and much need for that inventive originality which is the chief characteristic of genius and which enables one man to read indications which are meaningless to another; but it will scarcely soar so high within the limited domain of pharmacy as to win the laurel crown of genius.

If in the prosecution of pharmaceutical research you or your contemporaries should be led to discoveries so striking as to merit that distinction, it is to be expected that they will belong to and be claimed by a wider field of science than pharmacy embraces; but pharmacy will look on and applaud your success and take an honest pride in the source from which it sprung.

In conclusion, I will try to illustrate in a somewhat allegorical form the respective characteristics of genius, talent and industry.

"Genius" is a living organism, instinct with its own life, performing its appointed functions spontaneously, as of necessity.

"Talent" is an elaborate engine, skilfully devised to move many wheels and to perform divers works, but wanting the motive power.

"Industry" is the motive power.

A discussion followed the reading of the paper, in which the Chairman, Secretary, Messrs. Alcock, Elworthy, Howard and Parker took part.

A hearty vote of thanks was passed to Mr. Giles for his interesting paper.

Mr. R. J. MacDermott then read some notes on "Practical Photography." The paper was illustrated by experiments and apparatus.

A discussion followed in which the Chairman, Secretary, Messrs. Alcock, Elworthy, Giles and Parker took part.

A vote of thanks was passed to Mr. MacDermott for the trouble he had taken in bringing the subject before the Association.

The meeting then adjourned.

CHEMISTS' ASSISTANTS' ASSOCIATION.

Subnitrate of Bismuth.*

BY F. HARRIS ALCOCK.

(*Concluded from page* 539.)

PHYSICAL AND CHEMICAL CHARACTERS.

U.S.P. (1872).—A heavy white powder of a somewhat satiny appearance. Faintly acid odour and taste, and when moistened with litmus paper a decidedly acid reaction. Entirely soluble without effervescence in nitric acid, and the solution yields no precipitate with dilute sulphuric acid. Upon being heated to redness it loses 20 per cent. of its weight. When mixed with dilute sulphuric acid in excess, and subjected to Marsh's test, it yields no arsenic, or merely a trace. But in 1882 the following description is given:—"A heavy white powder, permanent in the air, odourless and almost tasteless, showing a slightly acid reaction, when moistened, on litmus paper, and insoluble in water or alcohol. When heated to redness the salt gives off moisture, and afterwards nitrous vapours, leaving a yellow residue which is soluble in nitric or in hydrochloric acid, and is blackened by hydrosulphuric acid. On dissolving 1 part of the salt in 5 parts of warm nitric acid (specific gravity 1·200) no effervescence should occur (absence of carbonate) and no residue should be left (absence of insoluble foreign salts). The reactions, for purity, of this solution, as well as those of the original salt, should be the same as those mentioned under "bismuthi carbonas." [These may be added, and consist of the following:—Solution in HNO_3, as above, poured into 50 parts of water, a white precipitate is produced, and on filtering and concentrating the filtrate to 6 parts, a portion of this, mixed with five times its volume of diluted sulphuric acid, should not become cloudy (absence of lead). If another portion be precipitated with an excess of water of ammonia, the supernatant liquid should not exhibit a blue tint (copper). On diluting a third portion with 5 volumes of distilled water, the filtrate should not be affected by test solution of nitrate of silver (chloride), or of nitrate of barium (sulphate); nor by hydrochloric acid (silver). If the salt be boiled with acetic acid diluted with an equal volume of water and the cold filtrate freed from bismuth by hydrosulphuric acid, the new filtrate should leave no fixed residue on evaporation (alkalies and alkaline earths). On boiling 1 gram of the salt with 10 c.c. of solution of soda (specific gravity 1·260) and holding a glass rod dipped in acetic acid over the test-tube, not more than a faint white cloud, but no heavy white fumes should appear (only traces of ammonia). If the preceding mixture after thorough boiling be diluted with water to 50 c.c. and filtered, the filtrate, when supersaturated with hydrochloric acid and treated with hydrosulphuric acid should not deposit more than a trace of a precipitate, which should not have a yellow or orange colour (only traces of antimony, arsenic and tin). On boiling 1 gram of the salt with 10 c.c. of strong solution of soda, decanting the liquid from

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* Read at a Meeting of the Association, November 8, 1882.

the precipitated oxide of bismuth into a long test-tube, and adding about 0·5 gram of aluminium wire cut into small pieces (a loose plug of cotton being pushed a short distance down the tube), the generated gas should not impart any colour or tint to paper wet with test solution of nitrate of silver and kept over the mouth of the test-tube for half an hour (absence of more than traces of arsenic)]."

Codex.—Of a fine pearl-white appearance; when pure, not affected by the light, but is soon coloured when it comes in contact with certain organic substances. To be preserved from all sulphurous vapours, which colour it brown.

German (1882).—A white powder, crystalline under microscope, of an acid reaction. At 120° C. 100 parts lose from 3 to 5 parts of water; and when heated stronger red vapours are emitted, and from 100 parts 79 to 82 parts of bismuth oxide are obtained. Half a gram dissolved in 25 c.c. diluted sulphuric acid (1 of acid in 6, and specific gravity 1·110 to 1·114) does not evolve carbonic acid, and remains clear. Some of this solution mixed with solution of ammonic hydrate in excess, when filtered is without colour, and when sulphuretted hydrogen water is added does not give any reaction (coloration). Another part diluted with a little more than an equal volume of distilled water, produces at once a precipitate when sulphuretted hydrogen is passed through, and if the precipitate be removed by filtration the clear supernatant liquid on evaporation should leave no residue. Subnitrate of bismuth dissolves in nitric acid with production of a clear liquid, which solution is neither rendered turbid by solution of nitrate of silver (17·0 grams to 1 litre) nor by solution of nitrate of barium (1 in 50). When warmed with an excess of solution of caustic soda, bismuth subnitrate evolves no odour of ammonia, and the clear liquid filtered, and placed in a test-tube with a few small pieces of bright iron wire and a small quantity of zinc filings, and heated; the gas evolved does not stain within an hour a piece of paper moistened with solution of nitrate of silver (1 in 2).

German (1872).—"Very white, crystalline powder; moistened with water turns blue litmus paper red; with nitric or hydrochloric acid a clear solution is formed without effervescence; a nitric acid solution diluted with a little water does not give turbidity with nitrate of silver, nor with dilute sulphuric acid. A solution obtained by boiling with ten times its weight of dilute acetic acid and precipitated by sulphuretted hydrogen and filtered does not on evaporation leave any residue. Solution of potash added in excess does not, when warmed, cause evolution of ammonia, and this solution diluted and filtered from insoluble residue is not rendered turbid by sulphuretted hydrogen. To see if free from arsenious acid heat with an equal quantity of sulphuric acid until nitric fumes cease to come off; mix with six times its weight of water and place in hydrogen apparatus, arresting sulphur compounds by means of cotton wool saturated with solution of acetate of lead placed as usual and holding over mouth of exit tube a piece of white filter paper, moistened with solution of nitrate of silver. To be preserved in well-closed bottles."

The appearance of bismuth subnitrate both ordinarily and microscopically varies very much. It is easily examined by means of the microscope, using a moderate power ($\frac{4}{10}$ inch). The crystals are generally small, prismatic, uniform, colourless, transparent, but may be acicular, triclinic, hexagonal, octagonal, and apparently in double oblique rhombic prisms, terminated by several planes. Pereira's description would not pass a sample which might answer U.S. tests in Pharmacopœia of 1880 and even 1882, for he says it is a dull white *inodorous, tasteless*, pulveriform substance, which with a magnifying lens is seen to consist of very fine silky acicular crystals. This appearance depends on mode of production, for if precipitated from very acid solution with little water the crystals are acicular and of a silky lustre. Clammy varieties of a dark grey colour may be looked upon with suspicion.

The formula for this substance, like its crystalline form, has been variously stated. Chemists have not agreed upon whether it shall be—

$$BiNO_4.H_2O;\ BiONO_3,H_2O;\ 4BiONO_3.BiH_3O_3.3H_2O;$$
$$5BiONO_3.BiH_3O_33H_2O;\ 3BiONO_3.BiH_3O_3.3H_2O;$$
$$3BiONO_3.2BiH_3O_3.H_2O:Bi_2O_3.N_2O_52H_2O;$$
$$Bi'''(NO_3)_3Bi_2O_3.3H_2O, \text{ or } BiO(NO_3)_2(HO)_2.$$

"It is difficult to prove whether or not the water in the subnitrate or hydrous oxynitrate of bismuth is an integral part of the salt (*vide infra* Gladstone's method). If it is the compound is simply the hydrato-nitrate ($BiNO_32HO$) of bismuth" (Attfield). One thing is certain and it is that commercial samples do not contain as much Bi_2O_3 as theory would require (being 79·28–82·37). Suppose $BiONO_32H_2O$ (molecular weight=306) to be the true formula, then we should require 100 parts to yield of Bi_2O_3, 76·477; N_2O_5, 17·64; water, 5·88 (see also Gladstone 'Chem. Mem.,' vol. iii.). Mr. Edwards in 1850 called attention to the variable amount of water present in this compound, his figures being:—

	Per cent.					
Bi_2O_3 . .	77·23	79·4	87·46	87·1	73·4	80·08
N_2O_5 . .	16·2	13·8	2·32	10·0	16·38	18·5
H_2O . .	6·0	6·6	10·1	1·6	9·5	1·3
	99·43	99·8	99·88	99·7	99·28	99·88

Again Pereira mentions five more authorities as under:

	Herberger.	Duflos.	Grouvelle.	Phillips.	Menigaud (at 212° F.).
Bi_2O_3 . .	79·70	80·00	81·37	81·92	85·33
N_2O_5 . .	14·44	13·58	13·97	18·36	14·67
H_2O . .	5·86	6·42	4·66	0·00*	0·00*
	100	100	100	100·68	100

To these may be added—

Gmelin.	Gladstone.
80·67	79·23
16·41	18·49
2·92	3·22 (mean of four experiments).
100·00*	100·94

Phillips and Menigaud supposed that all H_2O was removed by drying at 212° F., but Gmelin by repeated experiments showed that H_2O enters into the constitution of the compound. Gladstone's method consisted in ignition of the compound and determination of the water by passing the aqueous vapour, first over ignited metallic copper and then into a tube containing $CaCl_2$. Nitrogen was estimated by the absolute method used in organic analysis, and Bi as oxide by ignition of the salt in a platinum crucible.

It is sparingly soluble in water; decomposed by alkalies as in B.P. process for production of Bi_2O_3. Ammonia dissolves it to a small degree, due perhaps to formation of Bi_2O_3 and nitrate of ammonium which would retain some in solution. As above stated by gentle heat it becomes Bi_2O_3. It may be formed by heating ternitrate at 300° F. for several hours (Gladstone). With stannous chloride it assumes an orange-yellow colour which after some days, or immediately on boiling, changes first to brown and then to black. By repeated boiling with water it is said that all the acid can be removed and Bi_2O_3 alone will remain, but another writer says 1 per cent. HNO_3 is always left behind. The speedy effect of H_2S on this compound may be beautifully shown thus:—Take a book of one hundred pages, such as those in which silver leaf has been kept, and on the first page paint with a brush characters with this bismuth preparation and on last page put a little alkaline sulphide, the vapour of latter coming into contact with the bismuth by passing through the pores of the

* After drying on water-bath and placing under desiccator for some weeks.

paper produces a deep brown colour (brun foncé). M. Monge proved that air carries the vapour of the sulphide, since he found that on collecting the leaves one by one no coloration had taken place on them. Iodide of potassium in weak and *faintly* acid solution lets fall a brick-red precipitate of iodide of bismuth, and on this Thresh has endeavoured to form a quantitative method for estimation of alkaloids. With regard to the acidity of this preparation it is a question whether it ought to be very acid; the U.S. and German Pharmacopœias allow of a little, but some time ago a specimen was examined which was very acid, and on reference to such works as B.P., Professor Attfield's 'Manual,' Pereira's 'Materia Medica' (Bentley and Redwood), Macnamara's 'Neligan's Medicines,' Royle, Garrod, Griffiths, Scoresby Jackson, no direct mention is made of this. Phillips, however, on the authority of Martindale says "that it is sometimes so acid as to effervesce with carbonates," and Ekin in *Pharm. Journ.*, [3], iii., 381 says, "that manufacturers have told him that after some months it becomes acid." Roscoe, too, says "it has acid reaction." The B.P. preparation of the lozenge probably means that it should not be acid, for carbonates are there mixed with it. It would be interesting to know if the lozenges do alter in composition after keeping. Prepared exactly according to the B.P. when fresh it does not redden blue litmus when cold water is used to moisten it with, but when warmed, acid is soon liberated, and quickly reddens the test paper. There is another point which leads one to suppose that it should not be acid, and that is its use as a dusting powder and cosmetic; it would be unsuited for this purpose if very acid, and would in all probability do more harm than good in such cases as it is then used for; and, as has been said before, Pereira states that it is *inodorous* and *tasteless*, which is an indirect inference that free acid should be absent. Also Professor Gubler says it is a reliable *antacid*. It blackens the fæces of patients who take it. Here it may be mentioned that patients have sometimes complained that bismuth blackens the tongue and an explanation by Mr. Hamilton was mentioned in "The Month" of *Pharm. Journ.* (February, 1880-81), who said that it is probably due to the reduction of finely divided metallic bismuth upon the tongue by the sugar formed in the saliva after eating starchy matters. He found that the saliva, taken after fasting several hours and added to a heated alkaline solution of bismuth, caused no blackening, but that after eating bread and then adding the saliva to the bismuth solution, a blackening of the mixture readily occurred. In the case of a lady who had been taking bismuth for some months, she was suddenly alarmed one morning by finding that her mouth and tongue were quite black and came at once to ask her chemist the reason. It was found that she usually preceded her bismuth dose by one of Friedrichshall water which (as this did) sometimes contains sulphide of calcium, which is due to the action of organic matter on the sulphate of calcium present in this water, and hence had resulted in the production of black sulphide of bismuth.

IMPURITIES.

Very soon after this preparation became known to the world it was looked upon as a very uncertain and unsatisfactory one, because being extensively used, and closely allied to compounds of other metals it laid itself open to adulteration. On its acceptance by the medical faculty of the various colleges as a drug worthy of a place in their official pharmacopœias a test was subjoined which should indicate it to be free from lead, etc. Even now it is found impure, accidentally often, and intentionally much less frequently.

There are four sources of accidental impurity, viz., firstly, that arising from the metal itself; secondly, from the nitric acid; thirdly, washing water, and lastly manipulation. With regard to the metal, the method by which it is obtained, its source and geological associations, and firmness with which it sticks to its friends whose acquaintance it made at its source, would lead us to expect that we should find them many and formidable. We will not enter into the question of how these may be removed, but it will be well perhaps to have a glance at what may be and what have been found associated with the metal:—Gangue (this is understood by metallurgists to be a complex mixture of substances, such as stones or earthy matter in which or with which some metals such as gold, silver, bismuth, and iron are found): lead, antimony, arsenic, tellurium, selenium, iron, copper, gold, silver, zinc, cobalt, nickel, thallium (*Pharm. Journ.*, [2], iv., 302), vanadium, platinum, palladium, rhodium (?), tin, tungsten, sulphur, silica (quartz).

2nd. In the acid may exist solid matter, including chlorides and HCl; sulphates and H_2SO_4.

3rd. Distilled water, being the purest water, alone ensures the absence of traces of a multitude of things, such as compounds of calcium, magnesium, and the alkalies, especially chlorides and sulphates, resulting in the production of oxychloride and precipitation along with the silver if present, the precipitate retaining these often in a tenacious manner when they are present (*Vide* Riche, 'Year-Book of Pharmacy,' 1879).

4th. Amongst impurities due to this may be mentioned those which nitric acid solution of bismuth might dissolve from the vessels used, especially porcelain and enamelled ware; iron; particles of copper carried away mechanically from mortars made of iron or bell-metal when bismuth is powdered in them; ammonia from use of acid of different strength to the one ordered, viz., 1·420, and not using the proper addition of distilled water to dilute the acid; a parallel case is seen in the case of zinc and copper (*Pharm. Journ.* [3], ix., 849). If strong HNO_3 be used with the bismuth in powder even nitrogen is produced, and sometimes vivid flashes of light are seen. Pouring the whole nitric solution into water without separation from insoluble residue which may be present, as used to be directed in early editions of London Pharmacopœia. In this case, for probable contaminations see Dr. Letts's paper on "Bismuth Residues" (*Pharm. Journ.*, 1879). Too much or too little water used in washing, former causing it to be too basic, *the latter leaves free acid in.* Too high a temperature used for drying: this, as was said before, being a constant cause of variation.

Of other occasional impurities may be mentioned other compounds of bismuth, as hydrated oxide, phosphate, oxychloride, or oxysulphate, silica, sulphate of calcium, nitrate of alkalies (their hydrates or carbonates being used to saturate acid in supernatant liquors in order to obtain a greater yield). Particularly with reference to ammonia has this been noticed by a friend, who uses very large quantities of this preparation in combination with bicarbonate of sodium, the impurity being present sometimes to such an extent as to evolve very strongly the odour of ammonia gas, when the alkaline bicarbonate and the subnitrate were rubbed together in a mortar. Tichborne (*Pharm. Journ.*, 1860) asserts that manufacturers used chloride of sodium in the production of this preparation, which might account for the amount of oxychloride found in some commercial samples examined by Ekin (*Pharm. Journ.*, [3], iii., 381), and also the presence of silver which would be precipitated as chloride.

Of the above list of impurities the following were sought for in five different samples obtained from as many different manufacturers. The methods employed are given with other methods and also a tabulated list of results:—arsenic, tellurium, silver, lead, copper, iron, sulphur (which would occur as sulphate), ammonia, calcium chloride, phosphate, and carbonate.

1st, *Arsenic.*—It is well known that the B.P. process (Quesneville's) for the purification of the metal does not effectually remove this element. It is found in variable quantities, generally traces only, and in fact Parrish states that physicians believe that its presence has some bearing upon its therapeutic action and perhaps adds to its efficacy. M. Lassaigne detected one-sixth of 1 per cent. by Marsh's test. M. Glenard recommends heating strongly with acetate of potassium, and noticing if the odour of cacodyl is evolved. Another method is to treat with HCl, and collect vapours of $AsCl_3$; pass sulphuretted hydrogen gas into it and weigh as As_2S_3. The comparative method of Otto was used for the results subjoined, viz., Marsh's apparatus to which a $CaCl_2$ tube is attached to arrest moisture and the gas passed through combustion tubing drawn out in bulbs one inch long, these bulbs being strongly heated. The deposit of As, collected beyond this bulb, is noticed and amount compared with the deposit obtained from chemicals alone, as sulphuric acid and pure zinc are not absolutely free from arsenic. Before placing the bismuth subnitrate in the flask, it is evaporated to dryness in a fume chamber with some sulphuric acid, by which means the nitrate radical is eliminated. The hydrogen apparatus is allowed to go on uninterrupted for thirty minutes in each experiment.

Tellurium.—In this experiment advantage is taken of the reducing action of SO_2 on this element. A hydrochloric solution is prepared from the sample to be tested by evaporation to dryness with HCl two or three times, this repeated operation eventually leaves little HNO_3 in the solution to interfere with the action. To this solution thus prepared sulphite of sodium is added, and the whole warmed. If only traces are present a reddish coloration is produced, but if much be present, then after a time a dark coloured deposit of tellurium takes place. It is advisable to operate on a couple of drachms or so. This impurity makes itself evident by the peculiar fœtid odour of garlic which it communicates to the breath of patients who take bismuth for any length of time.

Silver.—Turach says that small quantities of silver cannot be detected by means of the usual reaction with hydrochloric acid or chlorides. The method adopted turned on the fact that bismuth when subjected to cupellation behaves in the same manner as lead, that is, becomes oxidized, and the Br_2O_3 formed is absorbed by the small cup-like moulds made of calcic phosphate or bone ash and designated cupels, leaving the silver as a shining bead behind. The bismuth subnitrate is ignited, and the resulting bismuth oxide gradually thrown into a heated porcelain crucible containing cyanide of potassium in a liquid state; this yields the metal, which settles at the bottom as a bright shining metallic mass, and may be seen very easily through the clear liquid cyanide and cyanate after a few minutes' heating. The whole is quickly poured into a crucible lined in cone-like fashion with asbestos, taking care that all the metal is transferred in one bead, and allowed to cool. Warming the mass in a beaker removes adhering cyanides and asbestos and a clear round metal bead is obtained, and this is proceeded with in the usual way prescribed for cupellation of metallic beads of lead and bismuth.

Copper.—Wood detects Cu by precipitation of the nitric acid solution (evaporated until a pellicle forms on the solution) by means of solution of ammonic chloride, the copper being left in the supernatant liquid; after some hours' repose, filter, add AmHO in excess and proceed in usual way (*Pharm. Journ.*, p. 317, [2], vol. x.). Ekin examined for Cu by addition of AmHo in excess to nitric acid solution, and treating the clear supernatant liquid with excess of acetic acid; on addition of ferrocyanide of potassium a red-brown precipitate is obtained. The latter test was used.

Iron.—The sample, gently ignited to remove all nitric radical, was dissolved in hydrochloric acid and diluted with water until turbidity began to show itself, sulphuretted hydrogen passed through until bismuth was completely precipitated, filtered, and to the filtrate, evaporated to remove as much acid as possible and then diluted with water, ferrocyanide of potassium was added. Care must be taken in this experiment that the hydrochloric acid is not present in such a quantity as to cause a *green* coloration with the reagent, which might be mistaken for traces of iron.

Lead.—The Pharmacopœia reagent used in testing for this impurity sometimes may give a precipitate when lead is absent. A. Riche (*Journ. Chem. Soc.*, page 841, 1878) states that the precipitate is very complex and may consist of sand, gelatinous silica, silicates, bismuth, silver, iron and especially lime in the state of sulphate. Carnot (*Journ. Chem. Soc.*, page 473, 1878) examined some specimens and found in seven samples ·011, ·016, ·023, ·032, ·038, ·065, ·098, grm. respectively, in the quantity operated upon, viz., 10 grms., and adds that these results should serve as a caution to those engaged in preparing and dispensing this drug. The B.P. method was used (rendered more sensitive by addition of a little spirit), and also one by Chapuis and Linnoissier (*Comptes Rendus*, 87, pp. 169–171), which was used qualitatively. The latter process consists in boiling the subnitrate with caustic soda and a small quantity of potassium chromate, the residue, after boiling, being separated by filtration. To clear the filtered liquid, acetic acid is added until slightly acid, when a yellow precipitate or cloudiness will be produced according to the quantity of lead present. Calcium phosphate containing silica and alumina, if present, and also impure soda, if it contains alumina and silica, of course, interfere with the latter reaction.

Chlorides.—Usual method, care being taken to begin with clear bismuth solution, formed with as little nitric acid as possible, for fear the acid solution might retain traces. Probably the removal of chloride by ebullition with pure fixed alkali would be better, adding excess of HNO_3 to filtrate and then reagent.

Carbonates.—No effervescence with acids.

Sulphates.—These might arise from wash water or oxidation of sulphur in the metal by HNO_3. The usual method, using as much water as possible to dilute the acid solution and $BaCl_2$ if in too acid solution, causes a precipitate which might be mistaken for $BaSO_4$; this, however, is insoluble on addition of more water. Nitrate of barium solution gives a precipitate which might be taken for sulphate. This, however, is insoluble on addition of more water.

Ammonia.—Ebullition with solution of fixed alkali and placing a piece of moistened red litmus in the neck of the flask in such a way as to prevent the alkali spirts coming in contact with the test paper.

Silica.—Through the courtesy of a friend, a specimen containing 3–5 per cent. of this substance was examined. Suspicion was aroused on account of the low price it was offered at in the market. Its insolubility readily reveals its presence.

Phosphate of Calcium.—As this has occurred in commercial samples on several occasions a method is given in some text-books for its detection. One originally devised by Monsieur Roussin (*Pharm. Journ.*, [2], x., p. 88), and modified by Messrs. Howard (*ib.*, p. 165), was shown to be liable to error (*ib.*, p. 347) by Mr. G. G. Hornsby. The method suggested by Dr. Tilden (*Pharm. Journ.*, [3], i., 504) is better, and was the one used, viz.:—A dilute nitric acid solution is taken and completely precipitated by means of sulphuretted hydrogen, filter and expel excess of H_2S by boiling; test a small portion of filtrate so treated for phosphoric acid by the molybdate of ammonium test, which gives a yellow colour if present. Another portion is tested for lime by neutralizing with ammonia, then adding acetic acid in excess, and lastly, oxalate of ammonium. A white precipitate of oxalate of calcium will be formed.

Other salts of bismuth may be examined as above for phosphate, oxychloride and sulphate.

The oxychloride has a soapy feel, and is amorphous; the same character also distinguishes the oxyhydrate when viewed under the microscope, after being moistened with a little water and a thin piece of glass placed over in the usual way.

TABLE OF RESULTS.

Microcharacter.	Arsenic.	Tellurium.	Ag.	Cu.	Fe.	Pb.	Ca.	Am.	Cl.	SO_4.	H_3PO_4.	Insoluble (Silica, etc.).	CO_2.
1. Very small crystals, cubical transparent, uniform.	Traces.	Traces	Absent.	Absent.	Faint traces.	Faint traces.	Absent.		Traces.	Traces.		Trace q.s. to cause turbidity of nitric solution.	Absent.
2. Crystals, size various, transparent, prismatic,	Excessive traces.	Absent.	Present (small quantity).	Absent.	Absent.	Faint traces.	—		Traces.	Absent.		Absent.	Absent.
3. Crystalline uniform needles, transparent.	Very small traces.	Fair traces.	Absent.	Absent.	Very faint trace.	Absent.	—	Absent in all.	Traces.	Traces.	Absent in all.	Absent.	Absent.
4. Regular crystals, prismatic uniform, transparent.	,,	Absent.	Absent.	Absent.	Very faint trace.	Absent.	—		Absent.	Absent.		Absent.	Absent.
*5. Crystalline, size various, prismatic, transparent.	Traces.	Absent.	Absent.	Absent.	Absent.	Fair traces.	About 1 per cent.		Traces.	Traces.		Absent.	Traces.

PHARMACY.

We frequently hear of explosions in pharmacies, but some it is a pleasure to find are not attended with any serious loss of life or property. Amongst this class may be mentioned mixtures which are very frequently prescribed by medical men, containing *ex. gratiâ*:—

℞ Bismuthi subnitratis
Magnesiæ carbonatis
Sodæ bicarbonatis
Aquæ menthæ piperitæ.

One operator might mix this and find nothing remarkable in his result; another, while checking such a mixture, finds after he has neatly finished it off, that the bottle bursts in his hands; a third is annoyed by the porter coming back again in a great hurry with the startling news that "a bottle has bursted" in his basket and marred the neatness of the packages; and lastly the patient sometimes experiences a species of fright when he or she observes such a phenomenon, and often wonders if the contents were a liquid explosive, or some other dreadful thing. Friend after friend has been asked "What would be the result of mixing this?" (the above prescription), and the opinions are astonishingly different. On this subject Mr. J. W. Yeats offers an explanation, and sends a copy of prescription (*vide* Dispensing Memoranda, *Pharm. Journ.*, [3], vii., 1055). He found the bismuth acid, and that double decomposition took place between the bismuth and carbonated alkalies thus:—$4BiONO_3 + 4NaHCO_3 = 2Bi_2O_2CO_3 + 4NaNO_3 + 2H_2O + 2CO_2$, the evolved CO_2 causing the mischief. A week later "An Assistant" states that he has made up similar mixtures, and has never met with such an occurrence. In vol. viii. of same series, page 66–67, the suggestion is made that the sample of bismuth should be examined, and it is said that decomposition is not a necessary result of such a combination; however, in such cases the writer of the prescription should be seen, and bismuth carbonate suggested to him as a good substitute. Reference may be made to Mr. Green's paper in *Pharm. Journ.*, [3], vol. ix., p. 505, in which experiments are described to show that decomposition does really take place, with effervescence and evolution of CO_2. This may be obviated, he says, by using neutral carbonates, which simply produce bismuth carbonate without evolution of CO_2. He recommends trituration of the two salts with hot water, and letting the the mixture cool before putting it in the bottle with the other ingredients. Probably such reactions are due in a great measure to variability of the bismuth. Some time ago a peculiar specimen was examined which was very acid indeed, so much so as to be easily tasted and smelt. It had been rejected by a medical man and effervesced strongly with alkaline carbonates. Rightly prepared this preparation should be very slightly, if at all, acid to litmus; when it becomes very acid it should be washed with a little water, and dried at the B.P. temperature and well preserved. That washing does make it more basic was proved by boiling ½ ounce in much water, pouring on to a filter, and washing very frequently with boiling water for two days, then drying at 150° F. until it ceased to lose weight:—1 gram gently ignited gave (mean of two results)—before washing 80·72 per cent. Bi_2O_3; after, 87·940 per cent. Bi_2O_3.

* A specimen was suspended in water, and the clear supernatant liquid being afterwards filtered was found to be acid to litmus and to contain bismuth in solution. The precipitate cleared by filtration and once washed, and dried at 150 F., effervesced slightly with acids, and solution after removal of bismuth with H_2S gave, after boiling and addition of ammonia, a rather large trace of calcium when oxalate of ammonium was added. It was examined by the spectroscope which immediately showed the peculiar light green band of calcium strongly.

In the first four instances, the per cent. of Bi_2O_3 in each (mean of two results) was found to be respectively 80·73 per cent.; 79·80 per cent.; 80·50 per cent.; 79·80 per cent. Unfortunately, the process adopted for the estimation of the nitric radical was not found to be trustworthy.

Parliamentary and Law Proceedings.

SUPPOSED POISONING AT WEST MALLING.

On Wednesday a Coroner's inquiry into the circumstances attending the death of Sarah Ann Wright, aged 16, daughter of a labourer at West Malling, was resumed before Mr. Joseph Rogers, county coroner.

The deceased, it appeared, had been ill for some time, and a few days before December 14, she was visited by the Rev. J. H. Timins, the vicar, who prescribed some medicine for her. On December 16, the rev. gentleman again saw her, and he then, after obtaining a glass and a spoon from the deceased's mother, gave her something from a bottle he produced from his pocket. No sooner had the poor girl swallowed this than she called out three times "Oh, Mr. Timins," then vomited more than once, and in about an hour and a quarter she died. Medical aid was at once procured, and two days afterwards the coroner held a preliminary inquiry into the matter. The same day a *post-mortem* examination was made by two local practitioners and as a result of their investigation they stated that the cause of death was poisoning by prussic acid. Various portions of the body were subsequently analysed by Professors Heaton and Tuson of London, and they reported that prussic acid had been found in the vomit and contents of the stomach, the amount discovered being about a-hundredth part of a grain, and essential oil of almonds was also found and separated. Death undoubtedly arose from a nerve poison, which in this case was prussic acid. The manner in which the poison came to be given to the deceased appeared from the evidence of Mr. Timins, who was duly cautioned by the coroner, and of Mr. Stedman, a chemist at Malling. The rev. gentleman's son had broken his arm and when he had recovered somewhat his father sent for some oil of almonds to reduce a nettle rash that appeared, and it was used externally with success. The bottle was put on a shelf with other poisons, but when Mr. Timins wanted some harmless expressed oil to give to the deceased he took a bottle from among others from a shelf where he did not keep any poisons, without noticing particularly which of the phials he took. He mistook it for another oil which was not dangerous. Mr. Timins further stated that he was under the strong impression that he was administering a harmless medicine to the deceased, and that when he saw the effect it had on her he himself swallowed a teaspoonful without any serious inconvenience. The chemist was positive that the bottle he sent to Mr. Timins was marked "poison," and the contents properly described. When he received the order he sent to inquire whether a mistake had not been made, and the rev. gentleman replied that he required the oil for outward application. The inquiry was adjourned for a fortnight.—*Times.*

Obituary.

Notice has been received of the death of the following:—

On the 30th of December, 1882, Mr. William Kemp, Pharmaceutical Chemist, High Street, Horncastle. Aged 54 years. Mr. Kemp had been a Member of the Pharmaceutical Society since 1848.

On the 3rd of January, 1883, Mr. John Roberts, Chemist and Druggist, Pye Bank, Sheffield. Aged 79 years.

BOOKS RECEIVED.

Jahresbericht über die Fortschritte der Chemie und verwandter Theile anderer Wissenschaften. Fur 1881. Zweites Heft. Giessen: J. Ricker. 1882. From the Publisher.

Sur l'Extraction des Matières Colorantes des Urines Bleues (Indigotine et Indirubine). Par le Dr. C. Méhu. Paris: 1882. From the Author.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Preliminary Examination.

Sir,—Perusing the Journal of January 6, I was considerably surprised to read the letter of your correspondent A. W. S., who, in my opinion, is too far outside the pharmaceutical world to broach such a subject as the Preliminary examination.

I contend that the examination in question is sufficiently strict and that to add more subjects will tend to discourage the younger members of the profession. If Cæsar, Book I., is so familiar, then select another author. The fact of a boy passing the examination is not, I admit, a proof of his proper education any more than the Major qualification is a guarantee that the possessor of it is incapable of making a mistake in his after career; the test is put and from the reply given to his question the examiner infers what the candidate knows and what he does not know, and from the inference drawn either passes or plucks him. Should the examination be made more harsh when so many fail in their attempt to pass even as it is now? The answers that are required from candidates in the Preliminary are perfectly sufficient to test any boy's elementary knowledge. I speak from experience, having both failed and passed not twenty years ago. A chemist is so seldom called upon to analyse English grammar that his pupils may well be excused examination in analysis.

Are there so many qualified assistants that it is necessary to place obstacles in the way of those wishing to enter the ranks? I think not. Are the advantages in this age of competition, both home and foreign, so great in our profession, that the trainers should be so heavily handicapped? Does the qualified man get such short hours and such a heavy salary to compensate him for the trials he had to undergo when being coached or reading for his examinations? Ask the assistants of London who, after having got through their apprenticeship, are working one hundred hours per week, exclusive of night work, which is generally very considerable, and for these—shall I say privileges?—are paid, with but few exceptions, a most miserable and paltry sum.

Possibly there exists in the imagination of A. W. S. a model college where, by an examination hitherto unknown, the defective may be sifted from those who have received a proper education. Many schemes, good perhaps in theory, are failures in practice, and to increase the severity of the Preliminary is unnecessary, and would, I feel confident, have a very injurious effect.

In conclusion, kindly permit me to ask a question, Why should candidates for the Major and Minor, when they fail to satisfy one examiner be examined again in the subjects in which they have previously been successful? I believe such is not the case in the medical examinations.

A. E. H. B.

Permanganate of Potash Pills.

Sir,—In the *Lancet* of January 6 permanganate of potash pills, containing 1 or 2 grains of the salt, are recommended by Drs. Ringer and Murrell for amenorrhœa. Having, during the last few days heard of cases of their spontaneous combustion, which is probable will occur if the common excipient containing glycerine, now generally used by dispensers, be used to mass them. I wish to point out that any readily oxidized excipient should not be used. Having prepared a quantity of the pills I found the following basis to answer best:—Vaseline, 2 parts; paraffin wax, 1 part; melt, stir till cold, and add kaolin, 3 parts; mix well. This binds the powdered permanganate together, and with a little dexterity the pills may be rolled out without much difficulty, and dusted over with kaolin. They may be coated with sandarach, dissolved in absolute alcohol, and rendered tasteless. Cacao butter may be used as an excipient, but it in time reduces the permanganate and it is troublesome to manipulate. In solution a dose of permanganate is very nauseous. In a tasteless pill, it dissolves slowly, and yet can be easily disintegrated; it is, besides, more agreeable to the stomach than in solution.

10, *New Cavendish Street.* Wm. Martindale.

The Manufacture and Sale of Patent Medicines.

Sir,—If the indiscriminate sale of potent remedies, covered by the patent stamp, is still to be allowed by unqualified traders, cannot some provision be made that the compounders possess at least the qualification of a vendor of oxalic acid, if not that of Pharmaceutical Chemist or M.R.C.S.?

Castle Cary. F. S. Moore.

W. M. A.—Probably the last mentioned labels would not involve the necessity for using a stamp, provided that the preparations are not advertised in any way for the relief of disease or claimed to be a specialty. But you are recommended to submit the question to the Inland Revenue authorities who alone are competent to answer it satisfactorily.

Sanitas.—We know nothing of the work. You should apply to the person under whose name it is advertised.

S. G.—Probably fermentation is set up.

Lime Juice.—We do not think it is possible to produce a preparation of the kind that "will not ferment;" the fermentation, however, may be retarded by proper precautions or by the addition of an antiferment.

Communications, Letters, etc., have been received from Messrs. Errington, Walker, Veritas, Independent, Norfolk, F.S.S., T.A.P.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 563.)

Balsamum Copaivæ, P.G.; Copaiba, U.S.P.—The botanical source of this oleoresin is now stated in the U.S.P. to be *C. Langsdorffii*, but in the P.G. it is attributed to *Copaifera officinalis* and *C. Guianensis*, instead of *C. multijuga*, as in the last edition of those works. Since, according to Mr. R. Cross's statement (*Pharm. Journ.*, [3], ix., 89), copaiba is collected indiscriminately from various species, its reference to any particular species is not of much importance. As copaiba does, however, vary considerably in proportion of volatile oil and resin, some limit in this direction might be easily imposed. Tests for the presence of gurjun balsam are now given in both Pharmacopœias, and for turpentine and fixed oils in the U.S.P. The latter adopts a specific gravity of 0·940–0·993, while the P.G. gives 0·96–0·99.

Balsamum Peruvianum, U.S.P. and P.G.—In the P.G. it is attributed to *Toluifera Pereiræ* (*Myroxylon Pereiræ*) instead of *M. Sonsonatense*, Klotsch., and in the U.S.P. to *Myroxylon Pereiræ*, Klotsch., instead of *Myrospermum peruiferum*, De Candolle. The tests for the purity of this substance differ in the two Pharmacopœias as follows:—The P.G. has altered the specific gravity from 1·15–1·16 to 1·137–1·145, while the U.S.P. gives specific gravity 1·135–1·150 (*Pharmaceutical Journal*, [3], xiii., p. 321). According to the latter the balsam is soluble in 5 parts of alcohol (specific gravity 0·820), and should show the absence of fixed oils and alcohol by not diminishing in volume when shaken with an equal weight of benzine or water. The bisulphide of carbon test is exactly that given in 'Pharmacographia,' p. 182, except that about 40 per cent. (instead of 38) of resin is said to be precipitated. In the P.G. the balsam is said to be miscible with an equal weight of spirit, specific gravity 0·830–0·834; 8 instead of 3 parts of bisulphide of carbon are to be added to precipitate the resin. This appears to be a waste of the bisulphide. According to the statement in 'Pharmacographia,' any further addition to the mixture of 1 part of balsam with 3 of bisulphide of carbon will precipitate the resin. The presence of turpentine, storax and balsam of copaiba are detected by heating the residue left by spontaneous evaporation of a mixture of 1 part of balsam with 5 parts of petroleum benzin previously well shaken together. Colophony is detected by shaking 5 drops of the balsam with 3 c.c. of liquor ammoniæ, when very little froth should be produced and a gelatinous mass should not be formed after twenty-four hours if the balsam be pure. Dr. C. Grote's test for 20 per cent. of resin or upwards is adopted ('Year-Book of Pharmacy,' 1881, p. 219), while Professor Flückiger's lime test is not given. It is not stated in the U.S.P. what admixture the distillation of the balsam with 200 parts of water is intended to detect. Peckolt states (*Pharm. Journ.*, [3], xi., 819) that balsam of Peru yields volatile oil when distilled with water, while that of *M. peruiferum* does not. It is probably intended, however, to detect oils of copaiba and turpentine.

Balsamum Nucistæ, P.G.—It is rather remarkable to find in a Pharmacopœia which so carefully distinguishes between rhizomes, roots and tubers, such an inconsistency as giving the name of "balsamum nucistæ" to an ointment containing yellow wax, olive oil and expressed oil of nutmeg.

Balsamum Tolutanum, U.S.P.—The name for the balsam of tolu tree now adopted is *Myroxylon toluifera*, Kunth., instead of *Myrospermum Toluiferum*, De Candolle. The test given for freedom from other resins is that bisulphide of carbon should dissolve out scarcely anything but cinnamic and benzoic acids. The simple test for the presence of cinnamic acid by warming a little between two pieces of glass and examining under the microscope for crystals of the acid is not given (*Pharm. Journ.*, [3], viii., 624.

Belladonnæ Folia, U.S.P. and P.G.—The U.S.P. gives the length of the leaves, but omits the breadth. The P.G. gives their length as two decimetres long by one broad, and remarks that the leaves are on both surfaces, "*albis punctis distincta*," a feature much more easy to observe on the upper than the under surface, and one which does not appear to be present in the leaves of stramonium. The dose is given as 0·2 gram or 0·6 *pro die*. In neither Pharmacopœia are any directions given as to the age of the plant from which the leaves should be collected, nor the time of year at which they should be gathered. The leaf is now the only part of the plant official in the P.G.

Belladonnæ Radix, U.S.P.—A preference for starchy roots is shown by directing the use of those breaking with a nearly smooth and mealy fracture (*Pharm. Journ.*, [3], xiii., 86), those which are tough and woody and break with a splintery fracture being disallowed. These directions, while providing against the admixture of such roots as *Medicago sativa* or marshmallow, are scarcely sufficient to exclude the root of *Scopolia japonica*, unless special attention is paid to the mealy fracture. The readiness with which the thin brown epidermis is scraped off by the nail, exposing the white starchy surface beneath, forms a feature which readily distinguishes young and good belladonna root from others of similar size and appearance. It is so difficult to obtain good samples of the root in commerce, that it is not surprising to find it omitted from the P.G.

Benzoin, U.S.P.; Benzoe, P.G.—The warning against the use of Penang and Sumatra benzoin in the last P.G. is now omitted, but the description still applies to Siam benzoin. The description in the U.S.P. also seems to be intended for Siam benzoin. As cinnamic acid is said to have been detected ('Pharmacographia,' 1st ed., p. 365) in Sumatra and Penang benzoin, as well as in some samples of Siam, the test for the absence of that acid is therefore probably intended to secure a suitable material for the preparation of benzoic acid. There is no proof that Siam benzoin is obtained from *Styrax Benzoin*, while the storax odour of the Penang variety and the vanilla scent of the Siam kind indicate that they are in all probability the produce of a different tree from that which yields Sumatra benzoin.

Brayera, U.S.P.; Flores Koso, P.G.—In the U.S.P. brayera (koosso) is now limited to the female inflorescence, and is attributed to *Brayera anthelmintica*, Kunth. The word *anthelmintica* is often erroneously spelt thus, its derivation from the Greek ἑλμινθος necessitating the use of "th" instead of "t." In the P.G. the female inflorescence is alone official; the name adopted for the koso plant is *Hagenia Abyssinica*, and the description now gives more botanical details, even going so far as to state that the fibre wound round the koosso consists of the stem of *Cyperus articulatus*.

Bryonia, U.S.P.—The roots, both of *Bryonia alba* and of *B. dioica*, L., are official. This is altogether a new addition, the drug not occurring previously in the secondary list. According to homœopaths the roots of the two species differ very much in strength and properties, that of *B. alba* being always preferred to *B. dioica*. The accuracy of this statement might perhaps be worthy of more attention than it has hitherto received now that the drug is introduced into the Pharmacopœia.

Buchu, U.S.P.—In the last edition the leaves of *B. crenata* "and other species" were official. The "other species" are now limited to *B. betulina*, Bark., *B. crenulata*, Hook., and *B. serratifolia*, Willd.

Calamus, U.S.P.; Rhizoma Calami, P.G.—This is another drug which probably finds a place in the U.S.P. owing to its use among the German portion of the population as an aromatic tonic in dyspepsia, etc. The description in the U.S.P. is not well worded, for the rhizome is described as showing numerous oil cells and *scattered* wood-bundles, the latter *crowded* within the subcircular nucleus sheath. In the P.G., 1872, the rhizome was directed to be collected in autumn and to be used only in the decorticated state. The root in its natural state is now official in both Pharmacopœias, and no directions are given as to the time of collection.

Calendula, U.S.P.—This, like bryonia, would seem to have been introduced to supply a formula for an extensively used homœopathic remedy, since it does not appear in the P.G. or in the previous edition of the U.S.P. A brief description of the flower-head is given, but no characters by which it might be distinguished from those of *Tagetes erecta*, L., and *Tagetes patula*, L., the plants commonly known as African and French marigolds, and the heads of which, according to Maisch, have been largely sold as calendula in the United States (*Amer. Pharm. Journ.*, 1867, p. 386). The achenes in these species are flattish, slender, and crowned with a few chaffy scales; the phyllaries of the involucre are united to form a tube, the receptacles are naked, and the ligulate florets are broader than in *Calendula*.

Calumba, U.S.P.—Radix Colombo, P.G.—The U.S.P. now adopts the name of *Jateorrhiza Calumba*, Miers, only, and the two Pharmacopœias consequently agree in this point.

Cambogia, U.S.P.—This is now attributed to *Garcinia Hanburii*, Hook. f. A description of the drug, and a test for its freedom from starch are given, but the proper percentage of resin is not mentioned.

Camphora, U.S.P. and P.G.—The name *Cinnamomum Camphora* is now adopted for the camphor plant. The characters given in the U.S.P., that camphor should be entirely soluble in alcohol and chloroform, and sublime without residue, are necessary since the introduction of the Japanese drug, in the manufacture of which mucilage is said to be used.

Cannabis Indica, U.S.P.; Herba Cannabis Indicæ, P.G.—The P.G. directs that the flowering tops should be more green than brown, while the U.S.P. states that the drug has a brownish colour. If it is usually met with in Germany of a greenish colour, it is not surprising that Dr. Fronmuller remarks that the extract is now four times as strong as it was thirty years ago. The P.G. is in error in giving the name of "bhang" to the flowering tops; these being known in India as "gunjah," or in the London market as "guaza." The object of retaining *Cannabis americana* in the Pharmacopœia is not evident.

Cantharis, U.S.P.; Cantharides, P.G.—The U.S.P. still retains the name *Cantharis vesicatoria* for the insect and the P.G. that of *Lytta vesicatoria*. In the U.S.P. a description and measurements are given, the latter being less than those of the P.G., which also directs that the ash left after incineration should not exceed 8 per cent. In the P.G. the maximum dose is now given as 0·05 gram, or 0·15 per day. The directions as to time of collection are now omitted. The U.S.P. orders a little camphor to be placed in a well-closed vessel with the insects; but no test as to percentage of cantharidin, or for the presence of euphorbium in powdered cantharides, is given in either Pharmacopœia.

Capsicum, U.S.P.; Fructus Capsici, P.G.—The fruits of *Capsicum fastigiatum* are official in the U.S.P., and those of *C. annuum* and *C. longum* in the P.G. The description of the dimensions in the latter is not so accurately worded as is usually the case in that work, since it admits of the construction that a conical fruit of capsicum might be 5 centimetres long and 4 broad in the lowest part, a shape which is by no means typical of commercial capsicum.

Caryophyllus, U.S.P.; Caryophylli, P.G.—In both Pharmacopœias the botanical name is altered to *Eugenia caryophyllata*, Thunb. According to the P.G. the flower-buds should be 10–15 millimetres long (12 mm. U.S.P.) and should exhibit volatile oil when scratched with the nail (U.S.P.) or split longitudinally and pressed between blotting paper. It is necessary to try this test on several specimens, as the exhausted cloves are often mixed with those in good condition, the exhausted specimens being usually moist and without petals.

Castoreum, P.G.—American (Canadian) castoreum is now official, the Siberian, which has long been almost impossible to obtain, being excluded. The powder should not melt at a temperature of 100° C., which precludes the presence of resin, with which spurious castor sacs are sometimes filled.

Cardamomum, U.S.P.; Fructus Cardamomi, P.G.—The dimensions given in both Pharmacopœias indicate that the Madras as well as the Malabar cardamoms are intended, since 2 centimetres long and 1 broad is rather an unusual size for Malabar cardamoms. The long cardamoms so frequently contain badly developed seed, that directions to use seed freed from the husk would give a more uniform result.

Cardui benedicti, Herba, P.G.—A more minute botanical description is now given.

Carum, U.S.P.; Fructus Carvi, P.G.—The U.S.P. gives the length of the fruit as about 4 millimetres, a measurement which applies to Dutch caraways, while the P.G. now requires the length to be 5 millimetres, which is characteristic of English caraways.

Cascarilla, U.S.P.; Cortex Cascarillæ, P.G.—The P.G. forbids the use of copalchi bark (*Croton niveus*), which it describes as occurring in larger quills, with a more strongly radiate fracture, rather more acrid taste and greater thickness. As there are several barks to which the name "copalchi" is applied it is well that the description is given, since it does not apply to the bark commonly known as "copalchi" in this country. By an oversight the length of copalchi quills is given in the old measure (1 foot) instead of in decimetres.

CASSIA FISTULA, U.S.P.—The description now given is sufficient to distinguish the pods from those of *Cassia moschata*.

CASTANEA, U.S.P.—A botanical description of the leaves is now given and it is directed that they should be gathered in September or October while still green. The drug is probably retained from the secondary list on account of its value in whooping cough. No allusion is made to the shape of the base of the leaf, which in the nearly allied species *C. americana* is rather acute.

(*To be continued.*)

NOTE ON THE ORIGIN OF CASSIA LIGNEA.*

BY W. T. THISELTON DYER, M.A., F.R.S.,

Assistant Director, Royal Gardens, Kew.

The spice now known in pharmaceutical literature under the name of *Cassia lignea* has, from time immemorial, been an article of trade from South China. Flückiger and Hanbury are indeed of opinion that it was the cinnamon of the ancients, what now bears the name being peculiar to Ceylon and unnoticed as a product of the island till the thirteenth century.† Cinnamon and cassia are, however, enumerated amongst the products of the East from the earliest periods; and the former was known to the Arabians and Persians as *Darchini* (*dar*, wood or bark, and *chini*, Chinese). It seems in ancient times to have been carried by Chinese traders to the Malabar coast, where it passed into the commerce of the Red Sea. In this way the statements of Dioscorides, Ptolemy, and others, are accounted for, who speak of cinnamon as a product of Arabia and Eastern Africa, countries in which there is no reason to suppose it ever grew. At the present day it is still an important item in Chinese commerce. I find, from the Statistical Returns of the Chinese Imperial Customs (for copies of which Kew is indebted to Sir Robert Hart), that the export from China for the last two years stands as follows‡:—

		Quantity.	Value.
1880	. .	38,784 piculs,	225,692 Haikwan taels.
1881	. .	57,456 „	300,303 „

1 picul = 133⅓ lbs.; 1 Haikwan tael = 5*s.* 6½*d.*

With regard to the botanical source of Cassia lignea, it is remarkable, considering its ancient history and its present importance in trade, that up to the present time nothing certain has been ascertained. Flückiger and Hanbury remark:—"Although it is customary to refer it without hesitation to a tree named *Cinnamomum Cassia*, we find no warrant for such reference; no competent observer has visited and described the cassia-yielding districts of China proper, and brought therefrom the specimens requisite for ascertaining the botanical origin of the bark."§

Bentley and Trimen also remark, in their 'Medicinal Plants,'|| "Though it is probable that this species (*Cinnamomum Cassia*) affords Chinese cassia, the fact has never been proved."

In the face of the uncertainty felt by these authorities, it appeared to be desirable to have the point, if possible, cleared up. The attention of the Colonial Office was accordingly drawn to the matter, November 18, 1881; and it was suggested that Mr. Charles Ford, Superintendent of the Botanical and Afforestation Department, Hong Kong, might be allowed, with the consent of his Government, to proceed to the cassia plantations on the West River for the purpose of reporting on the cultivation and collection of Cassia lignea, as well as of bringing back for distribution from the Hong Kong Botanic Garden living and dried botanical specimens of the authentic plant. Lord Kimberley was so good as to approve of the proposal; and in the month of May last Mr. Ford accordingly started for the cassia districts of the West River, the Sai Kong. He completely succeeded in the object of the expedition, and described his journey and its results in a Report to the Hong Kong Government, August 9. This Report has been printed as a Government Notification (No. 339); but as in that form its circulation will necessarily be very limited, I think the facts deserve the wider circulation which will be afforded by the Society's Journal.

Mr. Ford's journey was timed so that he might be in the districts at the season when the trees were flowering. This enabled him to obtain authentic specimens for their botanical identification, and also to witness the operation of obtaining and preparing the bark.

Mr. Ford gives the following account of the geographical position and extent of the cassia districts:—

"There are three chief districts where the cassia is cultivated, viz.:—Taiwu, in lat. 23° 34′ N., and long. 110° 18′ E. in the Kwangsi province; Lukpo, in lat. 23° 6′ N., and long. 112° 24′ E.; and Loting, in lat. 22° 52′ N., and long. 111° 8′ E., both in the Kwangtung province. These are the market towns of the district; but the cassia is cultivated over a large area of country stretching to considerable distances from the towns, the extent of which could not be ascertained owing to the unreliable accounts given by the different people questioned, who either had very vague notions of area, or were disinclined, as they usually are, to give information to foreigners.

"Taiwu is about four or five miles from the West River, and is reached by a pleasant walk leading over a plain; but the nearest cassia plantations are situated twenty-five or thirty miles further in a southern or south-westerly direction, to which there is no communication by river. Taiwu is about one hundred and eighty miles west of Canton. The Taiwu people said that the area of cultivation was not increasing.*

"The next most important, if not the *most* important (or at least tending in that direction) district is the Loting one, commencing at about eight or ten miles distant from the city of Loting. After leaving the West River about eighty miles of the Loting River—the Nam Kong—has to be traversed before reaching the city, and from there the distance to the plantations has to be accomplished overland. One of the largest cultivators said that in this district there were about 1,000,000 *maus* (about 52,600 English acres) under cultivation, and that the area was greatly extending every year. The cultivation of cassia has been carried on here for only about twenty-five years, *i.e.*, since the Tai-Ping rebellion, at which time, for the preservation of the plants and protection of them from destruction by the rebels, they were transferred from a district further south, at which it is reported the cultivation of cassia was abandoned when it was commenced at Loting.

"The next district is that of Lukpo, which is much less important than the other two. The city of Lukpo is situated on the northern bank of the West River; and the plantations are situated at about fifteen miles between the nearest one and the city.

"In addition to these places there are several small localities near the West River at intermediate places, where small patches of cassia are grown; and as the quantities of bark obtained are too small to send to market towns, it is brought off by small boats and sold to larger boats which carry produce down the river.

"About six miles south-west of the small town of To Shing, which is situated on the southern bank of the

* From the *Journal of the Linnean Society*, December 18, 1882.

† 'Pharmacographia,' pp. 520, 521.

‡ 'Returns of Trade at the Treaty Ports for the year 1881,' p. 10.

§ 'Pharmacographia,' p. 528.

|| Vol. iii., *sub tab.* 223.

* "Near the town of Taiwu, according to Mr. Moss ('Narrative of an Exploration of the West River,' 1870), the best cassia bark is produced" (Bretschneider, 'Early European Researches into the Flora of China,' p. 13).

river, about twenty-five miles above the confluence of the Loting and West rivers, there are some plantations, from which, however, no bark has been obtained for two years and no new plantations made for ten, because the low prices which can now be obtained for the bark do not leave any profit to the producers. This was the only instance which came to my knowledge of the decrease of the trade in the cassia production, although it is said that the Java cassia trade, in consequence of the lower prices at which the cassia can there be produced, is cutting out and crippling the China trade."

From each of the districts of Taiwu, Lukpo and Loting, Mr. Ford obtained and sent to Kew copious and excellent specimens. These have been examined by my colleague, Professor Oliver, who informs me that they certainly all belong to the same species, and that this is undoubtedly *Cinnamomum Cassia*, Blume. Mr. Ford took great pains to ascertain if this was the exclusive source of Cassia lignea. He reports:—

"This is the *only* tree from which cassia bark, 'buds,' or leaves of commerce in China, so far as could be ascertained from personal inspection and reports, are obtained. All the trees seen in the districts of Taiwu, Loting and Lukpo, and intermediate localities where cassia was grown in smaller quantities, were of this species, nor were there, apparently, distinct varieties of the species in cultivation. The cultivators and other natives were much interrogated as to whether they knew or had heard of any other tree which yielded the products under notice, and the invariable reply was that there was no other kind. There is, therefore, I think, no doubt but writers who have named other kinds as cassia-yielding trees of China have been mistaken or misinformed on the subject. One writer alludes to a tree in terms which partly correspond to the description of *Machilus velutina*, Champ., another tree belonging to Lauraceæ, and indigenous to South China. It is quite possible that this tree may have been supposed by a casual observer to yield cassia bark, because it is sometimes grown in plantations intermixed with those of *Cinnamomum Cassia*. The trees are reared, planted, and treated in precisely the same manner as the cassia trees; but the bark is required for a very different use, viz., to supply a glutinous extract which is used to stick together powdered cassia bark and sandal wood (*Santalum album*) to form the joss-sticks used for incense. *Cinnamomum Burmanni*, Bl., which it has been supposed may probably yield 'in part the cassia bark of the Canton market,' does not, I feel sure, supply cassia bark to any extent. I did not see it anywhere cultivated; nor was it seen growing wild in any but very small quantities, and these wild trees bore no signs of having been cut as had the cassia trees: many natives were asked if it was ever used; but, with one exception, all denied that it afforded any cassia bark. The one exception was an old woman, who was cultivating a field of Indian corn close to a few small trees of *Cinnamomum Burmanni*, and who said that its bark was sometimes, but rarely, used to adulterate the true cassia bark."

Mr. Ford on his return journey paid a visit to the well-known Chinese botanist, Dr. Hance, H.M. Vice-Consul at Whampoa, who identified the specimens of the Cassia lignea tree collected by Mr. Ford as belonging to *Cinnamomum Cassia*. There is, in fact, in the Kew Herbarium a specimen of the same species collected by Dr. Hance in 1876; but I have searched in vain to see if Dr. Hance has published any thing about it, and the specimen bears no note that it is the source of Cassia lignea. This specimen is the material upon which the plate given by Bentley and Trimen is based, and represents no doubt the true plant.

Cinnamomum Cassia was first described by Blume, in 1825.* The species was apparently founded on cultivated specimens from Java, where Blume states it was "ex China introductum."

The Kew Herbarium possesses a cultivated Java specimen contributed by the Leyden Herbarium. This is no doubt an authentic type of the plant described by Blume; and Professor Oliver finds that it agrees precisely with the plant collected by Mr. Ford on the West River. It may be, therefore, considered finally settled on the one hand, that the Chinese Cassia lignea plant is really the *Cinnamomum Cassia*, Blume, and, on the other hand, that the plant cultivated in Java is identical with that now known to be the source of the spice in China.

It is remarkable that though the cultivation of the Cassia lignea tree has apparently been carried on in Southern China from time immemorial, it does not appear to be indigenous there.* In Cochin-China, however, there appears to be some probability of its being really wild. *Cinnamomum Cassia* is, botanically, very closely allied to *C. obtusifolium*, Nees, one of the species from which a similar product is obtained on the Khasia hills.

It only remains to give Mr. Ford's account of the mode of collecting and preparing the bark. He obtained and sent to this country a set of the implements, which are deposited in the Kew Museum.

"*Bark.*—When the trees are about six years old, the first cut of bark is obtained. The season for barking commences in March and continues until the end of May, after which the natives say the bark loses it aroma, and is therefore not removed from the trees. The branches, which are about an inch thick, being cut to within a few inches of the ground, are carried to houses or sheds in the vicinity of the plantations. All the small twigs and leaves being cleared off, a large-bladed knife, with the cutting-edge something like the end of a budding knife, is used to make two longitudinal slits and three or four incisions, at sixteen inches apart, round the circumference through the bark; the bark is then loosened by passing underneath it a kind of slightly curved horn knife with the two edges slightly sharpened. Pieces of bark sixteen inches long and half the circumference are thus obtained.

"The bark, after its removal and while it is still moist with sap, is then laid with the concave side downwards, and a small plane passed over it, and the epidermis removed. After this operation the bark is left to dry for about twenty-four hours, and then tied up in bundles about eighteen inches in diameter, and sent into the merchants' houses in the market towns.

"*Leaves.*—The leaves which are cleared from the branches that are barked are carefully preserved and dried, and afford by distillation cassia oil. A large number of leaves are sent to Canton, where I was told the operation of distilling is performed.

"*Twigs.*—These are removed from the cut branches at the same time as when the leaves are obtained. They are a marketable commodity for native uses.

"*Buds.*—Cassia-buds are the immature fruits. They are gathered when about one-eighth grown. Buds, and the seeds which are annually required for sowing, are obtained from the trees ten years and upwards of age that are left standing at about fifty and a hundred feet apart amongst the trees which are cut down every six years for their bark. These seed-bearing trees are not cut unless there is a demand for the very thick bark on their trunks, when some of the trees which can be conveniently spared are sacrificed."

TURPENTINE: ITS NATURE AND ADULTERATIONS.†

BY PROFESSOR HENRY E. ARMSTRONG, PH.D., F.R.S.

In the course of investigations on the terpenes, camphor and allied compounds, in which I have been engaged during several years past, the opportunity has occurred

* 'Bijdragen Fl. Nederl. Indië,' ii., p. 570.

* The earliest printed notice in works professing to give botanical information about China appears to be in Martini's 'Atlas Sinensis' (1655). See Bretschneider's 'Early European Researches into the Flora of China,' p. 13.

† From the *Journal of the Society of Chemical Industry*, December 29, 1882.

of gradually collecting a number of data which probably are of sufficient technical value to find a place in the *Journal of the Society of Chemical Industry.*

Thanks to the kindness of my friend, Mr. E. Phillips, of Messrs. Ingall, Phillips and Co., I was enabled to examine average samples of most of the cargoes of turpentine landed by his firm during the years 1877 to 1880, and thus to obtain a clear insight into the character of the commercial article. The high price of turpentine during the past few seasons has undoubtedly led dealers here to adulterate it, and it was to be feared that shippers might not uniformly resist temptation; therefore, at the request of the above-mentioned firm, since the beginning of last year, I have regularly tested all cargoes landed at their wharves.

The crude resinous exudation, formerly known as "turpentine," is no longer an article of commerce in this country, the obviously rational course being nowadays adopted of separating it into its constituents, "spirit of turpentine," or "turpentine oil" and rosin. On this account the name "turpentine"—*vulgare* "turps"—is now commonly employed as synonymous with the longer appellation, spirits or oil of turpentine, and it is in this sense that the term is employed in the paper.

The commercial varieties of turpentine mainly consist of hydrocarbons of the formula $C_{10}H_{16}$, of which certainly *three* distinct classes may be distinguished, viz., *terpenes, citrenes,* and a third of which *sylvestrene*, the characteristic constituent of Russian turpentine, is the type. Under *terpenes,* I include those varieties which boil at about 156° C.; under *citrenes,* those which boil at about 176° to 178°, such as are the chief constituents of the oils derived from various species of *citrus.*

French Turpentine.—It is generally stated that French turpentine is the produce of a single species of conifer, *Pinus maritima.* It certainly is of remarkably uniform quality, judging from the almost constant rotatory power of samples which I have had occasion to examine at various times, and probably the properties of the terpene of which the French oil mainly consists are not very different from those of the commercial article. Using any form of polarimeter which admits of the observation being made in monochromatic light—it is, perhaps, well to note that the Soleil form cannot be employed for the examination of turpentine—and operating with a 200 mm. column, the value of α_D is on the average about $-60°$ to $-61°$.

American Turpentine.—American turpentine is said by Hanbury and Flückiger ('Pharmacographia,' 1st ed.) to be chiefly the produce of the swamp pine (*Pinus Australis*), this and the loblolly pine (*Pinus tæda*) being, they say, the most important sources of turpentine.

The following particulars regarding the separation of the hydrocarbon from the crude resinous exudation will probably be of interest. I am indebted for them to Dr. Thomas F. Wood, of Wilmington, N.C.; they were written at the request of Mr. Charles Rice, American editor of the 'Pharmacographia':—

"Turpentine is distilled in copper stills now. Formerly iron stills were used. All crude turpentine is distilled with water. A fifteen-barrel still (barrel weighs 280 lbs.) is charged early in the morning. Gentle heat is first applied until the mass is liquefied, and a coarse wire skimmer is used to remove the chips, bark, leaves and such other foreign substances as rise to the surface, the temperature meanwhile rising until 316° F. is reached. All the accidental water (that contained in the crude turpentine as it comes from the forest) having been distilled off, a small stream of cold water is now let in, so that the heat is kept at or below 316° F., the boiling point of oil of turpentine. The oil of turpentine and water now come over, and the mixture is caught in a wooden tub. The distiller tests the quality of the flow from time to time in a proof-glass, and the distillation is continued until the proportion of water coming over is 9 of water to 1 of oil of turpentine. At this stage the heat is withdrawn, the still-cap is taken off, and the hot rosin is drawn off by a valvular cock at the side of the still near the bottom. This rosin passes through a strainer before it reaches the vat, to rid it of foreign substances which may not have been previously removed by the skimmer. The yield of oil of turpentine from 'virgin dip' (the first exudation from a newly-boxed tree) is about 5 gallons to the barrel, about 20 per cent. being left in the rosin,* since the removal of a larger proportion would darken the colour, and consequently depreciate its value. The yield from 'yellow dip' (the runnings of the second and subsequent years) is about 4 gallons to a barrel. The yield from 'scrapings' (the inspissated gum from the tree facings) is about 2 to 3½ gallons according to age, and also to the proportion of trash which it contains."

The separation of turpentine, by what is practically a steam distillation process, serves to explain the fact which, until I received the above information, had often surprised me, that the commercial article is uniformly free from products of the decomposition of rosin by heat.

Some idea of the importance of the turpentine industry will be gathered by inspection of the following table, representing the number of barrels imported into London since 1872:—

1873	44,495	1878	56,221
1874	57,720	1879	42,960
1875	57,093	1880	39,649
1876	57,371	1881	63,724
1877	49,500	1882	57,489

Probably about two-thirds of the entire quantity sent to this country is landed in London.

In so far as general properties are concerned, there is no practically distinguishable difference, other than in colour, I believe, between various samples of the commercial article, but tested by the polarimeter they vary considerably.

The chief port of shipment is Wilmington, and most of the turpentine from this port, like that from Bordeaux, is of remarkably uniform quality. Thus out of thirty-five samples, representing in all cases bulks of several hundred barrels, and in a number of cases bulks of from 1000 to 2000 or more barrels, no less than twenty-eight samples varied in rotatory power (value of α_D per 200 mm.), only within the very narrow limits of 27° 6′ to 28° 35′; four samples had an inferior rotatory power of 24° 29′ to 26° 40′, and only three had a superior rotatory power of respectively 29° 31′, 31° 21′, and 32° 38′.

That shipped from Savannah, on the other hand, is, as a rule, characterized by a relatively low rotatory power, *e.g.*:—

Ex. 1569	brls.	$\alpha = 22° 21'$	Ex. 1696	brls.	$\alpha_D = 19°$
Ex. 1000	,,	$\alpha_D = 24° 9'$	Ex. 1870	,,	$\alpha_D = 20° 33'$
Ex. 1383	,,	$\alpha_D = 20° 22'$	Ex. 1200	,,	$\alpha_D = 21° 21'$
Ex. 1571	,,	$\alpha_D = 19° 39'$	Ex. 1595	,,	$\alpha_D = 19° 12'$

In the case of the last of these shipments, I had the opportunity of taking five samples, each representing about one-sixth of the bulk, which gave the following values:—21° 4′, 21° 19′, 18° 13′, 17° 38′, and 20° 6′. I have not been able to ascertain whether the turpentine shipped from Savannah is the produce of a different tree, or whether the difference in climate between the two districts, of which Wilmington and Savannah are "centres," is the cause of the marked variation from what may be termed the Wilmington type. I trust that the publication of this paper may, as one result, lead to my being favoured with information on this point.

Judging from the opportunities which have presented themselves for examining turpentine shipped from Charleston, the deliveries from this port would appear

* The fact that the whole of the hydrocarbon is not removed accounts for the statement sometimes made, that "rosin spirit" is optically active, that made from pure rosin, according to my experiments, being inactive.

to comprise turpentine of somewhat high rotatory power, as well as those of the Wilmington and Savannah types:—

Ex. 1000	brls.	$\alpha_D = 30° 24'$	Ex. ——	brls.	$\alpha_D = 19°$
——	„	$\alpha_D = 30° 38'$	Ex. 1874	„	$\alpha_D = 26° 42'$
Ex. 250	„	$\alpha_D = 33° 33'$	Ex. 1886	„	$\alpha_D = 29° 39'$
Ex. 1689	„	$\alpha_D = 28° 15'$	Ex. 200	„	$\alpha_D = 24°$
Ex. 2179	„	$\alpha_D = 24° 15'$			

Other parts also furnish a somewhat irregular product; the values, however, always lie within those already given, and in the majority of cases belong to the Wilmington type, Brunswick alone exhibiting a marked tendency to furnish a product of the Savannah type.

Commercially, I believe, no distinction is made between the turpentine shipped from various American ports; nor indeed is French turpentine, which is now a comparative rarity in the English market, regarded as having distinctive qualities. My observations on the whole justify this practice: French turpentine is slightly less readily oxidized, absorbing oxygen somewhat less rapidly than American turpentine, but the difference is probably insufficient to make itself felt in practice.

Russian Turpentine.—Commercially this variety is of no importance, as it cannot well be used in paint or varnish making, both on account of its unpleasant odour and of the extreme readiness in comparison with French or American turpentine with which it absorbs oxygen, forming a viscid oil; its vapour appears also to produce far more marked physiological effects than either of the ordinary oils, inciting violent headache in many individuals. It is the produce of *Pinus sylvestris*, but I have not been able to ascertain whether the turpentine is specially collected, or is a mere bye-product. According to one account which I have received, the waste timber is piled into heaps and a fire lighted; the resinous matter which drains away is then collected and the turpentine extracted from it by distillation.

Different samples are remarkably different in their optical character, as the following numbers show:—

α_D(per 200 mm.) =	36° 29′	44° 11′	40° 42′
	36° 7′	41° 0′	46° 45′
	34° 18′	35° 28′	36° 4′
	38° 58′	30° 42′	37° 5′
	32° 27′	35° 20′	42° 10′
	31° 20′	38° 6′	39° 52′
	34° 8′	45° 10′	30° 10′
	39° 58′	38° 4′	

Excepting the first four, all these samples were drawn from single barrels, and were obligingly furnished to me by Mr. Kingzett.

Russian turpentine has been shown by Tilden (*Chem. Soc. Trans.*, 1878–80) to consist of a peculiar $C_{10}H_{16}$ hydrocarbon, the so-called *Sylvestrene* of Atterberg (*Ber.*, 10, 1202), and of an isomeride possessing the character of American turpentine. Sylvestrene, according to these authors, has a *specific* rotatory power of $(\alpha_D) = 19{\cdot}5°$ (Atterberg), 19·6° (Tilden), that of the associated hydrocarbon being 36·3° (Atterberg). In confirmation of the assumption that one of the constituents of Russian turpentine is probably identical with the main constituent of American turpentine, I may mention that I have separated from the latter by fractional distillation a portion having a rotatory power per 200 mm. of no less than 49° 34′, and that on several occasions, by submitting American turpentine to air oxidation, and afterwards distilling off the unaltered hydrocarbon by steam, I have obtained products of considerably higher rotatory power than the original oils. I have also examined several samples received from Mr. Kingzett of the hydrocarbon carried over by the air current during the air oxidation of Russian turpentine. In most cases these have been almost free from sylvestrene, and have exhibited a higher rotatory power than the original crude turpentine from which they were derived.

The numbers above given fluctuate within wide limits, and are of interest as indicating that the proportions in which the two recognized constituents of Russian turpentine are present probably vary considerably, and also that other perhaps isomeric hydrocarbons are mixed with them; they serve to confirm the idea that American turpentine is also a mixture of isomeric hydrocarbons. I may add that certain observations even lead me to think it not unlikely that the low dextrorotatory power of American turpentine is due to the presence of a lævorotatory terpene; this would serve to explain the difference in optical character of products from different localities. The comparative study of American turpentine—and indeed generally of oils containing $C_{10}H_{16}$ hydrocarbons—from this point of view, I think deserves attention; variations in climatic and other conditions may have led to a gradual differentiation both in botanical and physiological character of a single parent stock.

Method of Analysis.—The terms "petroleum spirit" and "petroleum oil" as commercially used do not admit of very precise definition; for the purpose of this paper, I would therefore define petroleum spirit as being that portion of crude petroleum which may be volatilized by means of steam from water boiling at atmospheric pressure, and petroleum oil as being the non-volatile portion. Judged of by this definition, commercial spirit and oil are, as a rule, more or less mixtures; the amount of spirit in the best burning oils is, however, small.

The presence of petroleum oil in turpentine is readily detected and the amount estimated by steam distilling. Unless it has been freely exposed to the air for a long time, but a mere trace of viscid matter remains on steam-distilling turpentine; on one or two occasions only have I met with samples containing a small amount of rosin, which was left as a solid on distilling off the turpentine by a steam current. Should more than a few tenths of a per cent. of non-volatile matter remain, it is probable that petroleum is present. This usually betrays itself by the more or less marked blue fluorescence of the residue; but should this criterion fail, the behaviour of petroleum and of the non-volatile product of the air oxidation of turpentine on digestion with dilute nitric acid will serve to differentiate them. The latter is readily oxidized and dissolved; the former does not alter much in bulk, but apparently undergoes more or less complete nitration. I have never yet met with a sample containing rosin oil, but it would not be difficult to detect it, as it is oxidized by nitric acid, and behaves in a most characteristic manner when triturated with a paste of slaked lime, forming the well-known grease.

The detection and estimation of petroleum spirit is less readily effected. The method which I employ is based on the different behaviour of turpentine and paraffins with sulphuric acid. The paraffins, it is well known, are almost unaffected, whereas turpentine is polymerized and for the most part converted into substances of high boiling point which do not volatilize in a current of steam. I say for the most part, because, as I have elsewhere stated, a certain amount of cymene and of a paraffinoid hydrocarbon is always produced. Inasmuch as the amount of cymene so produced varies with the strength of the acid and the temperature, being larger the more concentrated the acid and the higher the temperature, it is important always to work under uniform conditions, at as low a temperature as convenient, and to use diluted acid. I employ two strengths of acid, a mixture of 2 vols. acid and 1 vol. water (2:1 acid) and a mixture of 4 vols. acid and 1 vol. water (4:1 acid). The turpentine—500 c.c. is a convenient quantity—is placed with about one-fourth to one-third of its bulk of 2:1 acid in a well-stoppered bottle, and the mixture is somewhat cautiously agitated. It soon becomes more or less heated, and as it is important to effect the polymerization at a temperature not much above the ordinary atmospheric temperature, the bottle is placed in cold water for a short time. After repeated agitation with the acid, the turpentine is converted into a viscid oil, and when this is the case and no more heat is developed on continued agitation, the contents of the bottle is transferred to a separating funnel, the acid layer is run off and the oil poured into a flask; the latter having been connected with a condenser and a steam-pot—an ordinary tin can answers admirably—all that is volatile is distilled off. The distillate is mixed with about half its bulk of 4:1 acid, and treated in a precisely similar manner.

The product from this second operation should only consist of a mixture of cymene and the paraffinoid hydrocarbon; in bulk it should not be more than 4 to 5 per cent. of the original hydrocarbon. This is the result of a very large number of estimations; as little as 3 per cent., however, has been obtained in experiments conducted with special care. If much more than about 5 per cent. be obtained, it is desirable to repeat the treatment with 4:1 acid.

If, from the result of this treatment, it appears probable that petroleum spirit is present, the product is placed in a well-stoppered bottle, together with several times its volume of concentrated sulphuric acid, heated to 50° to 60°, with which it is violently agitated. This treatment is repeated if desirable (weak Nordhausen acid being with advantage substituted for the concentrated sulphuric acid), and the residual hydrocarbon is separated, steam distilled, and then measured. The amount thus obtained should not exceed from ½ to 1 per cent. of the original bulk of turpentine. This treatment with concentrated acid affords a check on the previous determination.

If American petroleum spirit be thus treated it suffers comparatively little loss, so that the amount of hydrocarbon above 1 per cent. represents the *minimum* amount of petroleum spirit in the turpentine. The spirit from Scotch petroleum contains a very much higher proportion of hydrocarbons alterable by sulphuric acid, and therefore cannot be satisfactorily estimated.

To confirm the presence of petroleum spirit, the turpentine should be distilled. Petroleum spirit commences to distil at a temperature which may be above or below that at which turpentine boils, according to its quality, but always distils within comparatively wide limits of temperature; turpentine commences to boil near 160°, and almost entirely passes over below 180°.

The presence of rosin spirit also affects the boiling point in a similar manner. Evidence of the presence of this adulterant is also afforded by the increased yield of hydrocarbons on treatment both with 4:1 and concentrated sulphuric acid, as rosin spirit also yields a cymene and paraffinoid hydrocarbon on treatment with 4:1 acid. The cymene from rosin spirit being isomeric with that from turpentine, proof of the presence of rosin spirit can be obtained by the detection of its cymene, but this is a somewhat delicate operation.

Addendum.—The method above described is also available for the analysis of solvent naphtha from coal tar and similar products; it is, in fact, the only method which is capable of affording results which approach exactness. The problem is by no means so simple, however, as the coal tar product itself contains, besides benzene and its homologues, basic bodies, hydrocarbons alterable by diluted sulphuric acid, and paraffins. Until, therefore, a considerable number of genuine samples have been examined, the method is chiefly of value as a qualitative test.

THE FIG TREE.*

During a lengthened stay in Naples and attendance at the Zoological station of that city, Count H. zu Solms-Laubach, assisted by Dr. P. Mayer, one of the staff of the institute, and by Baron Valiante, made a special study of the origin, domestication and cultivation of the fig-tree (*Ficus carica*, L.), the result of which he has published in the form of a pamphlet, 'Die Herkunft, Domestikation, und Verbreitung des gewöhnlichen Feigenbaum, Von H. Grafen zu Solms-Laubach. Göttingen, 1882.' The work is especially devoted to the study of the history of the fig-tree, and the operation of caprification, which, as is known, consists of hanging the fruit of the wild fig upon the cultivated tree, receives considerable attention. Perhaps it will be as well to mention here, for the benefit of some less acquainted with the subject, that the fruit of the wild fig is hung upon the cultivated tree by gardeners, in order that the insect which lives in the wild may enter the cultivated fruit, which they think results in preventing the figs from falling off, hastens their maturity, and improves their taste. Count Solms-Laubach begins by mentioning that already in ancient times two distinct varieties of fig-trees were clearly distinguished, the fruit of the first of which is sweet, succulent and eatable, that of the other remaining hard and milky until it attains a very imperfect maturity, without the least formation of sugar, and then quickly dries up. Count Solms-Laubach distinguishes the first species by the name of fig-tree, the other by the name of caprificus, or as it is called in the Neapolitan dialect, "profico." The caprificus (or wild fig-tree) usually bears fruit thrice, the cultivated fig-tree twice a year. The caprificus in the interior of its figs has both male and female flowers; the fig-tree usually only female. It is the female flowers of the caprificus fig which contain the insects that serve for the operation of caprification. Both the caprificus and the fig-tree are obtained from sowing the seed of the cultivated fig; but as the quality in such cases is generally very bad, propagation is exclusively carried on by shoots. The curious insects developed in the caprificus flowers, and called *Cynips Psenes* by Linnæus, but now named *Blastophaga grossorum*, were already known to the ancients as a means of caprification. These insects belong to the order of Hymenoptera. The females are winged, the males wingless. In Naples, where the author made the greater part of his studies, the wild figs produced at different seasons of the year are respectively named "mamme," "profichi," and "mammoni;" and it is from the first of these, the so-called mamme (which are the earliest harvest of the caprificus and ripen in April), that the insects which have wintered therein issue in spring in order to lay their eggs in the fruit of the second harvest, the so-called profichi, which ripen in June. When this has taken place—a very few insects, thanks to their great productiveness, are able to fill numerous flowers with their eggs—the mother insects die; in May the larvæ, and in June the perfect insects are formed, and meanwhile the fruit of the third harvest, the so-called mammoni, which ripen in August and September, are ready to receive the female Blastophagæ. From these mammoni, finally, the brood wanders into the mamme in order to winter, and thus the chain of events is completed, and in the following spring the laying of eggs in profichi is recommenced. Let us now see what happens when the female Blastophagæ, instead of entering the figs of the caprificus, lay their eggs in those of the cultivated fig-tree. The insects, indeed, perform the operation, but are unable to lay their eggs in the proper place (for reasons shown in the pamphlet, but too detailed to be mentioned here), and the progeny, therefore, never develops. Nevertheless the entrance of the insects has a most important influence; they carry with them into the fig with exclusively female flowers the pollen of the male caprificus flowers, and thus cause the formation of seed. Our author describes the Blastophaga as a small black insect issuing between the scales of the ripe fruit in June. Having arrived outside, it suns and dries its wings, and cleans its hairy body with its feet to rid itself of the pollen which adheres to it so thickly that it looks as if powdered. If one opens a wild fig at the proper time, a large number of these insects are seen running about, evidently seeking to escape. The wingless and

* From the *Daily News*.

helpless males are distinguished by a bright amber colour. When the insects pentrate the figs of the young profichi to lay their eggs, they frequently lose their wings, so great is the effort needed. Count Solms-Laubach often found whole bunches of torn-off wings, where many females had entered the same figs. They generally die after laying their eggs, while seeking their way out. Opinions are divided as to the efficacy of caprification. By some it is considered advantageous, while others regard it as injurious. Count Solms-Laubach gives his verdict as follows:—"Caprification is an operation, traditionally preserved from generation to generation in the same form, which, once necessary, is now scarcely useful, but the scientific importance of which as a means of determining the changes experienced by our cultivated plants in the course of years, cannot be too highly valued."

After deciding the geographical extent of the cultivation of the fig-tree, the author calls attention to the curious fact that caprification is not always practised where the insect is found. In Greece and its islands, in Sicily and Naples, in Southern Spain and Portugal, in North Africa and Syria, and Asia Minor, it is generally introduced; but is not practised in middle and North Italy, the Tyrol, Sardinia, Corsica, the South of France, Northern Spain, the Canaries and Azores, nor in Egypt. Fossil remains prove that the *Ficus carica* was spread over the whole Western portion of our present civilized world in pre-historic times, and that it existed also in Greece and in Asia Minor cannot be doubted, in spite of insufficient proof. In France the quaternary district in which it existed exceeded in extent the present district of cultivation. The author believes, with Lloyd, that the fig-tree had died out in the whole of the Western world, and was only reintroduced in the progress of civilization. He finds the different species so similar that a common origin cannot be doubted. Western Asia and North Africa are named as the fatherland of this origin, but without sufficient proof. The author comes to the conclusion that the fig-tree had an equatorial fatherland, in contrast to the circumpolar fatherland of the vine, and finds the most favourable conditions for such an origin in the Punjaub, Beluchistan, and South Persia, as well as in the border terraces of Abyssinia. From the circumstance that probably the invention of caprification will have gone hand-in-hand with the domestication of the fig-tree, and that the former operation is carried on now exactly as it was in ancient times, and also because the nation which invented caprification must have been tolerably far advanced in civilization, the author believes that the cultivation of the fig-tree commenced at a single point, and thence spread to the rest of the world. To which nation, then, do we owe it? It is proved by ancient authors that the domestication of the fig-tree was known in Greece in the ninth century, B.C. The Bible, and especially the Semitic name of "ti'n," a word belonging to the dialect of the Bahrâ race, leads us to Arabia as the mother-land of domestication and thence probably it spread to the Semitic peoples of Syria. These commercial nations having once possessed the tree, it was natural that its cultivation should spread. The Greeks will have received it from the Phœnicians, as probably also will North Africa, Southern Portugal and Spain, Sicily and Malta; and many facts speak for such a direct introduction. In Italy we find the curious circumstance that caprification is practised in the south, but not in the north. The contrast was so great that even in the eighteenth century the North Italians were not aware that their southern countrymen made use of caprification. Count Solms-Laubach comes to the very interesting conclusion that the Romans received the fig-tree direct from the Phœnicians (of which the name *Ficus* is cited as a proof), but only the tree and not the practice of caprification was known to the Semitic races; while caprification was independently introduced into South Italy by the colonizing Greeks.

The last chapter of the pamphlet is devoted to a short study on the sycamore (*Sycamorus antiquorum*, Miq.), to which the author's attention was drawn by the many analogies between that tree (in the fruit of which similar insects are found) and the fig-tree.

VEGETABLE SUBSTITUTE FOR RENNET.*

BY SIR J. D. HOOKER.

Mr. Stormont, Superintendent of the Government Farm, Khandesh, reported, May 10, 1880:—"Cheese-making is a branch of agricultural industry altogether unknown in this district, and but imperfectly understood in any part of India; yet there seems no reason why it should not be successfully practised."

Commissioner E. P. Robertson, minuted upon this, June 10, "Cheese to be saleable amongst the natives of this country should be made with some vegetable rennet. Natives would not touch cheese made with ordinary rennet, and I am convinced that good cheese cannot be made without the use of some rennet. If a good vegetable rennet could be procured the curd cheeses could be made; they would be cheap, and ryots would soon find a ready sale for them."

These facts having attracted my attention I consulted Mr. A. H. Church, formerly Professor of Chemistry in the Royal Agricultural College, Cirencester, but who has taken up his residence at Kew, and is now Professor of Chemistry to the Royal Academy. This gentleman very kindly made some experiments on curdling milk, with calcium chloride and with vegetable acids. He arrived at the conclusion, however, that though in the laboratory good results could be obtained they depended too closely on careful attention to the conditions of the process to afford a workable method for everyday use in India. Meanwhile, I had turned my attention to some suitable vegetable "rennet." Surgeon-Major Aitchison, while engaged at Kew, in working up his Afghan collections, under instructions from the Government of India, suggested a well-known North-West Indian plant (*Puneeria coagulans*), as possessing the desired qualities.

The plant in question is one of the best-known plants in Scinde, Beluchistan and Afghanistan. "It bears the name of Puneer-bund (cheese-maker), from its being used by the Beloochies and Afghans in making cheese (puneer) as a substitute for rennet."

I communicated this information to the India Office. As will be seen from the following extract from Mr. Stormont's report for 1881, the suggestion was immediately acted upon with very gratifying success.

"During the year a good deal of attention has been devoted to dairy experiments, especially the making of cheese after the practice of Italy and Switzerland. The Commissioner, C. D., pointed out that, before cheese-making can ever become an industry of the ryots, some vegetable substance must necessarily be found to take the place of the animal rennet used in European countries.

"In connection with this difficulty, Surgeon-Major Aitchison brought to the notice of the authorities at Kew that the fruit of *Puneeria coagulans*, a shrub common in Afghanistan and Northern India, possesses the property of coagulating milk.

"A quantity of the dried capsules of this plant was accordingly obtained, and part of it tried here, and found to be most suitable for the purpose. Being a member of the poisonous nightshade family, its safety was in the first place carefully and gradually tested. It has been ascertained that an ounce of the pounded capsules in a quart of water is a very suitable strength for use; a tablespoonful of this decoction coagulates a gallon of warm milk in about half an hour. Seeds of the plant sown have germinated freely, and their further progress will be specially reported upon."

* From the 'Report on the Royal Gardens at Kew.'

The anxiety as to the botanical position of *Puneeria* amongst the *Solanaceæ* has, I think, no solid foundation. The genus *Puneeria* is now reduced by botanists to *Withania*. This is a member of the tribe *Solaneæ*, which appears to be generally free from the poisonous principles so characteristic of *Atropeæ* and *Hyoscyameæ*. It abounds, in fact, in plants producing fruits which daily experience shows to be innocuous, such as the tomato, aubergine, capsicum, *Cyphomandra* and cape gooseberry.

THE DILUTION AND MIXTURE OF ACIDS, ALCOHOL, SOLUTIONS OF SALTS, ETC.*

BY TH. J. WRAMPELMEIER, PH.C.

There have appeared, at different times, rules and formulæ for the dilution of alcohol and acids. Some of them are very simple for particular cases, but are either not applicable to the more complicated cases, or, in their application, involve more or less tedious algebraic operations. I do not remember having seen any rule that is so simple or of so nearly universal application as the one I have used for some time, and which I will give below.

I started with the following consideration. It is evident that, if we mix 100 grams of 75 per cent. (by weight) alcohol with 100 grams of 25 per cent. (by weight) alcohol, the product will be 200 grams of 50 per cent. alcohol, because the first 100 grams contain 75 grams absolute alcohol, and the second 100 grams contain 25 grams—total 100 grams in the mixture whose weight is 200 grams, *i.e.*, 50 per cent. Now the 100 grams 75 per cent. alcohol contain 25 grams more absolute alcohol than is necessary to make it a 50 per cent. alcohol, whereas the 100 grams 25 per cent. alcohol *lack* 25 grams absolute alcohol of being the strength 50 per cent. Suppose we are to make 50 per cent. alcohol out of both the 75 per cent. and 25 per cent. alcohols, we add enough of the 75 per cent. alcohol to the 25 per cent. alcohol, so that the excess over 50 per cent. of the former is just sufficient to make up the deficiency below 50 per cent. of the latter, or *vice versâ*. Accordingly, in mixing two alcohols of different per cent. strength to make one of intermediate strength, the *excess* of absolute alcohol in the one (over what is necessary to make it the desired strength) must be equal to the *deficiency* of absolute alcohol in the other. Let

P = per cent. strength (by weight) of the stronger.
p = per cent. strength (by weight) of the weaker.
W = weight of stronger.
w = weight of weaker.

Then $P \times W$ = amount of absolute alcohol in the stronger alcohol, and $(P - p')\,W$ = excess of absolute alcohol above what is required to make it strength p'. Similarly $(p' - p)\,w$ = deficiency of absolute alcohol in the weaker alcohol (below what is necessary to make it strength p'). To make the mixture strength p', we must mix them, so that $(P - p')\,W = (p' - p)w$, from which we get the proportion—

$$(P = p') : (p' - p) : : w : W,$$

and our rule which is as follows:—

Having two solutions of the same substance and different per cent. strength (by weight) to make a solution of intermediate strength, mix them in the inverse proportion of the differences between their percentage strength and the percentage strength of the required mixture.

Or, having two solutions strength P (for the stronger) and p (for the weaker) to make one of intermediate strength, p′, mix them in the proportion of p′ - p of the stronger to P - p′ of the weaker.

When, instead of the weaker solution, water is to be used, as in the dilution of alcohol or acids, p becomes zero, and the proportion becomes p' of the solution to $P - p'$ of water. The following cases may arise:—

* From *New Remedies*, January, 1883.

(1) Given the weight of the stronger, how much of the weaker will be required to make the mixture of the required intermediate strength? The proportion is—
$p' = p : P - p' : : W : x$ = weight required, or if, instead of the weaker solution, water is to be used,

$$p' : P - p' : : W : x = \text{weight of water required.}$$

Example.—Having 100 kilos nitric acid, strength 70 per cent., how much nitric acid, strength 10 per cent., must be added to this to make an acid strength 50 per cent.?

$$(50 - 10) : (70 - 50) : : 100 : x.$$

$x = 50$ kilos = weight of 10 per cent. acid required.

If water is to be used instead of the 10 per cent. acid,

$$50 : (70 - 50) : : 100 : x.$$

$x = 40$ kilos = weight of water required.

(2) Given the weight of the weaker, how much of the stronger will be required? The proportion is—

$$(P - p') : (p' - p) : : w : x.$$

x = weight of stronger required.

Example.—Having 100 lbs. alcohol, strength 23 per cent. (by weight) to make 45 per cent. alcohol, how much 93 per cent. alcohol will be required?

$$(93 - 45) : (45 - 23) : : 100 : x.$$

$x = 45{\cdot}8$ lbs. = weight of 93 per cent. alcohol required.

(3) It is desired to make a certain quantity of the solution of intermediate strength, how much of each the stronger and the weaker will be required?

Let a = weight of alcohol (strength p') to be made,
and x = weight of stronger alcohol (strength P) rerequired,
then $a - x$ = weight of weaker alcohol (strength p) required.

We have $(P - p') : (p' - p) : : a - x : x$;
from which $(P - p) : (p' - p) : : a : x$.
x = weight of stronger solution required.
$a - x$ = weight of weaker solution required.

Example.—To make 10 kilos of alcohol, strength 85 per cent. (by weight), how much of each 91 per cent. and 45·5 por cent. alcohol is required?

$$(91 - 45{\cdot}5) : (82 - 45{\cdot}5) : : 10 : x.$$

$x = 8{\cdot}7$ kilos = weight of 91 per cent. alcohol required.
$10 - 8{\cdot}7 = 1{\cdot}3$ kilos = weight of 45·5 per cent. alcohol required.

If water is to be used instead of the 45·5 per cent. alcohol, p becomes zero, and we have—

$91 : 85 : : 10 : x = 9{\cdot}34$ kilos 91 per cent. alcohol.
$10 - 9{\cdot}34 = 0{\cdot}66$ kilos water required.

(4) Again, we may have three or more solutions which we desire to mix, in order to obtain a solution of certain strength, as, for instance, it may be desirable to use up several lots of recovered alcohol in the preparation of an alcohol of certain strength. It is evident that a sufficient quantity of the strongest alcohol or alcohols must be used, so that the excess of absolute alcohol above the required per cent. will equal the sum of the deficiencies of absolute alcohol of the weaker alcohols.

Let P = per cent. strength of strongest alcohol.
W = its weight.
p' = per cent. of required alcohol.
p'' = per cent. of a weaker alcohol.
w = its weight.
p = per cent. of the weakest alcohol.
w' = its weight

Then $(P - p')\,W = (p' - p'')\,w + (p' - p)\,w'$.

Example.—(*a*) You have 10 kilos alcohol strength 10 per cent. (by weight) which you desire to bring up to 50 per cent., using therefore 2 kilos of 25 per cent. alcohol and a sufficient quantity of 90 per cent. alcohol. How much of the last will be required? Substituting $P = 90$, $W = x$, $p' = 50$, $p'' = 25$, $w = 2$, $p = 10$, $w' = 10$, and

$$(90 - 50)\,x = (50 - 25)\,2 + (50 - 10)\,10.$$

$x = 11{\cdot}25$ kilos 90 per cent. alcohol required.

(*b*) You desire to make 10 kilos diluted alcohol, U.S.P. (45·5 per cent. by weight), using 2 kilos 40 per cent. alcohol. How much 91 per cent. alcohol and how much water will be required?

$$P = 91$$
$$p' = 45{\cdot}5$$
$$p'' = 40$$
$$p = 0$$
$$w = 2 \text{ kilos}$$
$$W = x,$$

then $w' = 10$ (amount to be made) $- 2$ (weight of w) $- x$ (amount of W)

$$(91 - 45{\cdot}5)\,x = (45{\cdot}5 - 40)\;2 + 45\;(10 - 2 - x)$$

and $x = 4{\cdot}1$ = weight of 91 per cent. alcohol required.

$10 - (2 + 4{\cdot}1) = 3{\cdot}9$ = weight of water required.

Other and different cases might be presented, but the above will show the general application of the rule, not only to the dilution of alcohols, acids, etc., but also to the bringing up of the strength of solutions, as, for instance, when it is necessary to fortify a wine.

THE ADULTERATION OF COCHINEAL.*

BY DR. JULIUS LOEWE.

Commercial cochineal appears in two forms, according to the method used in killing the insects, namely either as dull grains covered with a white dust, or as shining, blackish-brown grains, free from dust.

The whitish variety has long been known to have been subject to adulteration, by being weighed with 10 to 12 per cent. of mineral substances—such as sulphate of barium, carbonate or sulphate of lead, chloride of lead, talcum, etc.,—mostly all such substances as combine a high specific gravity with small bulk. The amount of such impurities may generally be detected by estimation of the ash of the cochineal: the unadulterated drug yielded not much over 0·5 per cent. of ash.

On account of the frequent adulteration of the white variety, purchasers fell into the habit of demanding the dark, undusted kind, which appeared to offer a better guarantee of purity. But even this has, of late years, been frequently found adulterated with various substances, as binoxide of manganese, sulphide of lead, ferric oxide, etc.

The method of adulteration, in this case, is generally so perfect that even a good judge will often be unable to detect it by mere inspection. It was, therefore, of interest to ascertain by what means this adulteration is so skilfully performed, and a series of experiments soon led to the discovery of the method.

To moisten cochineal with a cold adhesive liquid, such as solution of gum, etc., and then to add the weighing material, does not lead to the desired result, since the accompanying water extracts colouring matter from the cochineal, which imparts a red colour to the added mineral matters, and thereby detracts from the appearance of the article. Besides, the foreign substance does not penetrate sufficiently into the ridges of the insect, and only adheres to it very superficially, so that it may be easily recognized.

By the following method, however, the weighting may be done perfectly, and it is this method which is used, on a large scale, by the adulterators.

Cochineal is cautiously exposed to an atmosphere of steam, great care being taken that it does not come in contact with any water of condensation, but be merely enveloped in steam. The grains thereby swell up to several times their volume, and from their ridges exudes a very small amount of strongly adhesive red juice which serves as a glue for the weighting material to be added. As soon as the grains cease to increase in bulk, they are removed from the atmosphere of steam, and transferred in a suitable vessel—flask, drum, etc.—when the mineral substance is added (up to 10 or 12 per cent.), and the vessel is set in rotary motion until the material is completely taken up by the adhesive juice adhering to the insects. The grains are then removed and dried in a current of warm air, when they contract to their previous volume, and retain the weighing material concealed within their folds and ridges. By this method white mineral substance afterwards added remains uncoloured, and the dark substances previously incorporated remain undetected.

It appears, therefore, to be, under all circumstances, advisable to purchase only such cochineal as has been found pure, on estimating the ash. It is true, that this might also be made nugatory, if organic substances were used as adulterants, for instance, flour as "white substance," and asphaltum as "dark substance." Yet, if this were done, the real purpose of adulteration would not be attained, since these substances have but a small specific gravity compared with their volume, and would, therefore, not likely be chosen.

* From *Dingler's Pol. Journ.*, 246, 90. Reprinted from *New Remedies*, January, 1883.

EFFECTS OF IRON ON DIGESTION.*

In an inaugural dissertation published at Berlin, Dr. A. Düsterhoff records the results of some experiments bearing on this subject. One gram of fibrin was added to 20 c.c. of artificial gastric juice, and during digestion equivalent quantities of various preparations of iron were also added. At the end of the process the undigested fibrin was dried and weighed, and the quantity of soluble syntonin in the solution was also estimated. The time of digestion was in one case three hours, ten minutes, in another it was seven hours and a half. In the first series 0·0614 gram of metallic iron was in each case added, in the form of pyrophosphate, perchloride and protolactate respectively. In the second series, various other preparations were used, the amount of metallic iron being in each case equivalent to 0·0077 gram. Other experiments were made with white of egg; the amount of albumen precipitated by boiling after digestion being estimated. The outcome of the experiment is—that the organic salts of iron seriously hinder and check peptic digestion. Probably the hydrochloric acid of the gastric juice displaces the organic acids from the iron salts and so is used up; while the free organic acids in the digestive fluids are far less powerful digestive agents than the hydrochloric acid. But this cannot be the only cause at work, for perchloride and phosphate also tend to hinder digestion. Even reduced iron has a similar effect, for it partially dissolves in the juices, forming chlorides. Its solubility, like that of the phosphate, is however not very great. Ferrous salts seem to interfere less with digestion than ferric salts.

EXTRACT OF MALT WITH QUININE.

Extract of malt	195 parts.
Hydrochlorate of quinine	1 part.
Glycerin	4 parts.

Dissolve the hydrochlorate of quinine in the glycerin, and mix it with the extract of malt.

This preparation should be freshly made when wanted for use.—*New Remedies.*

EXTRACT OF MALT WITH IODIDE OF IRON.

Extract of malt	96 parts.
Solution of iodide of iron	4 parts.

Mix them.

The solution of iodide of iron is prepared by bringing together 3 parts of iron with 8 parts of iodine, and enough water to make 40 parts, when the reaction is completed and the liquid filtered. Twenty parts of this solution contain 5 parts of ferrous iodide.

This preparation should be freshly made when wanted for use.—*New Remedies.*

* From the *Centralb. f. med. Wiss.*, November 11, 1882. Reprinted from the *Practitioner*, January, 1883.

The Pharmaceutical Journal.

SATURDAY, JANUARY 20, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ALKALI INDUSTRY.

THE history of the manufacture of soda and potash salts has been marked by some very unexpected results, which have not always been profitable to those most closely connected with the industry. When nearly a century ago the French pharmacist, LEBLANC, was engaged in working out the process for manufacturing soda crystals ever since associated with his name, he little anticipated that whilst his labours would bring little more than an almshouse and a pauper's funeral to himself, they would lay the foundation of a most important industry, which, during a long series of years was fated to be carried on principally in a country which was then the greatest rival of his own. So, too, another French pharmacist, BALARD, after many years of patient investigation and experiment, had only just succeeded in elaborating remunerative processes for obtaining potash salts from the salt marshes of his native district, when all prospect of monetary profit from them was dispelled by the announcement of the discovery of enormous saltine deposits in North Germany. On the other hand, when at various times a due regard to the public health and convenience has imposed upon the soda industry conditions which at first seemed to be unbearable, the real outcome has been fresh "leaps and bounds" of prosperity, continually giving new force to the adage that "Necessity is the mother of invention." It has been understood, however, for some time past, that an ebb in the tide of prosperity has become manifest; manufacturers are said to have been carrying on operations without profit, or even at a loss, whilst, this notwithstanding, the Board of Trade returns just issued for 1882 once more show a decrease in the export of alkali from the United Kingdom. Under such circumstances any observations upon the subject from so experienced a manufacturer and chemist as Mr. WALTER WELDON would have been sure to have attracted attention; but it may be truly said that a paper on the present condition of the soda industry, read by him a few evenings since before the London Section of the Society of Chemical Science, of which he is the President, is one of the most interesting and surprising contributions to the history of applied science that has yet been made.

Mr. WELDON commenced with a gloomy picture of the condition of the LEBLANC soda industry in this country at the present time. On the Tyne, out of twenty-five works that were in operation a very few years ago only thirteen are now worked, eight of the others having been actually dismantled in despair of ever again being able to manufacture soda in them by the LEBLANC process except at a loss. Even in Lancashire, where the manufacture is carried on rather more advantageously in respect to supply of material and nearness to markets, several alkali works are standing still, and few are working up to their full capacity for production. In Belgium the manufacture of soda by the LEBLANC process has absolutely ceased, whilst in France, Germany and Austria, where both soda and chlorine products are protected by high duties, it stands in considerable peril. One of the principal factors to this state of affairs has been the phenomenal growth of the soda manufacture by the ammonia process, which, as Mr. WELDON puts it, "has come upon the makers of LEBLANC soda almost like a thunderbolt out of a clear sky." A dozen years ago the total quantity of soda manufactured by this process barely amounted to one thousand tons in the year, but now it is estimated that on the Continent alone it reaches one hundred and ten thousand tons annually, and it is still rapidly augmenting. No doubt this contrast of prosperity and adversity in the two processes is attributable mainly to the fact that—under present conditions as to the cost of sulphur and the price obtained for the chlorine bye-product—when the manufacture of LEBLANC soda is yielding no profit at all, that of ammonia soda is yielding fully £1 per ton. As if these circumstances were not sufficiently adverse, the makers of the LEBLANC process are now threatened by a new and even keener rivalry from another quarter. It appears that Spanish and Portuguese pyrites are capable of yielding, besides sulphur and iron, about 3 per cent. of copper, and small quantities of the precious metals, sufficient to more than repay the cost of extraction. When most of the sulphur has been burnt off from the pyrites for sulphuric acid, the residual "burnt ore," or "pyrites cinders," is now treated by the wet way for the extraction from it of copper, and in most cases of gold and silver also, and after these have been removed there remains an almost pure oxide of iron—known as "purple ore"—which finds a ready sale for various purposes in connection with the manufacture of iron and steel. Moved by these considerations, and by the fact that French pyrites does not contain copper, the Rio Tinto Company—one of the great companies dealing in Spanish pyrites—has promoted a subsidiary company, with a capital of £1,200,000, for carrying on in France and other countries the manufacture of soda by the LEBLANC process, using Spanish pyrites in the operations. This new Company, however, will not rely for its profits either upon soda or chlorine, but on copper and oxide of iron. Soda and chlorine will be simply extra products in connection with the first stage of converting pyrites into pyrites cinders, which the Company will be content to sell at the bare cost of manufacture if no better price can be obtained.

Notwithstanding the advantages attached to the ammonia process it was at one time thought that these would be limited by the increased cost of ammonia, consequent upon the larger consumption, and by the rise in the price of hydrochloric acid due to the decrease in its production through the non-utilization of chlorine in the ammonia process. So far, however, as ammonia is concerned, the prospect of its cost affecting the question is fading into the remote distance, for here again the occasion has been productive of the application of chemical and mechanical skill. The collection of the ammonia formerly allowed to escape from coke ovens has been remuneratively effected, whilst the application of the same idea to blast furnaces has been sufficiently developed to render probable the early appearance of ammonia from this source in the market. As to hydrochloric acid, with the decrease in its production and the probable consequent increase in its price came attempts to recover the chlorine from the residual calcium chloride which has hitherto been a waste product in the ammonia process; but this has not yet been effected economically.

In the face of all this, Mr. WELDON asks, "How are the English LEBLANC soda manufacturers to continue to live?" The outlook is undoubtedly gloomy; but Mr. WELDON sees some breaks in the clouds in the promise of a more complete utilization of all the raw materials. There appears also to be a probability of an early considerable fall in the price of pyrites; but at the most this would not be likely to make up for more than about one-third of the twenty shillings per ton which is said to be the present difference in the cost of manufacture by the two processes. But there are especially two resources within reach, which he considers to be probably sufficient to turn the tables upon the ammonia process and make the old LEBLANC process the cheaper of the two. These are sulphur recovery and cheaper fuel. The cost of Sicilian sulphur, delivered at Marseilles, is about £5 per ton, and the amount which will have to be made up after the anticipated fall in the price of pyrites to equalize the cost of soda production under the two processes is estimated at about 12*s.* per ton of alkali. By recent modifications in the SCHAFFNER and HELBIG sulphur recovery process it is confidently hoped that the whole of the sulphur may be recovered from soda waste in the free state, and as this would amount to 6 cwt. per ton of soda, the profit on this recovered sulphur should amount to at least 2*s.* per cwt. The problem, therefore, may be stated thus: in order to become masters of the sulphur market, and at the same time to gain by the recovered sulphur the required profit of 2*s.* per cent., it will be necessary that English soda makers should be able to recover sulphur at a cost not exceeding £2 per ton. This, it is satisfactory to learn, Mr. WELDON thinks they will be able to do eventually, though not at first. With respect to economy of fuel, a vast revolution is hinted at. The suggestion is that "the soda maker should entirely cease to use raw "coal as fuel, but should convert all his coal into "coke, collecting for sale the oil and ammonia "evolved during its conversion into coke, and him-"self using for heating purposes the gases evolved "during the coking operation and the coke itself." It is believed that in the Newcastle district, where some two millions of tons of small coal, rich in its yield of oil, is produced annually, and is almost a waste product, the soda maker would be enabled thus to get his fuel for nothing.

It is evident from what has already been said that this paper is singularly rich in suggestive matter, which promises to exercise an important influence on the future of other industries besides the soda manufacture, and we hope to have an early opportunity of printing it *in extenso* in the pages of this Journal.

"HALF AND HALF" DISPENSING.

FOR some time past an active correspondence has been going on in the pages of one of our medical contemporaries as to the advisability and possibility of medical practitioners leaving the dispensing of medicines to pharmacists. We are quite content to note the manifest advance of opinion in the direction that as far as possible pharmacists should be entrusted with the work for which they have been specially trained, and for which, as pointed out by one who speaks with the authority of a medical examiner, medical students under present conditions have scarcely any training at all. But there has also been an ample exhibition of the old bugbears—counter prescribing, exorbitant charges, and even the assumption, as by a writer in the *British Medical Journal* last week, that dispensing is best conducted under the supervision of the prescriber. A case reported on p. 598 of this Journal furnishes a cruel commentary upon these objections. Even "counter prescribing" for simple ailments will pass muster by the side of prescribing for a patient through the intervention of a domestic and a messenger, whilst the dispensing by a housekeeper of "half and half" from two out of a row of bottles is perfectly grotesque. We do not mean to insinuate that this case is typical of medical dispensing, but it is by no means singular, and we feel justified in referring to it for the purpose of enforcing the risks that are inseparable from the practice, not at all unknown, of drawing general conclusions from exceptional cases.

"Polarimeters and their Practical Application" is to be the subject of a Lecture by Mr. C. O'Sullivan, to be delivered under the auspices of the Council of the Institute of Chemistry, in the room of the Chemical Society, Burlington House, on Thursday next, the 25th inst. There are to be experimental illustrations.

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On Tuesday last, at the Royal Institution, Professor C. W. Williamson began a course of five lectures on "The Primeval Ancestors of Existing Vegetation, and their Bearing on the Doctrine of Evolution," and on Thursday, Professor Dewar began a course of nine lectures on "The Spectroscope and its Applications." An abstract of Professor Williamson's first lecture will be found on p. 594.

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On Thursday evening next, the 25th inst., Mr. C. F. Cross is to read a paper before the Applied Chemistry and Physics Section of the Society of Arts, on the "Technical Aspects of Lignification."

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On Wednesday evening, Mr. W. K. Burton brought before the Society of Arts the important subject of the sanitary inspection of houses, in which he pointed out the damages that might arise from the negligent or unskilful carrying out of the best conceived sanitary arrangements and the necessity for provision being made that such work be supervised by competent persons.

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There seems to be some prospect at last of the proposed amendment of the law regulating the practice of pharmacy in France occupying the attention of the Legislature. A Bill brought forward in the Chamber of Deputies by M. Heppolyte Faure, formerly a pharmacien, having passed the ordeal of the preliminary committee, and been reported as fit to be taken into further consideration. The next stage is to refer the Bill to a special committee nominated by one of the bureaus of the Chamber.

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Referring to the importance of the crisis, the *Répertoire de Pharmacie* makes some pertinent remarks on the necessity of union among French pharmacists that may find an additional application in this country at the present juncture. It says: "For many years past we have assisted at a heart-breaking spectacle. Many of our brethren, obedient to their personal sentiments, aspirations and wants, have been pleased to criticize the various Bills that have been submitted to the public authorities; none of them has sufficiently borne in mind that a practical result can never be arrived at in proposing to abolish that which exists without stating positively what it is desired should replace it. Some, it is true, have indicated their idea of a pharmacy law, but many among them have not sufficiently reflected upon the inconveniences and dangers that would arise should their ideas prevail. The counsel which we have to give may be stated briefly: Be united, and, above all, be practical."

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M. Eugène Lebaigue, who for the last ten years has ably edited the *Répertoire de Pharmacie*, retired at the close of the year and his place has been taken by M. C. Thomas, one of his former *collaborateurs*.

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Two papers have just been issued by the Board of Trade containing returns relating to gas undertakings in England and Wales. These show that, during the year 1881, 6,365,336 tons of coal were carbonized to produce 63,345,300,497 cubic feet of gas, and that of this quantity 57,876,326,386 cubic feet went to supply the wants of 1,581,654 consumers or in the lighting of 293,379 public lamps. The capital and loans authorized amount to £60,577,736, of which £44,626,205 has been paid up or borrowed. The proportion of this business carried on by local authorities is about two-sevenths.

* * * *

The Accounts relating to Trade and Navigation of the United Kingdom just issued, show that the "peruvian bark" imported during the year 1882 weighed 138,763 cwts., and was of the estimated value of £1,781,482, whilst there was exported only 80,014 cwts., valued at £903,332. This would leave a good margin for the quinine manufacturers.

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The bellicosity that appears to be an essential concomitant of water analysis has invaded a new field. Concurrently with the setting in of the winter season there has been, as usual, an increase in the proportion of organic matter present in the London water supply, and in a report quoted by the Registrar-General the water supplied by four out of five of the London companies is pronounced for this reason "unfit for drinking." Messrs. Crookes, Odling and Tidy, referring to this in the report which they send periodically to the Local Government Board, say: "We take upon ourselves to assert that the analytical results set forth in the report, which are not appreciably different from our own, do not afford ground for any such appalling statements." The public may well be excused for wondering which of these important public departments receives sound scientific advice and which is misled.

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The *Lancet* mentions a case where an application by a ratepayer for a copy of the report of an analysis which had been made by order of the Local Sanitary Authority, on the well water used by his household, has been refused on the ground that it would "establish a dangerous precedent." An appeal to the Local Government Board only elicited an opinion that the point was one upon which the local authorities must use their discretion.

* * * *

According to the *Newcastle Daily Chronicle* the Public Analyst for the county of Durham is very dissatisfied with the recent magisterial decision in the sweet spirit of nitre case reported on p. 500. In his quarterly report he expresses his surprise and indignation that such a certificate should have been sent from Somerset House, and that the South Shields magistrates should have acted upon it. He maintains that the London Pharmacopœia has given place to the British Pharmacopœia and says that on all occasions he tests drugs submitted to him by the tests contained in the latter work.

* * * *

A medical contemporary, which a fortnight since referred to a "Russian remedy" for heart disease "which rejoices in the name of *Convallaria majalis*," last week made the astounding discovery that the plant is "the familiar lily of the valley," and, under the caption of "Nothing New under the Sun," has published the fact for the information of "those of our readers whose botanical knowledge does not go beyond the plants of the Pharmacopœia."

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The sixth meeting of the present session of this Association was held on Wednesday, January 10, in the Pharmaceutical Rooms, 119, George Street. Mr. Peter Boa, President, in the chair.

The minutes of the previous meeting having been read and adopted, the Chairman explained that Mr. J. D. Robertson was unable to be present and in his absence he called upon Mr. Claude F. Henry to move Mr. Robertson's resolution regarding the sale of patent medicines containing poisons.

Mr. Henry said he regretted Mr. Robertson was unable to be present. He maintained that the sale of poisons by unqualified persons under cover of the patent medicine stamp was a glaring inconsistency and an undoubted public danger. The discussions which are going on both in the pharmaceutical associations and in the medical and pharmaceutical press showed that it only required that the general opinion of those best acquainted with the subject should be brought before the proper authorities in some combined and formal manner in order to bring about a much needed reform. He referred to some remarks made by the President of the Leeds Chemists' Association, which he understood had induced Mr. Robertson to give notice of this motion. As he fully agreed with Mr. Robertson in this matter, he begged to move:—"That this Association resolves to co-operate with all societies which are agreed that the present poison laws should be altered so as to include so-called patent medicines containing poisons and to take steps to bring the matter before the proper authorities."

The motion was seconded by Mr. William Aitken and unanimously agreed to by the meeting.

Mr. J. D. Robertson was appointed to act with the committee in carrying out the resolution.

The members then had an opportunity of examining a most interesting and valuable collection of new drugs, lent for exhibition by Messrs. Thomas Christy and Co., London; living specimens of *Erythroxylon coca, Guaiacum officinale, Theobroma cacao* and *Pilocarpus pennatifolius*; and a collection of microscopic objects, mostly pharmaceutical.

Mr. MacEwan described the more important of the new drugs, remarking that it was a collection of great value and was certainly the most important that had been brought before the Association. It included a series of Mexican drugs, exhibited for the first time in this country, among which the following were noticed:—Capsicum longum, Capsicum cordiforme (Chili mulato), Capsicum cordiforme (Chili ancho), Capsicum speciosum (Chili chilporth), Thevetia icotti, Croton niveus, Lippia citriodora, Ericonia floribunda, and yerba sel pollo. The other specimens included a series of Japanese drugs described by Mr. Holmes, several products of Carica papaya, Euphorbia pilulifera, cola nuts, Duboisia leaves and extract, guaco, Jamaica dogwood, pituri leaves, rusot, erythrina seeds (*Erythrina corolloides*), kombo gumbo bark, etc.

Mr. Hill, in drawing attention to the living specimens, remarked that they were grown in the botanic gardens and were in good condition for the season. The pilocarpus was a seedling plant grown in the gardens from seed brought home by the late Dr. Paterson, of Bahia. The leaves, it was pointed out, were simple not compound. In the case of one of the latest developed leaves, however, there were two leaves showing the gradual transition to the compound imparipinnate leaves characteristic of the fully developed plant. It was mentioned that Dr. Paterson had at the same time brought home some seeds of the goa powder plant (*Andira Araroba*) and these had been successfully propagated, and they had now in the botanic gardens a fine specimen of the plant, which was believed to be the only one in Europe.

Attention was also called to the microscopic specimens.

The President moved that the thanks of the Association should be given to Messrs. Thomas Christy and Co., London, for their collection of drugs, to Professor Dickson for the specimens of economic plants, and to Messrs. Gilmour, Purves, and Thompson, for microscopes and microscopic slides. The motion was cordially responded to by the meeting. A similar compliment was paid to Messrs. Hill and MacEwan for their arrangements and descriptive remarks.

Some further business having been disposed of, the Chairman announced the next meeting for January 31, when a paper on "The Manufacture of Sulphuric Acid," will be read by Mr. John R. Hill, the Secretary to the Association. The meeting then adjourned.

Proceedings of Scientific Societies.

ROYAL INSTITUTION.

By the courtesy of Professor C. W. Williamson we are enabled to publish the following *résumé* of the first of a course of five lectures, which was delivered by him at the Royal Institution on Tuesday last, on—

The Primeval Ancestors of Existing Vegetation and their Bearing on the Doctrine of Evolution.

Lecture I.

The object of the course is to examine each of the principal types of vegetation met with in the older fossiliferous rocks; to trace the links found in the newer rocks, connect those ancient forms with living ones, and finally to ascertain how far the results give support to the Darwinian theory of Evolution. The first great and conspicuous fact is that nearly all the flowering plants (angiosperms) are of very modern geological age, and have no true primeval representatives; hence they are not dealt with in the course. The highest types of vegetation found in the older (palæozoic) rocks belong to the group of gymnosperms, *i.e.*, the coniferous and cycadean plants. They indicate, so far as we know, the most advanced form to which vegetation was developed up to the cretaceous age, with the exception of a small number of doubtful monocotyledonous plants from the triassic and oolitic rocks. This general order of appearance is, so far as it goes, consistent with the demands of Darwinism, since the gymnosperms, associated with the ancient cryptogams, undoubtedly occupy an intermediate position between the latter and the monocotyledons, which in turn, are a less highly developed group than the dicotyledonous group which makes its first appearance at a still later age. This relationship of the gymnosperms to the inferior cryptogams on the one hand, and to the higher phanerogams on the other, is demonstrated by the organization of their reproductive structures. Thus, the pollen sacs of the lower conifers and cycads are little more than the sporangia of some cryptogams, and the contained pollen grains of the former correspond to the microspores of the latter. In like manner the flowers of the same conifers are reduced to elements so simple, viz., a single ovule, that each flower is little more than one of the microspores of the other. Attention to these peculiar relationships will again be called in the concluding lecture of the course.

On turning specially to the conifers we find that most of the well-known living genera, such as Pinus, Abies

Larix, Cedrus, and their numerous allies, made their appearance at a late date in the world's history, viz., along with the flowering exogens. When we descend amongst the older strata we find very different types to prevail. So far as the microscopic aspects of their woody tissues are concerned the most ancient conifers approach the semi-tropical araucarias of the southern hemisphere more closely than they do recent and more northern forms; but besides this general araucarian type we can trace back other special forms. One of the most remarkable of these is the Salisburia or gingko of China and Japan, the leaves of which resemble the leaf of a maiden hair fern much more closely than they do those of other conifers. True Salisburiæ lived in the tertiary age, not only in Europe and North America, but even in Greenland. The oolitic rocks of Siberia furnish a well-marked gingko, and the discovery of the peculiar fruits has shown that the widely diffused oolitic Baierias, long regarded as ferns of the genus Cyclopteris, are in reality Salisburias, and the American permians have furnished a similar type. In the carboniferous and Devonian rocks of Great Britain and America numerous stems and branches abound of the remarkable genus Dadoxylon. Recent researches have made it probable that this, apparently the most ancient gymnosperm, has organic features, linking it with the gingkos, and being the ancestral stock from which they have sprung.

Turning to the great group of the Abietaceæ, it is interesting to find a true cedar in the cretaceous rocks as well as a sequoia, a close relative of the so-called Wellingtonia, the great tree of California. In the oolitic we find a numerous group of conifers, apparently including true representatives of the araucarias as well as cypress-like forms. In the liassic strata, forming the base of the oolitic, we find still more generalized plants, in which the cones resemble those of one modern type, associated with the foliage of another. Descending successively to the Keuper, the Triassic and the Permian beds we meet with a succession of yet more generalized types, leading us still further away from the living ones. In many of these the compact cones of the latter gradually become more elongated and lax until some of them more closely resemble branches clothed with woody foliage rather than true cones. Below the Permian the conifers are only represented by the dadoxylons already referred to.

The other great division of the gymnosperms, the Cycadeæ, presents a very similar history only so far as stem and foliage are concerned; the modern type of Zamia abounds not only through the tertiary cretaceous and oolitic rocks, but are met with even in the Permian strata. As is well known the oolitic age has been designated the age of gymnosperms, hence, the peculiar conifers and cycads of that period undoubtedly constituted its dominant forest vegetation.

On reaching the carboniferous beds the oolitic types have wholly disappeared, their place being taken by a remarkable group of which the genus Cardaites is the typical representative. The male and female inflorescence of these plants has been found in remarkable perfection at St. Etienne, in France, and though these structures differ widely from those of living cycads, there is no reason for rejecting the idea that some of them are the ancestral stocks from which the oolitic types and through them the living forms have sprung. That these plants constituted a very important feature in the carboniferous woodland landscape is shown by the fact that the seeds of numerous genera and species of Cycadeæ are met with in vast numbers both in Europe and North America. Though formerly the cycads were so abundant in the northern hemisphere, even within the arctic circle, they have now entirely abandoned that hemisphere, being only met with south of the equator, where they extend in an almost unbroken zone on the outer skirt of the tropical regions from Australia and New Zealand, through Africa to Central America.

CHEMISTS' ASSISTANTS' ASSOCIATION.

Plant Names.*

BY C. E. STUART, B.SC.

"What's in a name? That which we call a rose,
By any other name would smell as sweet."

The truth of this well-worn dictum seems undeniable. And yet the fair Capulet whose thought it embodies was nevertheless anxious to get the name of her ideal altered, or even (in which I believe she would not in the present day be singular) to change her own. This may be merely a characteristic bit of feminine inconsistency, but I think it at once casts a doubt on the literal acceptance of the apparent truism put by the bard into the lips of Juliet.

If we look into the matter we shall find that the principle is true in itself, but that its truthful application is rarely if ever met with. For when is a name merely a name? Perhaps it is to such a country bumpkin as Wordsworth has described, whose

" . . . . primrose by the river's brim
A yellow primrose was to him,
And it was nothing more."

But almost invariably a name has meaning and associations; it calls up in the mind a picture, awakens memories, and affords food for thought and reflection.

Now I want in this paper to try and paint a few pictures with plant-names as subjects, touching up old ones, and presenting perhaps for criticism a few that may be new to you.

Botany used to be contemptuously spoken of as a science of hard names; but that was before organic chemistry existed;—organic chemistry with its many-syllabled names, which are the astonishment of the vulgar, and at which even pharmaceutical students will sometimes open their mouths, yet which are generally what names should be—pictures of the things named, albeit often sadly wanting in arrangement (which is form) and clearness (which is colour).

Of plant names, as given by botanists, the chief fault is that there are too many of them; portentous lists of synonyms being prefixed to the descriptions of very many even of our well-defined British species. This arises mainly from the imperfect knowledge of the structure and affinities of the plants which have been by fabricators of Floras distributed into genera and species. Thus the original discoverer of a plant may, after a cursory examination of it, assign it to a particular genus, or create a new one specially for it; while another observer by more patient and detailed investigation obtains a more accurate knowledge of it, and may change the generic and specific names accordingly. Then comes perchance another ardent student who rediscovers our plant in some other locality, and if, as will probably be the case, it is unknown to him, whether he be Smith or Jones, promptly is *Smithia viridissima* or *Jonesia unica* installed in the new Flora, where its affinities may for time more or less prolonged give rise to interesting discussions, until on comparison of authentic specimens in old and new Floras the duplex designation becomes apparent.

Or of two observers describing the same specimen, one may assign greater diagnostic importance to some one characteristic, and the second to some other characteristic; and the plant may go to this or that group accordingly. This difference of opinion is due to the laxity of the definitions of many genera and species; a laxity which must always exist to a greater or lesser extent, but which may be removed in great part in many cases by careful investigation and reasoning, and also by the study of new species in relation with older ones. As an example of the benefit of this last suggestion may be given the following extract concerning the genus *Parnassia*.—"It has been most generally placed among Thalamifloræ with Droseraceæ, next to Violaceæ and Polygalaceæ;

* Read at a meeting of the above Association, December 20, 1882.

but its close affinity with Saxifraga and Chrysosplenium has now been fully proved, *especially by the recent publication of several curious Himalayan species.*" (Bentham, 'Flora').

At the same time it must be noted that the continual normal variation of species will often render a particular individual difficultly referable to its proper species, and that many species are so nearly allied that they provide links between one genus and another, rendering sharpness of definition impossible.

In connection with this subject it may be mentioned that many of the plants alluded to in classical writings are now difficult of identification; first on account of vague description, and secondly on account of change of name rendered needful by modern knowledge. Thus the Greek "*Jasione*" is our *Convolvulus Sepium*, while we give the name "Jasione" ("the healer") to the sheep-bit. Again, *Hibiskos* is the marsh mallow, *Althæa officinalis*, and not the shrub now termed hibiscus. And in Virgil's beautiful lines, Ruskin translates the "*pallentes violas*" which the white nymph Nais was to gather for Alexis, as "pale flags," not violets which we now associate with Viola.

The multiplication of synonyms appears then in the present state of our science to be to a great degree unavoidable; and having pointed out the reasons for this, I will pass to the consideration of the names of the plants as most commonly accepted:—

In the first place, Have the names been given to plants according to any plan? I may answer, Distinctly not.

Linnæus was, as students of Bentley will remember, the first who definitely laid down the system of binomial nomenclature, that is, the giving of both a generic and a specific name to each kind of plant, and numbers of his names are still the accepted ones.

Jussieu and De Candolle defined most of the natural orders.

In analysing the British orders, genera and species, we shall find examples, so far as I am aware, of all the origins of plant names. I shall, therefore, refer almost entirely to them.

First then of the natural orders:—

1. The names are taken from some typical genus of the order. To this heading place all the British orders, as Rosaceæ from *Rosa*, Ranunculaceæ from *Ranunculus*, etc., with the exception of those to be next mentioned.

2. The names are taken from some peculiarity of flower, leaf, etc., running through the order. Such are—

Cruciferæ
Aquifoliaceæ
Umbelliferæ
Caprifoliaciæ
Compositæ
Labiatæ
Amentaceæ (Cupuliferæ)
Graminæeæ
Coniferæ.

Next:—Genera. These are—

1. Either named after themselves by discoverers, or after discoverers by subsequent describers; or again by discoverers or by subsequent describers are dedicated in the name and to the memory and glory of more or less distinguished botanists whatsoever.

This practice has some merits, but it leads in many instances, as I shall show later, to the most barbarous cacophony and word-coining.

2. Names are given at the sweet or malicious will of the name-maker, and with or without reason (generally the latter, so far as my imagination will let me discover), commemorative of some celebrated personage or place; and these are of two classes, historical and mythical.

Of this practice, the obvious criticism is, where there is rhyme and reason for the doing, where the name fits the plant and violates no probability nor stretches the imagination too sharply, and specially if the name is good Latin or Greek, then let us applaud it; if not, then be it condemned.

And 3. Some peculiarity of a plant or plants of a genus, peculiarity either real or imaginary connected with size, shape, properties and so on, has earned it its name.

This is by far the most general origin of the generic name, and to my mind is about the most legitimate method of name formation.

For as the natural system of plant classification has in its broad basis the advantage over the Linnean system, in that it brings together plants of similar structure and habits, which by the latter were arbitrarily separated and grouped by mere number of certain parts, a method erroneous in principle, for throughout nature number is consequent on structure, and not structure on number; so in the details of the natural system, an arbitrary plan of distributing generic names is to be deprecated and abandoned in favour in this case also of a natural system of name giving; a system carried out on such excellent lines as shadowed forth in the names aconitum, convolvulus, stellaria, and shall I say myosotis? the last a name at which I have heard some sentimentalists rail, but which in its meaning of mouse-ear as applied to the shape and texture of the leaves of the genus has always seemed to me more appropriate than the English Forget-me-not, while its Greek softness is equally pleasing to the ear.

For examination of the various reasons governing the adoption of specific names I can do no better than refer you to Gray, as quoted by Bentley, in his 'Manual,' who takes as an illustration the genus Viola. You will remark that nearly all the specific names indicate qualities or peculiarities of the several plants, but that frequently a botanist's or other name is dragged in as a substantive or as an adjective, and also that as many old species have been transferred to other genera, their former generic name has been retained as a specific name, as is the case with *Lythrum Salicaria*, *Dianthus Armeria*, etc.

Turning back now to develop the peculiarities of the generic names—

Of the first, the discoverer's or celebrated botanist's class, I will remark that the cases are very rare in which it is not a positive insult to a plant to connect it with the name of a man. So delicate is the charm, so quiet and unobtrusive is the growth of our wayside flowers, so elevating are the thoughts which they naturally suggest, that any connection of them with human affairs seems utterly out of place, True, types may be found in plant life of many, I think not of all, of the varied habits and instincts, faults and virtues, littlenesses and greatnesses of human nature; but that is no reason for connecting any plant with that specific unit of humanity known as a botanist. To the great, however, to the illustrious pioneers of the science it may be permitted that their names should be enshrined in and so adorn the catalogue of plant names. Thus I exemplify the name *Linnæa*, and a modest little alpine herb has an undying interest thrown around it by its sweet-sounding and honouring name of *Linnæa borealis*.

But apart from the above somewhat sentimental objection to proper names as generic terms, there is the real one of untranslateability. How many common English, German or French names will translate themselves into Latin with euphony and without outraging the ear of the scholar?

Glance down the list of genera and say what you think of such terms as—

Clarkia
Bouganvillea
Eschscholtzia
Rodriguezia
Catleya
Ludwigia
Saussurea
Scheuzeria
Sibthorpia

Teesdalia
Wolffia
Zannichellia.

These are names proper enough and significant enough in their native garb; but when, like Bottom the Weaver, they are "translated" behold they, as applied to plants, are as much out of place, as ugly and as earthy as was that otherwise worthy Athenian citizen among the fairy denizens of the woodland shades.

Ruskin says, in his odd but suggestive botanical work, 'Proserpina,' that "a day will come when men of science will think their names disgraced, instead of honoured, by being used to barbarize nomenclature," and I hope such may come speedily.

I will, however, note that there are some names which seem made to Latinize; as that of the great Swede Linné already mentioned; Asa Gray, which as Asagræa looks a thoroughly Græco-Latin designation; and Lobel, for which, until I read a sentence in Professor Attfield's address to the School of Pharmacy Students' Association, I should have been fully prepared to turn in my Latin dictionary and find as Lobelia its hidden kernel of meaning. "Lobel" is perhaps unknown to many of you; as adding, therefore, henceforth a new interest to the medicinal plant, I may state that Lobel was a native of Flanders, born in 1538, died 1616, and was botanist and physician to our James I.

Next, of proper names arbitrary and imaginative.—These are in many instances not sharply defined from the next or peculiarity class, some peculiarity of habit or structure often dictating the imaginative proper name.

In this class much of the poetry of plant names is found. We are told by one of Virgil's shepherds that the anger of Amaryllis is to be feared as the wolf to the fold, showers to the ripened corn, or storms to the stout trees; and truly the beauty of many of the Amaryllids is so superb that one can imagine any slight to it being rebuked with a proud and glowing scorn.

Andromeda is to be found by the adventurous vasculum-bearing Perseus in trembling watery peat-bogs, growing blushingly erect in the domains of the amphibian monsters, the frogs and newts.

Atropa suggests the Fate, Atropos (the inflexible), whose shears cut short the thread of human life: hence most appropriately given to the deadly nightshade. The specific name *belladonna* comes oddly in opposition with Atropa, for the Fates were not usually represented as beautiful, but rather as grey old women.

Adonis vernalis with its crimson petals tells of the fatal wound inflicted on the Thracian hunter by the fierce wild boar; but are there not many other things which it might with no furthur exercise of ingenuity be thought to shadow forth?

Iris, the messenger of the gods; Hercules, as *Heracleum* Actæon, as *Actæa*, are other mythological names, the suitability of which my imagination is not sufficiently active to discover.

On the historical side valerian is called after Valerius, who first used it in medicine and who has therefore a rightful claim to memory; but what claim has Gentius, King of Macedon, to immortality in connection with the beautiful tribe of gentians? Ruskin hints him rather undeserving, and suggests *Lucia* as a generic name; Lucy of Teesdale then being the spring gentian, whose blue eyes thrilled a friend and myself with delight as we saw her in April for the first time on her native heaths around the high Force of the Tees.

Now comes an instance of naming which is at first sight puzzling. How comes it that the genus *Euphorbia*, so acrid and poisonous, bears the Greek name for "good nourishment," which it most distinctly is not? The mystery becomes clear only when we find that this is a historical name. Euphorbus, the first to use the plants of the genus for medicine, was physician to King Juba of Mauritania, and possibly this name of his, with its meaning given above, was but a nickname given to him by his patients signifying that as court physician he lived on the fat of the land.

Thirdly, as to intrinsic generic names.

It is in this class of name that we find most of the quaint conceits, old delusions and superstitions, and imagined resemblances of and concerning plants, as well as happily caught characteristics and vestiges of simple-craft still more or less credited,

They may be best divided into names more and names less imaginative. I will give you one or two examples of each, taking the latter first.

Such is *Acanthus*, from the Greek *akantha*, a thorn; *akanthis* being a thistle, probably like our Scotch thistle, and *akanthos*, that acanthus whose spine-tipped leaves adorn the capitals of Corinthian pillars.

Cratægus is a name a step removed from the evident correctness of epithet of the above example; *Kirasos*, its root, meaning strength, and this, as applied to the wood of the wild service-tree, the original *krataigos*, is not so fitting a bestowal as that of the thorn bound up with the thistly acanthus.

Fumaria, the smoky, applied to the fumitorics, is apt, as all will concede who know the grey misty foliage of the genus; but it is more imaginative than the two former instances.

The geraniums of our summer woods recall with their long beak-like fruits the crane whose Greek name *geranos* they bear.

The Robert of *G. Robertianum* is, as some suppose, a Benedictine abbot to whom is dedicated the twenty-ninth of April about which time the herb comes into flower. But it appears to me that it cannot count for nothing that names Robert and Robin are given to *red* creatures, as to this same Herb-Robert, to

"that little weed of ragged red,
Which bids the robin pipe;"

and to robin redbreast; the inference being that savage and almost inarticulate primæval man, struck with the stimulating brightness of the rays of slow vibration in the solar spectrum, signified the effects of them by the purring pleasure of the rolling R, which is more fully developed in *Rhodon*, *Rosa*, *Rose*, *Rhœas*, *Rhoia* (pomegranate), applied to red plants, and in Robin, Robert, Rupert, applied to red men.

Rubus, again, has the same root of redness; and the genus, whether in its pink-hued flowers, its purple fruits or fruit juice, or its crimson autumnal leaf-tints, is fully worthy of its name.

Lysimachia and *Lythrum* are both Englished as Loosestrife; this should etymologically be only of the former; and as I am unable to find that it *does* loose strife, I think we must fall back for explanation on the theory that the name commemorates Lysimachus, a friend and general of Alexander the Great, and hence this belongs properly to the second class of names.

A splendid example of the purely imaginative name is *Chelidonium*, meaning swallow-wort, so called because it flowers at the time when the swallows return in the spring.

Lamium offers us an open choice of derivation. It may either be from "*Lama*," a ditch, from its place of growth; or from "*Lamia*," a snaky monster given to preying on unwary youth (Keats has a fascinating study of one); or else from "*Laimos*," the throat, the root whence *Lamia* is derived. This latter, seeing the gaping throat of the flower, seems the most fitting starting point.

Scrophularia and *Pedicularis* are instances of plants named from diseases for which they were once supposed efficacious.

Now I have run through a few illustrative instances of the various methods of plant naming which I have enumerated. It remains for me to say a few words on hard names. It is a habit with the unreflecting to stigmatize names which they find lengthy and unfamiliar as pedantic, harsh and unnecessary. But they do not perceive, what a little thought would tell them, that in the language to which they belong they may be as fitting and as fraught with pertinent meaning as any familiar English name. Thus, *Pardalianches* is a hard, uncouth-looking word, but it is simply our English Leopard's-bane, and as a Greek word it is by no means unmusical. And so with *Anisopetalum, Cryptarrhena, Eulophia, Ornithidium, Pleurothallus, Stenorrhyncus, Xylobium,* at which Ruskin grimly sneers.

And this reminds me of a new system of plant naming and classification proposed and partially carried out by this distinguished art-critic. Its leading principles are somewhat as follows:—Starting with no scientific botanic knowledge, many of the prejudices of the past may be thrown aside. Begin, therefore, by relying on your own poetic judgment for the division, so that (for instance) *oxalis* and *anemone* both come into the same order, since both are delicate flowers delighting in the woods. That they do delight in the woods is an historic fact, and as historic facts (it is well known) equally with "relative conditions of character and climate," are so unchangeable, if plant classification and naming is founded on them rather than on distinctive differences of form, which are so many, so subtle, so liable to continual reinterpretation, then we shall have unalterable groups which may be added to, but not disturbed or reconstructed. That is, in this world of change and imperfections we shall have at least a perfect and immutable system of both terminology and nomenclature.

Note, that the reasons given for this change are first, that many names are barbarous distortions of Greek and Latin words; second, that many names carry with them coarse and degrading suggestions. Both these propositions may be acquiesced in; but do they furnish sufficient reason for the upsetting and total remodelling of all plant arrangements as well as all plant naming? The third reason is, that the botany of Ruskin, being intended to be useful to the vulgar rather than to the scientific, should give to plants names characterizing them individually, and not founded on their connection with other plants at the Antipodes. Thus, Herb-Robert might be called shortly "Rob Roy, and have done with it," rather than, dwelling on its connections, christen it "Macgregoraceous."

This reason, which is no reason but a dogma, strikes at the root of natural classification, and at once places the system outside serious consideration. It sets out the dream of a poet, imaginative, beautiful, but unpractical. However, there is much to be learnt from the eloquent imaginings of its gifted author; one great lesson being not to look upon plants simply as material for dissection or for preservation in musty folios. Text-books must and text-books do take chiefly this view, but it is a healthy change from the consideration of plants as "subjects" (as the medical student would put it), to regard them as "objects" full of life, beauty and character, with ways, wills and instincts of their own. Dryad-haunted tree, starry flower, fertile grass of the field, to these are we indebted for the filling up of great portion of the wants and pleasures of our existence, and the fuller knowledge of them in all their varied forms, habits and necessities cannot but have favourable effect on human joys both actual and ideal.

Parliamentary and Law Proceedings.

Dispensing in a "Surgery."

On Friday, January 5, the Macclesfield Coroner (Mr. Yates) held an inquest at the Town Hall touching the death of a widow named Elizabeth Walker.

The first witness called was—Hiram Walker, labourer, who said the deceased was his mother, 72 years of age. She had been in pretty good health lately—nothing to cause any alarm, but was taken ill on December 26, complaining of a bad cold. On the 28th he went to the sick club, of which she was a member, for a note to get the doctor to attend her, and afterwards went to Mr. Jotham's surgery in Duke Street, where he waited forty minutes, but could get no one to answer. He left the note on the counter and went home and stayed with his mother, who kept "in a middling way" till after midnight on Saturday night, when she got worse. On Sunday morning, between nine and ten o'clock, he went again to Mr. Jotham's house in Roe Street, but did not see Mr. Jotham. His housekeeper answered the door, and he told her that he had come to see the doctor, about Mrs. Walker. She said Mr. Jotham was upstairs in bed, and that she would tell him. She went upstairs, and from the top of the stair called down to him to know what ailed her—whether she had any pain. Witness replied no, that she was only coughing. The servant then went into Mr. Jotham's room, and eventually came down and mixed a bottle of medicine in his presence. He took the medicine home and gave his mother a dose (a tablespoonful), which she was to take every four hours. She died in about ten minutes after taking the medicine. The servant took the physic out of three different bottles, and put it in the one produced (one of Parkinson's large-size soda water bottles, which was nearly full of a muddy, dark-coloured liquid).

Jane Morton (Mr. Jotham's housekeeper) was the next witness. She said she remembered the last witness coming to Mr. Jotham's house on Sunday morning, December 31, between nine and ten, and stating that his mother was very ill—very low. Mr. Jotham was in bed; and she went upstairs to him, told him what the man said, and by his order she gave him a bottle of medicine.

The Coroner: Did you mix it?—No; it was ready mixed—it always is.

What, for anybody's complaint?—No; but for that complaint. Witness added that she got the medicine out of two bottles which were plainly labelled. She knew from Walker's description what his mother was suffering from, and that kind of medicine was wanted. Asked whether she was in the habit of mixing medicines, witness said Mr. Jotham always handed her a paper stating what medicine she was to "put up." She was not in the habit of mixing medicines. She knew, from conversations she had had with Mr. Jotham over dinner and at other times, that he had called occasionally to see deceased.

Further questioned by the Jury, she said in ordinary cases she "put up" the medicine, but in special cases Mr. Jotham did it himself. There was no entry made in any book of medicines supplied to club patients, neither had Mr. Jotham any report to make on the subject. Club patients should bring their own medicine bottles, and if they did not she put the medicine in any bottle she might have.

The Coroner: Does Mr. Jotham prescribe for a patient on the mere statement of anyone who comes to report a case to him?—He asks what is the matter, and if he isn't able to go he "puts up" the medicine.

The Coroner: Really. Well, I am astonished. I am very sorry for Mr. Jotham's patients if that is the case.

Mr. Gee: Do I understand if twenty patients come and say they have a cough, you give them all the same medicine?—Yes, if the complaint is the same. There are different bottles for different complaints. There are a whole row of large bottles for different complaints, and I feel quite competent to give out the medicine. He tells me what quantity to give out of the different bottles —in this case he told me "half and half"—out of two bottles.

Mr. Geo. Bland, surgeon, said he made a *post-mortem* examination of the body, and found deceased had been suffering from emphysema of the lungs and bronchitis, and that the valves of the heart were very much thickened. The stomach was healthy and contained about a pint of pale brown fluid. The other organs of the body were healthy. In his opinion death was caused by bronchitis, complicated by heart disease.

The Coroner: Is the medicine in that bottle the sort of medicine you would have given, having regard to the age of the woman and all the circumstances?—I do not know the contents of the bottle. It seems to be an ordinary cough mixture.

Mr. Lockitt: Do you think there was anything in the contents of the bottle to cause death?—Judging from what I have heard of the evidence, I should say the medicine had nothing to do with the death. She was dying when she took it.

Mr. Bullock: Is it your opinion she was neglected?—I can't say that.

The Jury eventually returned the following verdict:—"We are of opinion that deceased died from natural causes. We also agree that Mr. Jotham's conduct deserves severe censure for his gross carelessness in not attending to the deceased. We also believe that Mr. Jotham did not see deceased on December 22, as stated in his certificate."—*Macclesfield Courier.*

POISONING BY LAUDANUM.

Mr. J. Hewetson Brown, Coroner for the city of Carlisle, held an inquest, on Monday, touching the death of James Edwin Green, from a quantity of laudanum which he swallowed on Saturday night in the Victoria Hotel bar, Citadel Row. It appeared that the deceased, who had been a polisher and van-man, had been discharged from his situation about a month ago, a circumstance which is said to have preyed on his mind. On Saturday last he was in the bar of the Victoria Hotel, in Citadel Row, under the influence of drink. While there he borrowed an empty bottle from the barman, and sent a friend for twopennyworth of laudanum to the chemist's shop of Mr. Pattinson, in the Crescent. On the laudanum being brought the deceased poured it into a glass and drank it. After the lapse of some time medical help was obtained, but Green died about eleven o'clock. Evidence to the foregoing effect having been given,—

John Pattinson Little, assistant to Mr. Pattinson, chemist, of the Crescent, said he was not a qualified assistant chemist. The witness Scholes, whom he knew, came for twopennyworth of laudanum on Saturday afternoon. He supplied him with it and labelled the bottle "poison." He did not make inquiry as to whom and for what purpose Scholes wanted the drug. Laudanum was not one of the poisons registered under the Pharmacy Act, 1868. About half an hour afterwards he again saw Scholes, who said Green had taken the laudanum and they did not know what to do with him. He told Scholes to get a doctor as soon as possible and keep Green awake. He knew Green, and he was not in the habit of getting laudanum. He supplied Scholes with about half an ounce of laudanum. He was quite aware that it was sufficient to kill a man.

A Juror said he thought witness had acted carelessly.

Witness did not think so. Sometimes a pint at a time was sold.

The Juror: Yes, but to persons whom you know.

Witness: Well, I knew this man.

Medical evidence was given that death had resulted from an overdose of laudanum, and the Jury returned a verdict that "Death was caused by an overdose of laudanum taken in ignorance of its results or effects."—*Carlisle Journal.*

SUPPOSED DEATH THROUGH TAKING A PATENT MEDICINE.

An inquest was held at the County Court House, Stowmarket, on Friday, January 12, before A. F. Vulliamy, Esq., Coroner, touching the death of Sarah Scurrah. The nephew of the deceased said his aunt had complained of tightness of the chest, and on the evening of Tuesday, January 9, she was so much worse that he obtained medical advice. When Dr. Groome arrived he at once pronounced her to be dying. Some brandy and water was administered and other remedies applied, but in a few hours she expired. Deceased had frequently refused to allow him to send for a medical man. She took some patent medicine which she had by her the day before her death.

A nurse, called in to attend the deceased on Tuesday evening, said she was unconscious the whole of the time until her death.

Mr. Thomas Wilson, chemist, Stowmarket, supplied the nephew with some soothing medicine for the deceased, consisting of a mixture of bromide of potassium and aromatic spirits of ammonia. The bottle contained full directions as to how it should be taken.

Inspector Simkin produced two bottles of medicine, from both of which he had been informed the deceased had taken some.

Dr. W. W. Groome said he was called in to see the deceased on Tuesday evening. She was perfectly insensible. Her skin was cold, and her face was covered with sweat; the pupils of the eyes were contracted and insensible to light, the pulse was quick and feeble, and her breathing was rather noisy. Having been shown the medicine which she had taken he came to the conclusion that she was suffering from the effects of opium. The label of the bottle contained the words "Not to be taken by children," and from that fact he should say it contained opium or morphia. He was of opinion that she died from opium poisoning. In a person of her age a small dose might produce considerable effect.

The inquiry was adjourned in order that a *post-mortem* examination, and an analysis of the contents of the stomach and patent medicine, might be made.—*East Anglian Daily Times.*

Review.

A HANDBOOK OF CINCHONA CULTURE. By KAREL WESSEL VAN GORKOM, formerly Chief-Inspector of Cultures in the Netherlands East Indies. Translated by BENJAMIN DAYDON JACKSON, Secretary of the Linnean Society. London: Trübner and Co. 1882.

In this work of nearly three hundred pages the author has given the results of his experience in the cultivation of the cinchona plant in Java whilst acting as Director of the Dutch Government Cinchona plantations. The successful cultivation of the cinchona in Java was first attained under Heer van Gorkom's Directorship, during 1864 to 1875, for when he succeeded Junghuhn in 1864 the Java plantations were in a very languishing condition. Hasskarl's seedlings had been proved to be chiefly the inferior species of cinchona, *C. Pahudiana* (*C. ovata*), of which 531,456 were, at the end of 1863, under cultivation in the open ground, whilst the plantation only contained 7408 calisaya plants. But in 1864 the cultivation of *C. Pahudiana* was restricted, and special attention given to the more valuable species of *C. Calisaya*, and the success of the plantations was assured by the planting out in 1866 of 12,000 young Ledger plants that had been raised from seed obtained from Mr. Ledger in 1865. Since 1872 *C. Ledgeriana*, *C. officinalis* and *C. succirubra* have been exclusively propagated, with the result that in 1880 the plantations contained 498,000 Ledgeriana, 401,000 officinalis, and 278,000 succirubra plants.

The earlier chapters contain the history of the cinchona, its botanical description, an account of its introduction into Java, and of the species and varieties cultivated there. Under the head of Chemical Investigation we find a short account of the cinchona alkaloids, and the results of Moens' analyses of the three species under cultivation, whence it appears that in 1879—

	Total alkaloids. min.	max.	Quinine. min.	max.	Net weight of bark in ½ kilos.
Ledgeriana gave	6·1	8·1	6·0	7·0	7850
Officinalis ,,	5·3	6·8	1·2	4·6	3365
Succirubra ,,	6·0	8·0	0·6	0·9	25,201

It is to be regretted that in these analyses no details are given of the other alkaloids.

In 1878 Moens showed by an analysis of the outside scrapings or shavings of Ledgeriana, that the old method of the cascarilleros, which consisted in depriving the thick branches of their epidermis, was a costly operation, for in the samples of shavings he found 9·5 and 7·5 per cent. total alkaloid, containing 8·3 and 6·7 per cent. quinine respectively.

By the scraping process Moens and Scheffer ascertained that a kilogram of superior bark could be obtained annually from each tree; the author considers, moreover, that scraping might be done once or even many times with good results, but skill is required to prevent injury to the tree.

In Java, as it is now found in Ceylon, no variety of cinchona can be cultivated with better prospects of speedy and ample production than the succirubra; but the author is of opinion that so long as quinine is of primary importance, there can be no satisfaction in the exclusive cultivation of the succirubra.

The amount of alkaloids in the bark does not regularly increase with the age of the tree, and in normally developed trees, the maximum amount of alkaloids will be in trees from six to eight years old. The author does not regard the process of renewing under moss to be applicable to inferior kinds of cinchona; as is now well known, its effect on succirubra is to increase the yield of quinine and to decrease the cinchonidine, and on officinalis to suppress in most cases cinchonidine entirely.

In chapters IX. and X. are fully described the cultivation of cinchona, its propagation by seed, and the gathering and keeping of the seed; and in chapter XI., its artificial propagation by cuttings, with a description and full size illustration of Venleman's method of side grafting Ledgeriana on succirubra stems, which was first carried out in 1879. On this point we read, "For scions young twigs of Ledgeriana trees are taken, those with one joint are large enough, though as there are no reasons for extraordinary economy it is better to use tops of branches with two or three joints. The woody stem of a young succirubra plant serves as a stock, preferably a seedling, because cuttings usually possess a less developed root system. Succirubra stems as thick as a lead pencil offer sufficient surface; stronger stems may perhaps supply more nutriment to the scions, but it is an advantage on the other side that the diameter of stock and scion should agree, that the opposed barks may be united as completely as possible."

The best results are expected from this method, and it has the further advantage of requiring no propagating houses, and of being applicable after cropping an inferior cinchona plantation.

A detailed account is given as to the erection of propagating houses, laying out the beds and preparing the ground and nurseries, and as to the nature of the soil and the space between the plants.

With the exception of a species of beetle, *Bostrichus* or *Dermestris*, which attaches itself chiefly to the sickly and transplanted trees, and a yellowish-brown larva, the only serious plague is "cinchona rust," which seems to be allied to the "tea rust," and is due to *Helopeltis theivora.* Cutting out and burning the prunings is at present the only known remedy to this formidable pest. In the Malawar mountain ranges eight-tenths of an officinalis plantation was rendered worthless by the repeated attacks of the *Helopeltis.*

Interesting details are given as to harvesting the bark, regarding which it is stated that the planter loses by harvesting too early, for the amount of bark obtained in eight years would be doubled in the four succeeding years; also on stripping and drying and on sorting and packing the bark.

In chapter XXII., we read, with regard to the preparation of the quinetum in Bengal, "It appears a deplorable fact that the extraction from the bark is very incomplete, for one-half of the alkaloids go to waste. It appears from the report for 1879 that things are not more fortunate in Java. In the Chemical Laboratory at Weltevreden, from 3000 kilos of succirubra bark, which positively averaged 6 per cent. of alkaloids, there were not more than 56 kilos of quinetum made."

The subsequent chapters do not merit special notice; indeed, some of them might have been omitted with advantage, especially those on the artificial preparation of quinine and on the quinine alkaloids. In the former chapter we are informed that "it has even happened in Germany that an actual artificial fabrication of a cinchona alkaloid has been effected, but it possessed no polarizing power, therefore not identical with the natural production and decidedly differing in other properties," and in the other we are impressed with the belief that the chemical part of the subject has not been thoroughly grasped by the translator. To us, some parts are perplexing, but to the planter, who desires information on the chemistry of the cinchona alkaloids, we fear they would be sorely misleading. On page 215 we meet with "a new quina-basis," "chamæleon mineral," and on page 271 with "an alkaloid which is accumulated in the amorphous basis, and is probably fugitive." In several instances we should have preferred to have had the author's meaning given in equivalent English, rather than "as close a rendering of the original as possible and to run the risk of occasional awkwardness."

Enough has been said, we think, to show the value of Heer von Gorkom's work to cinchona planters, and to others interested in the cultivation of the cinchona plant.

BOOKS RECEIVED.

British Homœopathic Pharmacopœia, published under the direction of the British Homœopathic Society. Third Edition. London: E. Gould and Son. 1882. From the Publishers.

A Manual of Photographic Chemistry, Theoretical and Practical. By Rev. T. Frederick Hardwich, M.A. Ninth Edition, edited by J. Traile Taylor. London: J. and A. Churchill. 1883. From the Publishers.

A Manual of Nursing, Medical and Surgical. By Charles J. Cullingworth, M.D., etc. London: J. and A. Churchill. 1883. From the Publishers.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Permanganate of Potash Pills.

Sir,—As these pills have formed the subject of a letter from Mr. Martindale, it might be of interest to some to know of another process. Before his letter appeared, we had occasion to make some of these pills, each containing 2 grains of the salt. The senior apprentice had them given him to do his best with, when, after some failures, he found they were easily made by rubbing the salt first with a little simple syrup, then adding about 2 grains of powdered sugar to each pill.

45, *Forrest Road, Edinburgh.* James Mackenzie.

Communications, Letters, etc., have been received from Dr. Castle, Messrs. Moyse, Oliver, Lawrence, Umney, Wood, Lambie, Baldock, Nemo, Quærens, Devonia, A. P. S. (Hobart Town).

"THE MONTH."

At the instance of the United States Board of Health a comprehensive investigation has been carried out under the superintendence of Professor J. W. Mallet, with respect to the chief processes in use in the chemical analysis of drinking water, for the purpose of testing the absolute and relative accuracy of the results they are capable of yielding and as far as possible the nature and scope of the practical conclusions that can be drawn from them for sanitary purposes. From a preliminary report (*Nature*, Dec. 28, p. 211, and Jan. 4, p. 231) it appears that nine classes of waters were distributed amongst various chemists to be examined chemically, some using the combustion process, others the albumenoid-ammonia process and others the permanganate process. Class I. consisted of natural waters believed to be wholesome; Class II. of natural waters believed to have caused disease; Class III. of suspected waters; and the remaining six classes of waters intentionally contaminated in various ways. Biological experiments were also made with several of the waters. The report deals first with the degree of accuracy of the three processes, as shown by the amount of concordance in the results obtained by any process in repeated experiments on the same water, and in this respect, on the whole, the most concordant results were yielded by the permanganate process, and the least concordant by the combustion process, the albumenoid-ammonia process holding an intermediate position. As to the agreement of the results obtained with the quantities of organic constituents known to be present in a water, those obtained by the permanganate process were found to be much the least influenced by varying dilution, the combustion process indicating less organic carbon and more organic nitrogen when a weak solution was used, whilst with the albumenoid-ammonia process the weaker the solution the higher were the results obtained both for free and albumenoid ammonia. After stating some special conclusions as to each of the three processes, which can only be mentioned here, the Report passes to the chemical and biological results obtained as contrasted with the actual sanitary history of the natural waters examined. From an inspection of the tabulated results it appears that "no strongly marked generic difference is presented by the results from any of the processes for the estimation of organic matter or its elements between the generally wholesome waters of Class I. and the waters of Class II., which had been medically condemned, and were fairly assumed to be pernicious." It is pointed out, as telling against any chemical theory of the production of disease from this source, that if the whole of the organic carbon and nitrogen present in water of a highly dangerous water existed as strychnine, it would be necessary to drink half a gallon of the water to ingest an average medicinal dose of the alkaloid. But indirectly a larger amount of organic matter may be more dangerous, as furnishing more facilities for the multiplication of organisms. A more conspicuous difference between the waters of Class I. and Class II. was presented by the nitrates and nitrites, which whilst always present and often in large quantity in pernicious waters were either absent or only present in trifling quantity in the wholesome waters. It is suggested "whether the noxious character of water containing much nitrates and nitrites, themselves presumed to be harmless, and little organic matter which ought to be present in some form to support the 'previous contamination' view, may not be in reality due to the presence of a special nitrifying ferment, itself to be classed among the lower organisms capable of propagating disease." The biological experiments did not give satisfactory results, several of the waters believed to be wholesome, and which are largely used, being marked "suspicious," whilst not one of those believed to be pernicious was condemned. Professor Mallet concludes that it is not possible to decide as to the sanitary quality of a water by the mere use of a process for the estimation of organic matter or its constituents, and that there is no sound ground on which to establish such "standards of purity" as have been proposed, fixing the exact amounts of organic carbon or nitrogen, albumenoid ammonia, or oxygen of permanganate consumed, that shall be permissible

Sir William Thompson has delivered an extremely interesting discourse before the Glasgow Philosophical Society on "Approximative Photometric Measurements of Sun, Moon, Cloudy Sky, and Electric and other Artificial Lights." The lecturer pointed out that we have six senses, not five as is commonly made out, viz.:—Sense of force, sense of heat, sense of sound, sense of light, taste, and smell, a definition which was first given by Dr. Thomas Reid. Sir William shows from Pouillet's experiments on the radiant energy of the sun that the solar surface gives out radiant energy at the rate of 50 horse-power per square inch. A Swan incandescent lamp, when incandesced at 20 candles, is calculated to give out three-fourths of a horse-power per square inch. Hence the activity of the sun's radiation is about sixty-seven times greater than that of a Swan lamp per equal area, when incandesced to 240 candles per horse-power (*i.e.*, one Swan lamp at 20 candles requires one-twelfth of a horse-power). In remarking on the Carcel lamp and the standard candle, as photometric standards, the opinion was expressed that if as many precautions had been taken in elaborating the standard candle as have been taken in the use of the Carcel lamp, the standard candle would be as reliable as the lamp. Sir William further mentioned the interesting suggestion made by Violle of the use of molten platinum as a light standard. From Violle's experiments, communicated to the Paris Conference on Electrical Units by M. Dumas, Sir William considers that the tint of Violle's glowing platinum cannot be very different from that of the ordinary Swan lamp incandesced to its "twenty candles," and further that both as to tint and brightness it would appear that melted platinum at its "freezing" temperature is nearly the same as a carbon filament in vacuum incandesced to 240 candles per horse-power. For approximative photometric measurements, the author states that the "shadow method" of Rumford, when used with a reasonable amount of care, will give results within 2 or 3 per cent. of accuracy. The conclusions arrived at by the learned physicist as regards the luminous intensity of the moon's surface are very interesting reading. From his own experiments he concludes that the moon radiates something not enormously different from one-quarter of the light incident upon it. If about, say, one candle to every five square centimetres of surface was present on the moon, and the candles were all burning normally, the light received at the earth would be about the same in quantity, as estimated by our eyes, as it really is.

It would have very much the same tint and general appearance as an ordinary theatrical moon, except that it would be brightest at the rim and continually less bright from the rim to the centre of the circle, where the brightness would be least. The luminous intensity of a cloudy sky, about 10 a.m. one day, in York, during the meeting of the British Association, he found to be such that light from it through an aperture of one square inch area was equal to about one candle. An experiment on sunlight, made at one p.m. on December 8, at his house in the University, showed that the sun's surface as seen through the atmosphere at the time and place of observation was twenty-four times as bright as the Swan carbon when incandesced to 240 candles per horse-power. From the conditions of the experiment it followed that the intensity of the light from the sun's disc was equal to about 53,000 candles. This is more than three times the value found by Arago. "So much for a Glasgow December sun." Sir William considers that it cannot be very far wrong to estimate the light of the full moon anywhere on the earth as about one seventy-thousandth of the sunlight. A very full abstract of the lecture will be found in *Nature* of the 18th inst.

The now familiar cry of gas *versus* electricity has been the subject of a series of letters in the *Times* during the present month. The letters originated with a correspondent who, signing himself "Lux Pura," imagined he had detected large quantities of sulphuretted hydrogen in the gas supplied by the London companies, and gave a popular way of applying acetate of lead paper as a test for the presence of this noxious compound. The letter was full of crudities and a remarkable illustration of the proverb that "a little knowledge is a dangerous thing." Very able rejoinders have been made by Mr. H. Leicester Greville, of the Commercial Gas Company, and by Mr. G. Livesey, the well-known gas engineer, setting forth the true state of the law by which gas companies are bound to supply gas practically absolutely free from sulphuretted hydrogen.

At a recent meeting of the Newcastle-upon-Tyne Chemical Society an adaptation of the electric light for the illumination of microscopic objects, contrived by Mr. C. H. Stearns, was exhibited. It consists in the use of a Swan's incandescent lamp, which is calculated to give from one to three candle power, and is readily controlled by means of a small resistance coil of iron wire interposed in the circuit. Two or three Grove or Bunsen cells suffice as a source of electricity, or where the fumes would be objectionable a Leclanché battery may be employed, or better still an accumulator. The lamp may be readily fixed in any required position by means of a clamp; but in Mr. Stearns's microscope three lamps are permanently attached to and made a portion of the instrument, the body of the microscope forming one connection. One lamp is fitted above the stage; one below it, on the sub-stage; and one below the sub-stage, for polariscope work. Each lamp is connected with a three-way switch, so that the position of the light can be freely altered. At a recent meeting of the Obstetrical Society of London, also, Dr. Aveling exhibited a modification of Swan's incandescent lamp, so made that it could be introduced into cavities of the body for operative purposes.

According to the *Athenæum* of the 20th inst., Messrs. Mawson and Swan, of Newcastle-on-Tyne, have constructed a small accumulator, weighing five pounds, which is capable of supplying electricity for working one Swan lamp continually for two hours, and for a much longer time if the electricity is turned off when not required. This arrangement with Swan's lamp has been adopted with great advantage for the taking of microphotographs.

Mr. Octavius E. Coope has contributed a very valuable summary of his experience in electric incandescent and gas lighting at his mansion Berechurch Hall, three miles from Colchester. He adopted the Swan incandescent lamp and the Burgin machine, and the result of his experience is in every way decidedly in favour of electric lighting. One sentence from his letter is well worth reproducing here:—"The whole has been carried out as specified, and the result has been a success that has exceeded my expectations. The light is quite as easy to manage as gas, while the softness, the purity, and the agreeableness are such that a return to any other method of illumination would be now quite out of the question. The pictures, books, and decorations have no chance of injury; the ceilings and walls remain unsoiled, while the difference in health felt after sitting in a room electrically illuminated and another lighted by gas must be experienced before it can be appreciated." Very full details are given of the relative cost and maintenance of gas and electric light plant. This letter must be pronounced a most interesting and impartial statement of the question in this particular instance.

Electrical amateurs desirous of constructing a powerful plate electrical machine, at the moderate cost of a few shillings, should read the description of the Wimshurst "influence machine," given in the *English Mechanic* of the 12th inst.

According to a communication forwarded to Mr. Weldon by Messrs. Chance Brothers, the plant for treating about three hundred tons of vat waste per week by the Schaffner and Helbig sulphur recovery process, which consists in decomposing calcium sulphide with magnesium chloride (*Pharm. Journ.* [3], xii., 969), is nearly completed in their alkali works near Birmingham. Part of the plant is already at work, and it is said that the problem of the generation, storage and economical combustion of sulphuretted hydrogen thus derived from vat waste, and the construction of suitable apparatus for the purpose, may now be considered solved. At Messrs. Chance's works the sulphuretted hydrogen is stored in a gas-holder of 30,000 feet capacity, the outer water ring of which, in order to prevent any smell through an escape, is covered with a layer of dense mineral oil. At present the sulphuretted hydrogen passes from this gas-holder to a kiln, where it is burnt, the heat evolved being more than sufficient for a Glover's tower, through which the burnt gas, containing sulphurous oxide, is passed, and the conversion into sulphuric acid is uniformly effected with a very low consumption of nitre. In this way it is found practicable to recover from 90 to 95 per cent. of the sulphur from alkali waste as pure vitriol. The carbonic acid gas required for the decomposition of the calcium chloride bye-product, and for making its chlorine available for the reconversion of the magnesium oxide into magnesium chloride, is derived from a lime kiln, but probably it will also be possible to utilize flue gases.

In a communication to the Academy of Sciences (*Comptes Rendus*, xcv., 1363), M. Planchaud has contributed some further observations upon the conditions under which the reduction of sulphates is effected by "sulphuraria" and analogous algæ. He states that the introduction of 2 grams of chloroform into a flask containing these algæ, which had yielded sulphurous water weekly for a period of three months, stopped the action of the algæ for a month, after which, upon the evaporation of the chloroform, they resumed their activity. One gram of carbolic acid produced a similar result, but six grams stopped the action altogether by the killing the algæ. Another experiment consisted in enclosing some of the algæ between cakes of gypsum, the edges of which were luted. Upon separating the cakes some considerable time afterwards a few minute yellow points of crystallized sulphur were visible to the naked eye, due to the reducing action of the algæ, and M. Planchaud considers that this furnishes an explanation of the formation of the sulphur deposits which have been met with under the subsoil of Paris. He also considers that most of the natural deposits of metallic sulphides are attributable to the same origin.

Messrs. Gayon and Dupetit are continuing their investigation of the transformation of nitrates into nitrites under the influence of micro-organisms. They now describe (*Comptes Rendus*, xcv., 1365) four kinds of microbes, two requiring atmospheric oxygen for their development and two not, which are capable of removing two-thirds of the oxygen from alkaline nitrates. The most active of these, when sown in minute quantity in chicken broth containing 10 grams of potassium nitrate to the litre, multiplies rapidly at a temperature of 35° C. The liquid becomes turbid, but there is no evolution of gas, and under favourable conditions this kind of microbe has been found capable of reducing 9·6 grams of nitrate per litre per day. During the reduction some carbonic acid is formed, which is retained in the liquor in the form of potassium carbonate; but this does not represent all the oxygen derived from the decomposition of the nitrate. The least active of the four kinds decomposed 2·8 grams of nitrate per litre per day. Other organisms have been found to exercise this reducing action, and among them the microbe of chicken cholera, the splenic fever bacterium and the septic vibrion, but only to a comparatively limited extent.

M. Gayard describes (*Répertoire*, xi., 16) a method for the preparation of oxygen at the ordinary temperature by mixing potassium permanganate with strong nitric acid. Some nitrate of potash is formed, permanganic acid being set free and reduced. From this point oxygen is evolved with great regularity until two and half equivalents of the permanganic acid have been liberated, when the evolution stops suddenly. But if the vessel containing the mixture be plunged into boiling water, the oxygen from another half equivalent of acid can be obtained.

In a note on the use of asbestos filters for filtering liquids in chemical analysis (*Am. Journ. Pharm.* [4], xiii., 37), Mr. Cassamajor expresess a preference for the Australian kind, because the fibres being less flexible than in the Canadian or Italian they do not felt together and pack so closely on the perforated plate, and therefore allow the liquids to filter more rapidly. He recommends that the asbestos should be prepared for use by first rubbing it upon a coarse sieve (10 meshes to the inch), freeing what passes through from dirt by stirring it with water upon another smaller sieve (25 to the inch) until the water passes through clear, boiling the washed asbestos with strong hydrochloric acid for about half an hour, washing the pulp with distilled water on a perforated platinum plate placed in a funnel until quite free from acid, and then heating it strongly in a platinum dish. After cooling the asbestos should be preserved in a wide-mouthed stoppered bottle.

According to M. Féréol (*Practitioner*, Jan., p. 53), ammoniacal sulphate of copper is of great value in tic-douloureux and neuralgia of trigeminal origin. In almost all cases in which it was tried, it relieved the pain, sometimes instantaneously, and restored sleep to the patient after having been deprived of it for weeks. The usual dose was from 10 to 15 centigrammes, according to the susceptibility of the patient.

Drs. Ringer and Murrell have recently published a communication (*Lancet*, Jan. 6, p. 7) on the use of permanganate of potash in amenorrhœa. This salt is given in doses of one or two grains, beginning with one grain three times a day, increased to two grains four times a day, the desired result being usually obtained in three or four days after administration. It is said to succeed well after the failure of other remedies, such as iron, aloes, nux vomica, strychnia, pulsatilla, nitroglycerine and hot mustard baths. The fact that manganate of soda and binoxide of manganese were found to be "equally efficacious" would appear to indicate that the action is due to the manganese and not to the salt, in which case the use of the permanganate might be only a roundabout way of administration, especially when the necessary speedy reduction of this salt in the stomach is taken into account.

More than one writer to the *Lancet* (January 13, p. 86) calls attention to the fact that permanganate of potash forms a valuable injection for gonorrhœa, generally arresting the discharge in a fortnight. The strength recommended is half a grain to the ounce of distilled water.

In August last, M. Wecker directed attention to the fact that the seeds of the jéquirity plant, *Abrus precatorius*, used in the form of a lotion, were capable of producing artificially a purulent inflammation of the conjunctiva, which could be advantageously used in ocular therapeutics. The cause of this inflammation has been investigated by M. Silva Aranjo (*Comptes Rendus*, xcvi., p. 1204), who has submitted to microscopical examination the infusion and maceration of the seed and the exudation produced by their use. He finds that both preparations of the seed contain a great number of gonidia, which develop abundantly on the conjunctiva, and are probably the cause of the purulent condition which follows the use of the drug.

Dr. M. Carter (*Brit. Med. Journ.*, January 6, p. 9) calls attention to the successful treatment of tetanus with *Gelsemium sempervirens.* Although the suggestion of the probable utility of this remedy in such cases was made so long ago as 1875, the confirmatory evidence recently adduced shows the value of the investigation of the physiological action of drugs.

A correspondent of the *British Medical Journal* (Jan. 13, p. 90) states that he has found the application of a strong solution of chromic acid, three or four times, by means of a camel's-hair pencil, to be the most efficient and easy method of removing warts. The warts become black and ultimately fall off.

The operation of sponge-grafting seems to be coming into favour with surgeons. It is quite possible that the day is not far distant when sponge prepared for this purpose will be required at the hands of pharmacists. In the *British Medical Journal* (January 13, p. 51), Dr. P. W. Perkins Case describes its preparation as follows :—"Our method is to get the finest Turkey sponge free from grit, etc., and slice it as thin as possible, soak it in acid. nitro-hydrochloric. dil. for two or three weeks, till all the calcareous and silicious matters are dissolved, when after repeated washings with water, it has a very soft velvety feel; this, neutralized by washing with liquor ammoniæ and steeping in carbolic acid solution (1 tó 20) for twenty-four hours, is ready for use."

Dr. J. Whitson, in "Notes on the Treatment of Ulcers" (*Practitioner*, Jan., p. 20), remarks that the application of a specially prepared sand to granulating sores has been tried for some time with success, and that it possesses the advantage, since it absorbs the discharge, of seldom requiring removal, so that healing can proceed without interruption. This sand is prepared as follows :—It is first heated to a temperature capable of destroying all organic particles. It is then soaked in a solution of 1 part of bichloride of mercury in 1000 parts of water. After this the mixture is placed in bottles and can be used when required. This mode of treating ulcers is not new, the sandy earth of the termite ants having long been used for this purpose by the natives of the West Coast of Africa. This substance was some time since imported by Mr. Thos. Christy, under the name of 'termite earth," for trial in this country, but whether it possesses any antiseptic properties derived from the white ants is not known.

In the *Practitioner* (January, p. 17), Dr. Ringer states that an antagonism exists between veratrine and potassium salts as regards their physiological action. He was led to experiment in this direction by observing the fact that a saline solution containing lime caused the ventricle of the heart to dilate very slowly after each contraction, an effect produced also by veratrine, and that the presence of a small quantity of a potassium salt prevented this result. He finds that a small dose of potassium chloride will completely obviate this effect of veratria and restore normal contraction. If this view of the antagonistic action of calcium and potassium salts be confirmed, it will throw some light on the effects produced by certain mineral waters, and indicate the importance of a knowledge of the physiological action of even the commonest articles of food and medicine.

According to a recent communication to the Academy of Sciences from M. Bert (*Comptes Rendus*, xcv., 1253), inoculation with the slaver from the mouth of a mad dog, after filtration through plaster, does not reproduce the disease, but if the substance retained on the plaster be used hydrophobia is the result. He has also found that if the secretions which together form the slaver be separated they differ in their action. Thus inoculation with mucus from the respiratory passages of a mad dog will reproduce the disease; but if the secretion of the salivary glands alone be used it is inert in this respect, although it may cause death by setting up local suppuration. The saliva of a mad dog still possesses the property of converting starch into sugar.

M. Sanson has placed on record (*Comptes Rendus*, xcvi., p. 75) some experiments made upon the substance "avenine," isolated by him from oats, with a view to determine its effect upon the neuro-muscular excitability of horses. Avenine is a brown uncrystallizable substance found in the pericarp of the fruit and has the formula $C_{56}H_{24}NO_{18}$. The amount present in different varieties of oats is not uniform; the white sorts contain less than the dark, and the place of cultivation also influences the proportion present. Crushing the grain weakens the excitant property, so that whole grain is the most valuable for feeding purposes when work is required from the animals. Oats containing less than 0·9 per cent. of avenine cannot be relied on to give rise to the neuro-muscular excitability, which is produced with certainty when that proportion is exceeded. If the same effect is produced on human beings, the value of oatmeal porridge as a nutritious food where physical work is required is obviously not exaggerated. The wonderful properties as a nerve stimulant, attributed by Dr. Sell to oats, in the *New York Medical Gazette*, may be due to this active principle.

Lippia Mexicana, a Verbenaceous plant which has been recently recommended as a remedy in asthma and the cough of phthisis, has been submitted to a chemical examination by Dr. Podwissotzki, of Dorpat, who reports (*Ph. Zeit. f. Russl.*, xxi. 925) that he has separated from it a tannin, a crystallizable colouring substance belonging to the quercetin group of no medicinal importance, an oxygenated essential oil and a camphor. This camphor, which has been named "lippiol" and appears to be the principal representative of the medicinal activity of the plant, occurs in small quantity in the leaves, and as it readily volatilizes, it may be easily lost in transport or keeping. It melts between 25° and 30° C., and in composition corresponds to menthol. In the presence of the essential oil ("lippienol"), which occurs in larger quantity, the camphor mixes with water, forming a white emulsion-like mixture, having a bitterish taste. Dr. Podwissotzki considers his results indicate that the best pharmaceutical preparation would be a tincture of the fresh plant, prepared with alcohol strong enough to dissolve both the camphor and the oil, in the proportion of one part by weight of the flowers and leaves to nine of alcohol.

In a paper read before the Pennsylvania Pharmaceutical Association Meeting (*Pharmacist and Chemist*, January, p. 23), Mr. C. C. Klump gave the result of some experiments made upon the podophyllin resin of commerce with the view of ascertaining if the portion soluble in ether represents the active ingredient of the resin. He found that the portion of the resin insoluble in ether did not produce purgative effects, even when taken in the dose of 2 grains; while ½ of a grain of that soluble in ether proved purgative. One specimen examined by him contained 20 per cent. of resin insoluble in ether, and a specimen precipitated by alum yielded above 20 per cent.; while another, prepared according to the process of the U.S. Pharmacopœia, gave only ·6 per cent. The use of alum thus increases the product by 20 per cent. of insoluble resin above the amount of soluble resin yielded by the official process.

A new kind of vanilla has been described by M. Charbonnier (*Répertoire de Pharmacie*, Jan., p. 19. It is called in commerce Guadeloupe vanilla, and is the product of a plantation which was made in that island seven or eight years ago. The pods are compressed, not irregularly triangular like the Mexican, but approaching in aspect those of Bourbon and Java, from which it differs in having a darker colour. It is drier and does not so readily become covered with crystals of vanillin; the surface is striated longitudinally and has very few depressions. The perfume is peculiar and not so fine or so persistent as that of Bourbon vanilla, for which reason it is sold at about half the price. M. Charbonnier doubtfully suggests that it may be produced by a variety of *Vanilla planifolia*.

At this season of the year there are comparatively few medicinal plants in blossom. The coltsfoot (*Tussilago farfara*) has begun to open blossoms here and there; in warm sheltered districts in the South of England, *Daphne Laureola* may be found in flower, and *D. Mezereum* in flower is reported from the Isle of Wight.

In the Cambridge Botanical Gardens a fine shrub of *Hamamelis virginica* was, towards the beginning of the month, covered with its pale yellow starry blossoms; and in the conservatory a gigantic plant of *Aloe plicatilis*, said to be the largest in Great Britain, presented numerous opening spikes of flowers.

The return of coloured sepals to their original green hue is always a matter of interest, inasmuch as the circumstances which lead to the change are worthy of observation. This is more particularly the case when the flower has an abnormal structure like the Christmas rose, *Helleborus niger*, in which the petals are themselves green, and in which from the early period of flowering it is hardly probable that the flowers have been cross-fertilized with species having green sepals, such as *H. viridis* and *H. fœtidus*. Mr. Woolley Dod, writing in the *Gardeners' Chronicle* (January 6, p. 16), believes that the cause of the change is under, rather than above, the soil. From the fact that the same plant one year produces white and another year green flowers, and that the late flowers are more apt to be green than the early ones, it would seem as if a loss of vitality or want of nutrition were the cause. It is possible, however, that the sepals, being persistent, ultimately turn green, as asserted by some (*ibid*, Jan. 13, p. 57), owing to different chemical changes taking place after fertilization, and that when these take place at an early period the white colour more quickly gives place to the green. At all events the matter seems worthy of investigation from this point of view.

The *Gardeners' Chronicle* has lately given several papers from the pen of Dr. Plowright on heterœcismal fungi, a word applied to those leaf parasites which in one stage of their life history live on one plant, and at another stage derive their nourishment from a plant of a totally different natural order. As some of the host plants are used in medicine it may interest some of our readers to observe the fungi for themselves. *Rœstelia cancellata*, appears on the savine, as *Podisoma sabinæ*; and *R. lacerata*, which may be seen on the stems of the juniper in the form of yellow gelatinous linear projections, produces the *Rœstelia lacerata*, found on the leaves of the hawthorn. Two fungi found on wheat, *Uredo linearis* and *Puccinia graminis* exist in another stage on the berberry as *Œcidium Berberidis*; while the rust on oats, *Puccinia coronata*, occurs under another form on the buckthorn as *Œcidium Rhamni*.

It is generally supposed that the sunflower turns its face to the sun, but it is not so generally known that it rapidly returns to its original position soon after sunset. Mr. C. A. White, of Washington, remarks (*Nature*, January 11, p. 261), with regard to the wild variety of *Helianthus annuus*, L. (*H. lenticularis*, Douglas), that the flowers, which had taken the whole day to follow the sun from east to west, in one hour after sunset had already turned their faces to the east.

At a meeting of the Linnean Society on December 21, Mr. T. Cary read a paper on the development and mode of fertilization of *Asclepias Cornuti*. He pointed out that the petals and stamens, which are ultimately adnate, in the early stage originate separately, and that the broad filaments of the stamens form a fleshy pentagonal ring so as to be monadelphous. The stigmatic disc is not formed by the fusion of two stigmas, for the styles proper remain distinct through their entire extent. The pollen appears to exhibit an isolated and peculiar case of formation, approaching in one feature to that of *Naias* and *Zostera*.

Dr. Emerson Reynolds has recently recorded some interesting experiments made with a view to show how differently substances having the same elementary composition may act upon plants. He took sulphocyanate of ammonium and sulphurea, each of which contains two equivalents of nitrogen, four of hydrogen, one of carbon and one of sulphur, and found that the former acts as a poison to plants, while the latter stimulates the growth of the same kind of plants under like conditions and induces healthy development. This result evidently depends on the fact that the molecules of which the two bodies are composed are differently grouped.

M. Mangon has given (*Comptes Rendus*, xcvi., p. 80) the results of his investigation of the leaves of the ice plant, *Mesembryanthemum crystallinum*. The transparent vesicles, which cover the leaves like frozen dew-drops, contain a weak solution of common salt. The whole plant consists of a similar solution of alkaline salts retained in a state of solidity by vegetable tissue the weight of which does not exceed 2 per cent. of the entire mass. The ash, formed of salts of sodium and potassium, constitutes 43 per cent. of the weight of the dried plant. M. Mangon suggests that the capability of the plant to take up alkaline salts might be utilized in the removal of the excess which renders unproductive certain portions of the Mediterranean coast.

Mr. Becker (*Nature*, January 4, p. 231) has lately solved a riddle that has long puzzled travellers. In the white sand of the Ergent mountains, at Sarepta, (Asiatic Russia), curious stones are found which, when broken open, exhibit a brown kernel with a white spot in its centre. Some of these are of the size and shape of a hazel nut or walnut, others are cylindrical. Their surface is rough, and resembles a collection of drops, heaped upon and beside one another. Humboldt believed that they were recent formations. Zwick regarded them as very old. The formation of these stones is ascribed by Becker to the exudation of milky juice from roots of plants. *Euphorbia gerardiana*, *Tragopogon ruthenicus*, and *Scorzonera ensifolia* grow plentifully in the white chalky sand, and their long roots being inhabited and seamed by insects, the milky juice continually flows out and cements the soil around the roots. As the root gradually dies and disappears there remains in its place a white, often hollow, kernel, together with the brown colour derived from the root bark, the cylindrical stones being thus formed. The flat and target-shaped stones may originate from the milky juice running into the sand, since hardly any of them exhibited brown kernels.

According to an editorial notice in the *Journal of Botany*, it would appear that it is carried on at a monetary loss to the editor. This is somewhat of a reproach to the botanists of Great Britain, who it may be hoped will not allow one of the most valuable of botanical publications in the country to die out for lack of subscribers. The tendency in the present day for every natural history society to publish transactions of its own probably leads to the neglect of a journal which should receive notices of discoveries from every part of the country, seeing that it is intended to represent the progress of botany in Great Britain. The editor intends continuing the journal for another year at his own risk, and it is to be hoped the experiment may be a successful one, so that in the coming year he may not merely be able to cover his expenses, but find that the journal brings in a proper remuneration for the time and labour expended in editing it. The interesting "short notes" might form a very valuable feature in the journal if botanists in all branches of botanical science would record their observations, many of which too often are never allowed to see the light. The journal would then become more largely a British Journal of Botany.

At the drug sales this week *Cassia moschata* pods were offered. The false buchu leaves (*Empleurum serrulatum* and *Adenandra fragrans*) which have been put up for sale twice previously have not as yet met with a buyer. Morea galls and oval, smooth, not tuberculated Chinese galls were, among other rare drugs, exposed for sale. A singular kind of scammony, of soft, almost doughy consistence, was also noticed.

LIME JUICE: ITS PROPERTIES AND USES.*

BY MICHAEL CONROY, F.C.S.

Lime juice is the expressed juice of the fruit of *Citrus limetta*, a member of the orange tribe (Aurantiaceæ). The tree is a thorny bushy evergreen, with handsome dark foliage of exquisite fragrance. The flowers are white, resembling orange blossoms, and their perfume is equally delicious. The tree flourishes best in a light sandy soil near the sea, and comes into full bearing in about seven years after the seed is set. It grows wild in nearly all tropical countries, but is now largely cultivated in the island of Montserrat. The fruit is about one-half the size of the lemon, with a smoother and thinner rind, oval, rounded at the extremities, and of a pale yellow or greenish-yellow colour. The exterior of the rind possesses a fragrant odour, and a warm aromatic, slightly bitter taste, somewhat similar to that of the lemon. The juice, when fresh and sound, is sharply acid, with a peculiar refreshing and grateful flavour. In Montserrat the lime fruit harvest is heaviest from September to January, but a good supply of fruit is yielded throughout the whole year. Here, where the lime tree is specially cultivated for the sake of the juice, the work is done in a systematic manner with suitable machinery. The fruit, after collection, is taken to two central factories, where it is sliced by water power, and then squeezed in huge wooden presses, the juice being run into puncheons and quickly bunged up. This is a most important point in preparing the juice in a tropical climate, for if left exposed it would rapidly decompose. I am also informed that the choice fruit is alone used, and that only about two-thirds of the juice is pressed out, thus ensuring greater freedom from mucilaginous and pulpy matter. The further pressings, together with the juice of the unsound fruit, is evaporated to the consistence of treacle, and sent over to this country for the manufacture of citric acid.

It is chiefly owing to these precautions that Montserrat lime juice is so much superior to that produced in Jamaica and elsewhere, where no care or supervision is exercised in its preparation.

Lime juice contains citric acid, gum, sugar, albumen, extractive matter, inorganic salts and water. The most important constituent is the citric acid, but as to the percentage of citric acid contained in juice authorities disagree considerably. Upon this point, however, I am in a position to speak with great confidence, as during the last few years I have estimated the citricity of over 4000 samples of Montserrat juice, each sample representing a puncheon of over 100 gallons, and having been taken from the puncheon on the quay after landing. The citricity was estimated by the volumetric process with solution of caustic soda, made of such strength that 1000 grain measures represented 100 grains of citric acid.

By the kind permission of the sole consignees, Messrs. Evans, Sons and Co., Liverpool, I am enabled to place before you in a condensed form, the results of 4160 separate determinations obtained from the puncheons on the quay as above described.

The first table gives the average of each of twenty shipments, obtained by testing each sample separately, adding the whole together and dividing by the number of samples. The other two tables show twenty samples of high citricity and twenty samples of low citricity selected from the whole.

Table No. 1.

Number of samples examined.	Average percentage, free citric acid.	Average per gallon free citric acid, in ounces.
182	8·43	13·48
187	8·14	13·02
415	7·86	12·57
104	8·13	13·00
358	8·40	13·44
368	7·67	12·27
237	7·70	12·32
271	7·55	12·08
62	7·55	12·08
98	7·68	12·28
71	7·57	12·11
302	7·73	12·36
44	7·78	12·44
202	7·82	12·51
228	7·80	12·48
366	7·80	12·48
190	7·89	12·62
167	7·54	12·06
268	7·93	12·68
40	7·84	12·54
Total number samples 4160	Average of whole per cent. 7·84	Average of whole per gal. 12·54

Table No. 2. High Citricity.

Free citric acid. Per cent.	Free citric acid. Ounces per gallon.
10·05	16·08
10·05	16·08
10·05	16·08
10·00	16·00

* Read at a meeting of the Liverpool Chemists' Association.

Free citric acid. Per cent.	Free citric acid. Ounces per gallon.
9·95	15·92
9·65	15·44
9·60	15·36
9·60	15·36
9·60	15·36
9·60	15·36
9·55	15·28
9·50	15·20
9·50	15·20
9·50	15·20
9·50	15·20
9·55	15·28
9·45	15·12
9·45	15·12
9·45	15·12
9·45	15·12

Table No. 3. *Low Citricity.*

Free citric acid. Per cent.	Free citric acid. Ounces per gallon.
6·70	10 72
6·90	11·04
7·10	11·36
6·95	11·12
7·10	11·36
7·05	11·28
7·15	11·44
7·20	11·52
6·85	10·96
7·05	11·28
7·00	11·20
7·10	11·36
6·80	10·88
6·90	11·04
7·00	11·20
6·80	10·88
7·05	11·28
6·95	11·12
7·05	11·28
6·95	11·12

By adding up the first table and dividing by 20 (the number of the shipments) we get 7·84 per cent. as the average citricity of 4160 puncheons, equal to about 450,000 gallons.

Lime juice contains only a mere trace of sugar, while the quantity of gum and albumen is much less than that contained in lemon juice, on which account it is much less liable to fermentation and decomposition than the latter. The quantity of inorganic salts contained in lime juice is about the same and is also of the same nature as is obtained from lemon juice. The ash obtained from ten samples gave an average of 0·43 per cent. of the juice.

During the last decade lime juice has become a most popular temperance beverage, chiefly in the form of cordial, but its chief use is that of an anti-scorbutic on board ship, and while on this point I wish to draw your attention to the following extract taken from an excellent editorial, which appeared in the *Pharmaceutical Journal*, of June 3, 1871, and which contains two most important questions, that I trust will be answered in this paper. After treating of the prevalence of scurvy previous to the passing of the Merchant Shipping Act of 1867, the article says:—

"There can be no reasonable doubt that this system has succeeded remarkably well, as it has secured a proper supply of good juice to the mercantile marine, and scurvy has in consequence diminished from 60 to 70 per cent. But there are two unsettled and very important questions in connection with this subject which pharmacists should be specially able to aid in deciding. (1) The exact analytical standard of lime and lemon juice. (2) Does genuine lime and lemon juice require the addition of alcohol for its proper conservation?"

The first, so far as lime juice is concerned, I think is answered by the tables above quoted, and with the second we shall now deal. Some eighteen months ago, I mixed together over one hundred pint samples of lime juice, representing an entire consignment from Montserrat, and divided the bulk into two equal parts. One part was filtered perfectly bright and bottled off into wine bottles, while the other half was simply strained through muslin before bottling, no preservative whatever being added to either. The samples, on the date they were bottled, were tested for citricity and gave 8·15 per cent. free citric acid. They were then put away in a spare corner of the laboratory, exposed to light and occasionally to the direct rays of the sun for six months, when they were again examined (one from each group) with the following result:—

Filtered sample, 7·95 per cent. free citric acid.
Unfiltered sample, 8·15 per cent. "

At the end of twelve months from the date of bottling, another sample from each group was examined and was found to test exactly the same citricity as when last tried, namely 7·95 and 8·15 per cent. respectively. From this it will be seen that while the unfiltered sample retained its full citricity for twelve months, the filtered sample lost only 0·2 per cent.

This experiment, though put in hand for a different purpose, of which I will presently speak, answers the question as to whether alcohol is necessary for the preservation of lime juice, and when I state that in addition to the above test the juice was as sweet and sound as when first bottled, it will be admitted that the only answer is—No.

With lemon juice, however, the answer is the reverse, and I shall go further and show you that the quantity of spirit added by the Board of Trade regulations is insufficient and useless for its preservation. Lemon juice, owing to the fact that it contains much more sugar and mucilage than lime juice, is more liable to fermentation, and in commerce it is always, or nearly always, found in a state of fermentation, and in this state it is passed by the Somerset House authorities, and sent into bond to be fortified and bottled for the Merchant Marine Service. In bond 15 *per cent. of proof spirit* is added to it, and this is expected not only to kill the fermentive germs, but to preserve it from further deterioration. As practical chemists and pharmacists I need scarcely tell you that to obtain the desired result double the quantity should be used. What percentage of alcohol do we add to our freshly pressed juices of dandelion, hemlock, broom, foxglove, henbane, etc.? Twenty-five per cent. at 56 over proof, which is equal to 39 per cent. at proof strength, and this quantity we only consider sufficient for the proper conservation of freshly pressed juices, quite free from fermentation. I have frequently seen bottles of lemon juice bursting in bond during hot summer weather, an hour or two after bottling, from the pressure of carbonic acid gas produced by the fermentation, and frequently cases have to be unpacked to replace bottles that have burst from the same cause, *in bond*. From this it is evident that lemon juice requires to be more strongly fortified, and my experience is that fully 30 per cent. of proof spirit, or better still, its equivalent of a stronger spirit, would be necessary.

I said that the experiment with the filtered and the unfiltered lime juice, to which I have already alluded, was put in hand for a different purpose than that of ascertaining whether or not the addition of alcohol was necessary for its preservation. The object in view was to ascertain whether the clarification of the juice was in any way detrimental to its keeping properties, and I was led to try the experiment by observing that clarified juice sooner became darker in colour, and sooner lost its fresh aroma than the unclarified, and the result showed that my suspicions were correct, though to a less extent than expected, for as already stated the clarified sample lost only 0·2 per cent. in citricity, while the unclarified sample remained intact at the end of twelve months. Why is this? To answer the question it is necessary to remember that in pressing lime or lemon juice many of the essential oil vessels of the rind are ruptured, and the oil thus escaping becomes to a considerable extent emulsified by the mucilage and sugar of the juice, thus acting as an antiseptic preservative to the juice.

It is chiefly owing to the presence of essential oil, thus emulsified, that the turbid appearance of fresh lime and lemon juice is due, and to my mind it is quite a mistake to insist upon juice being quite clear for ship use, since the filtration necessary to attain this would separate almost the whole of the essential oil, the presence of which adds so much to its keeping properties.

As already mentioned the chief use of lime juice is as a preventive and remedy for scurvy, and in the Royal Navy, only lime juice is used, with the gratifying result that the once dreadful disease is practically unknown. In the Merchant Marine Service, however, lemon juice is chiefly used, owing to its cheapness, and here cases of scurvy are frequently occurring. It is not, in my opinion, because lemon juice is inferior to lime juice as an antiscorbutic that this result is due, but simply to the fact that it soon becomes inert and useless by fermentation, as already shown.

Lime juice has become a therapeutic agent of so much importance since the publication of our present Pharmacopœia that its introduction into the next issue is almost a certainty, and in anticipation of such a result I would recommend that the test for citricity be fixed at not less than 7·25 per cent. of free citric acid.

DETERMINATION OF BORACIC ACID.*

BY EDGAR F. SMITH.

When a solution of manganese sulphate is added to one of borax, and to this mixture an equal volume of alcohol, there separates rapidly a white flocculent precipitate of manganese borate, MnB_4O_7, insoluble in the alcoholic liquid. The excess of manganese sulphate remains in solution, and can readily be determined in the filtrate from the borate after the expulsion of the alcohol. To ascertain whether the above might be available quantitatively, the following solutions of definite strength were prepared and the experiments recorded.

1. A solution of manganese sulphate, made by dissolving 3 grams of anhydrous $MnSO_4$ in 250 c.c. H_2O. 10 c.c. of this solution would then correspond to ·0600 gram $MnSO_4$.

2. Potassium permanganate solution of such strength that 18·5 c.c. were equivalent to 10 c.c. of I or 1 c.c. $KMnO_4$ = ·00324 gram $MnSO_4$.

3. Borax solution: 10 grams well-crystallized borax dissolved in 1 litre of H_2O.

The manner of conducting each experiment was as follows: To 10 c.c. of the borax solution were added 10 c.c. $MnSO_4$ solution and an equal volume of strong alcohol. The whole was well mixed, allowed to stand, carefully covered for one half hour, when the manganese borate was filtered rapidly (best with a suction pump) and washed well with alcohol. The filtrate and washings were placed in a platinum or porcelain dish and evaporated to dryness on a water-bath. The residual manganese was then determined according to Volhard's* method, by dissolving it in water, adding zinc sulphate, then heating to almost boiling, and carefully running in potassium permanganate until the liquid assumed a pink colour. The quantity of manganese sulphate thus found and deducted from the whole amount of the salt added, gave a difference representing the manganese sulphate which had combined with the borax. After calculating the amount of manganous oxide to which the sulphate, found by difference, is equivalent, the following equations were employed:—

MnO : $2B_2O_3$ am't MnO : corresponding am't B_2O_3 (x); and

Orig. sub. 10 c.c. borax solution : x :: 100 : y (per cent. B_2O_3 in 10 c.c. of the borax solution).

Experiments.

Number of Anal.	Borax solution used.	$MnSO_4$ solution added.	$KMnO_4$ required.	$MnSO_4$ in excess.	$MnSO_4$ in combination with B_2O_3.	Per cent found of B_2O_3.
	cc.	cc.	cc.	gram.	gram.	
1	10	10	6·4	·0207	·0393	36·44
2	"	"	6·1	·0198	·0402	37·27
3	"	"	6·3	·0204	·0396	36·71
4	"	"	6·3	·0204	·0396	36·71
5	"	"	6·5	·0210	·0390	36·16
6	"	"	6·4	·0207	·0393	36·44
7	"	"	6·5	·0210	·0390	36·16
8	"	"	6·4	·0207	·0393	36·44
9	"	"	6·2	·0201	·0399	36·99
10	"	"	6·3	·0204	·0396	36·71
11	"	"	6·3	·0204	·0396	36·71
12	"	"	6·4	·0207	·0393	36·44
13	"	"	6·5	·0210	·0390	36·16
14	"	"	6·3	·0204	·0396	36·71
15	"	"	6·4	·0207	·0393	36·44
16	"	"	6·3	·0204	·0396	36·71
17	"	"	6·5	·0210	·0390	36·16
18	"	"	6·4	·0207	·0393	36·44

The calculated percentage of B_2O_3 in borax is 36·60, and from the experimental results it will be observed that the method can be successfully applied in the analysis of soluble borates.

In estimating the boracic acid in insoluble borates, as tourmaline, the following course was pursued. The finely pulverized substance was fused with a weighed quantity of pure sodium carbonate, the fused mass exhausted with water, and to the filtrate containing all the sodium borate, together with some sodium silicate and aluminate, was added an amount of pure ammonium sulphate molecularly equivalent to the sodium carbonate. The solution was then digested until all the ammonia was expelled and the volume of the liquid largely reduced. Any silicic acid or aluminium hydrate which had separated was now filtered off, and the precipitate thoroughly washed with hot water. The solution, again reduced in volume and containing only the borate and sulphate of sodium and excess of ammonium sulphate, was mixed with a definite amount of a manganese sulphate solution (strength previously determined), alcohol added, and after standing one half hour the borate was removed by filtration, the filtrate evaporated to dryness, and the residue carefully ignited to expel the ammonium salt. The manganese sulphate left was dissolved in water, and the same procedure as indicated in the preceding experiments was carried out.

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* From *Am. Chem. Jour.*, October, 1882. Reprinted from the *American Journal of Pharmacy*, January, 1883.

* *Annalen der Chemie*, 198, p. 318.

The Pharmaceutical Journal.

SATURDAY, JANUARY 27, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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THE DIGITALIN GROUP OF REMEDIES.

ANY one who has paid attention to recent literature relating to proposed new therapeutic agents must have been struck with the number of substances that have been recommended as possessing properties resembling those to which digitalis owes its value in the treatment of cardiac disease. These substances, however, while possessing points of resemblance in their physiological action, are derived from plants belonging to orders widely separated botanically, and differ considerably in their general chemical properties, although most of them have this character in common that they contain no nitrogen and are not acids. Indeed it is a remarkable fact that most of the extremely poisonous non-nitrogenous pharmacological agents derived from the vegetable kingdom belong either to the digitalin or the picrotoxin group; moreover, several members of the digitalin group yield decomposition products which in their action resemble picrotoxin. Whilst the action of some of these substances, and especially of digitalin, has now been fairly well studied, others have only been very imperfectly investigated, and it may be that valuable remedial agents are consequently in danger of relapsing into oblivion through the natural indisposition of medical practitioners to abandon a tried agent for the purpose of experimenting with others concernimg which little is known. Good service has, therefore, been rendered by Dr. SCHMIEDEBERG, to whom we owe much of our present knowledge of the active principles of digitalis, in contributing to the *Archiv für experimentelle Pathologie und Pharmakologie* an exhaustive and systematically arranged *résumé* of what is known concerning the group of powerful substances of which digitalin may be considered to be more or less the representative. Much of the information collected belongs strictly to the department of "pharmacology," as defined by Professor FRASER to be the "science of the action of remedies," and therefore need not be enlarged upon in these columns; but, besides this, there is information that may be classed under "pharmacognosy," to which reference may with advantage be made.

Dr. SCHMIEDEBERG enumerates fourteen substances as belonging to the digitalin group, and these he divides into four classes. Class I. consists of crystallizable glucosides, and includes digitalin, antiarin, helleborein, euonymin and thevetin. Class II. consists of non-glucosidal substances, not all crystallizable, and includes digitoxin, strophantin and apocynin. Class III. consists of non-crystalline glucosides, very slightly soluble in water: these are scillain, adonidin and oleandrin. Class IV. consists of amorphous glucosides, freely soluble in water and resembling saponin, and includes digitalein, apocynein and convallamarin. It may be mentioned with respect to the foregoing list that Dr. SCHMIEDEBERG has separated a glucoside that he has provisionally named "neriin," which appears to be probably identical with digitalein, from the *Nerium Oleander*, where it is accompanied by the less active glucoside which he has named "oleandrin." The "apocynin" and "apocynein" are the active constituents of the root of *Apocynum cannabinum.* A few other substances are mentioned, among which the most important are erythrophleine, the alkaloid of sassy bark, and neriodorin and neriodorein, the two glucosides separated by Mr. H. G. GREENISH from *Nerium odorum*, the latter two, it is thought possible, may upon closer investigation prove to be identical with oleandrin and digitalein (neriin).

As previously remarked the physiological action of the whole of these substances has not yet been thoroughly worked out, but enough is known to warrant their being classed together in one pharmacological group; for so far as has been at present ascertained they present no important difference in their action, beyond what consists in the different amount of effect produced by doses of equal weight, and their variations as to solubility in water and capability of absorption. Taking the action upon frogs' hearts as the starting-point for fresh investigations upon the digitalin group, Dr. SCHMIEDEBERG states the symptoms that all the members of the group are capable of producing, which may be briefly summarized as follows:—Augmentation of the volume of the pulse, under increase of the diastolic phase, and without any change in the absolute working power of the heart; irregular, "peristaltic" movements of the heart; systolic pause of the ventricle; and, finally, complete paralysis of the heart.

Dr. SCHMIEDEBERG raises the question whether when, as is usually the case, galenical preparations of digitalis are used, only the three constitutents known to belong to the digitalin group—digitalin, digitalein, and digitoxin—come into play, or whether other substances contained in the plant and in the official preparations exercise any influence; because, besides these three substances, there are other constituents, such as digitonin, digitaliresin and toxiresin, which belong to the picrotoxin group, the last two being decomposition products that are met with in the dried plant and may be formed in the intestinal canal through the splitting up of digitalin, digitalein and digitoxin. It is thought probable that digitonin is present in too small quantity to be of therapeutic importance, but that digitaliresin and toxiresin may sometimes exercise a disturbing influence. Moreover, the three principal constituents of digitalis,—digitalin, digitalein and digitoxin,—are themselves absorbed with difficulty and slowly eliminated, and to this is due the so-called "cumulative action" which has been observed in connection with this drug, and which is believed to have led to an unusual number of fatalities.

In consideration of these facts in connection with the digitalin group, Dr. Schmiedeberg is of opinion that in the interest of therapeutics and for the avoidance of great danger from too powerful action, it is of especial importance to use a chemically pure substance, which without producing local disturbance when injected subcutaneously, is readily absorbed, and through which, therefore, any desired degree of action could be maintained for a long time. Of the substances previously mentioned as belonging to the digitalin group he considers that in this respect the first places must be accorded to antiarin and thevetin, the former derived from the milky juice of the upas tree (*Antiaris toxicaria*), and the latter from the seed of the *Thevetia nereifolia*. Antiarin is not met with in commerce, and would be probably difficult to obtain, but thevetin might be more easily available. Of the digitalis constituents digitoxin would be excluded on account of its insolubility in water, which renders its absorption so irregular that the same dose on one occasion will produce little effect and on another will prove too powerful. Digitalin and digitalein are very difficult to prepare in a pure condition and would therefore be too costly. A similar remark applies to scillain, from the bulb of *Urginea scilla*, and adonidin, from *Adonis vernalis*, which are present in their respective plants in only very small proportions. Whether the material for the preparation of euonymin, which occurs in small quantity in the resin bearing the same name from *Euonymus atropurpureus*, or strophantin, from *Strophantus hispidus*, could be obtained at a moderate cost, and whether the preparation of these substances could be easily carried out, would have to be ascertained. But in the opinion of Dr. Schmiedeberg the whole of the four last-named substances would be particularly well suited for internal use. According to experiments helleborein would appear to be more easily absorbed and also more easily eliminated than the majority of the substances of the group; in fact, so rapidly does this absorption and elimination go on, that when administered internally in such doses as produce a strong effect when administered subcutaneously it is quickly dispersed, and all but a small portion passes out of the system without producing any therapeutic effect. Convallamarin and apocynein rank, together with digitalein, in regard to their properties, near to helleborein, but hardly come within consideration, because on account of their amorphous character they are probably not so readily absorbed as helleborein.

There remain only oleandrin and apocynin to be mentioned, the former occurring abundantly in the oleander, which is widely distributed throughout the entire Mediterranean district, and the latter in the North American "Indian hemp" (*Apocynum cannabinum*). Both of these substances can be prepared sufficiently pure without special difficulty, the apocynin even more readily than the oleandrin, because it is not accompanied by decomposition products so troublesome to separate. On account of their comparative insolubility these two substances are suitable only for internal use. In respect to their characters they agree essentially with one another, but they give different decomposition products. Oleandrin is a glucoside, splitting up when heated with dilute acids into sugar and "oleandresin," possessing an action similar to digitalresin; on the other hand apocynin, under the same treatment, passes into an inactive substance. Whether this difference will be of any consequence in the treatment of disease requires to be ascertained by experiment, when the relative capability of absorption of the two substances should also be studied.

The Junior Pharmacy Ball, held on Wednesday evening last at Willis's Rooms, passed off with great success, as many as 370 persons having been present. A telegram from Mr. M. Carteighe was read, regretting that through being engaged in attending a meeting of the Board of Examiners in Edinburgh he was unable to be present. In his absence the toasts of "The Royal Family," and "Success to the Junior Chemists' Ball," were proposed by Professor Attfield.

* * *

The Medical Union Society, which has been established with the object of furnishing "a means of intercommunication and organization" for students and junior members of the medical profession, will hold its first annual meeting and *soirée* in the Holborn Town Hall, on Wednesday next, the 31st inst. At 8 o'clock Dr. B. W. Richardson will deliver an address to students of medicine, after which there will be a vocal and instrumental concert.

* * *

At the meeting of the Chemical Society on Thursday next, February 1, a paper is to be read on "Some Derivatives of Fluorene," by Messrs. Hodgkinson and Matthews. There will also be a ballot for the election of Fellows.

* * *

On the same evening, at 8 p.m., a meeting of the School of Pharmacy Students' Association will be held, when some "Dispensing Notes" will be read by Mr. W. Johnston. A report upon "Secondary Batteries," illustrated by experiments, will be made by the Reporter on Physics, Mr. H. Allen, B.Sc.

* * *

A meeting of the Chemists' Assistants' Association will be held at University Chambers, 53, Conduit Street, on Wednesday evening, January 31, at 8.30 p.m., when a paper will be read by Mr. F. H. Alcock, "On Glycerine and its Application to Pharmacy."

The Annual Dinner of this Association is fixed to take place at the Holborn Restaurant, on Wednesday, February 14. Mr. M. Carteighe is to preside.

* * *

A series of six lectures on "Solid and Liquid Illuminating Agents," by Mr. Leopold Field, will be commenced in the Lecture Room of the Society of Arts on Monday next, the 29th inst. The lectures will constitute the second course of "Cantor Lectures" for the present session.

* * *

At the last meeting of the Newcastle-upon-Tyne Chemical Society it was decided by 52 votes out of 65 that the Society should be amalgamated with the Society of Chemical Industry, and a Committee was entrusted with the arrangement of matters of detail.

* * *

According to a note received from our esteemed correspondent, Dr. J. E. De Vrij, the International Colonial and Export Trade Exhibition which is to commence next May in Amsterdam promises to be very rich in subjects of interest to pharmacists. Dr. De Vrij suggests that intending visitors would do well to fix their head-quarters at Harlem, where they would be within a dozen miles' railway ride of the capital and conveniently situated for visiting the Colonial Museum in the town. Any way, as the demand for accommodation in Amsterdam will probably be excessive, it will be as well, if it be intended to stop in the city, to secure apartments beforehand.

* * *

An American contemporary, after referring to the International Pharmaceutical Exhibition to be held in Vienna this year, expresses an opinion that it might be desirable that it should be followed by another to be held in New York or Philadelphia in 1884 or 1885.

* * *

A lively sensation appears to have been produced in Paris, by a statement that some of the sulphate of quinine supplied to the French hospitals contains as much as 43 per cent. of cinchonine. *L'Union Pharmaceutique*, commenting upon the subject, appears to throw the blame upon the system which allows the public service to be supplied with foreign quinine by contractors who are incapable of detecting a fraudulent substitution if they wished to do so.

* * *

In an article on the deleterious effect of "cram," as carried on in elementary schools, the *Lancet* quotes statistics from various large towns in Scotland to show that there has been an increase in the mortality among children of five years old up to youths of twenty in the ten years during which the Education Act has been in operation as compared with the ten years immediately previous. In Aberdeen it has risen from 7·5 per cent. to 9·2 per cent.; in Edinburgh from 6·5 per cent. to 7·5 per cent.; in Glasgow from 5·5 per cent. to 7·25 per cent.; and in Dundee from 5 per cent. to 8·5 per cent.

* * *

The list of students in the Philadelphia College of Pharmacy for the Sixty-second Annual Session, 1882-83, shows that there are 254 "matriculants" in the "Junior Class" and 191 in the Senior Class.

* * *

The Municipal Council of the city of Paris, at a recent sitting, adopted a proposition to institute for the convenience of the public a night pharmaceutical service, upon the model of the night medical service, and a vote of 3000 francs has been inserted in the municipal budget to cover the expenses.

* * *

There are now in the United States two journals devoted to pharmacy printed in the German language. The *Deutsch-Amerikanische Apotheker-Zeitung* is published in New York twice a month and is now in the third year of its existence. The *Pharmaceutische Rundschau und Zeitung* has made its first bow with the opening of the present year. It also is published in New York; it is to appear monthly, and is to be edited by Dr. F. Hoffmann.

* * *

On the other hand two of the multitudinous United States journals printed in English,—the *Weekly Drug News* and the *American Pharmacist*,—having changed hands and become the property of one person, are henceforth to be consolidated. One of the "features" of the new journal, as stated in the opening number, is to be the printing of the papers read at the evening meetings of the Pharmaceutical Society of Great Britain, together with the consequent discussions. It may be mentioned that in carrying out this arrangement nearly twenty columns, out of thirty-nine which constitute the first number, have evidently been quoted from this Journal; but apparently the programme does not yet include an acknowledgment of the source.

* * *

The *St. Louis Druggist*, referring to Mr. Holmes's paper on "Spurious and Worthless Drugs," and "the excitement existing in pharmaceutical circles in England" upon the subject, congratulates its fellow citizens upon the better protection they enjoy from the importation of rubbish from without, but laments the damage done from within through the disposal by the Government of old medical stores, including tinctures and pills bought during the civil war nearly twenty years ago.

* * *

The same journal, in quoting the first instalment of Mr. Proctor's address on "Atoms and Molecules," introduces it as the production of "Professor Barnum S. Proctor."

* * *

Specialism in medicine is now to be extended to the medical journals. The *Monthly Journal of Medicine and Pharmacy*, a Philadelphia journal which for some time past has claimed to be devoted especially to quinological subjects, has undergone a change of title, and is henceforth to be called, "*The Quinologist.*"

* * *

On the recommendation contained in a report presented to the Paris Society of Pharmacy by M. Gérard, the prize for the competitive theses presented by pupils in the Paris School of Pharmacy last session has been awarded to M. Guinochet, for a treatise on the "Aconitates," in which he describes at least twenty new salts of aconitic acid.

* * *

The name of Mr. John Babtie, Pharmaceutical Chemist and Provost of Dumbarton, has been added to the Commission of the Peace for the County of Dumbarton on the recommendation of the Lord-Lieutenant of Dumbartonshire.

* * *

Information has been received of the death on the 5th inst. of Mr. John Barker, who was elected an Annuitant on the Benevolent Fund in 1880.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held on Monday, January 22, 1883, the undermentioned certificates were received in lieu of the Society's examination:—

Certificates of the College of Preceptors.

Aplin, John Henry .... Chard.
Bowell, Horace James Whitney. Ilfracombe.
Churchouse, Charles Herbert... Chard.
Hoare, Austin .... Ilfracombe.

Certificates of the University of Cambridge.

Painter, Frederick Hubert ...... London.
Wilson, Robert John .... Chesterfield.

Certificate of the University of Oxford.

Fryer, Charles John .... Warwick.

The report of the College of Preceptors on the examination held on January 2nd was received.

Three hundred and thirty-one candidates had presented themselves for examination, of whom *one hundred and thirty-seven* had failed. The following *one hundred and ninety-four* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

Abram, Fred. Wm. Joseph...... Wisbech.
Ainley, Edward Theodore ...... Mirfield.
Alexander, Charles Angus ...... Glasgow.
Allen, William Henry Arthur... Norwich.
Allen, Willie .... Basingstoke.
Almack, Edward Ambrose ...... Bedale.
Ames, William Ralph .... Bath.
Asten, Walter .... Birmingham.
Atkins, Frederick John .... Royston.
Badcock, Hy. John Francis ... Sheerness.
Bainton, Arthur .... Manchester.
Baker, William Herbert .... Cosham.
Ball, George .... Manchester.
Ball, John Arthur .... Nottingham.
Bamford, Thomas .... Aberavon.
Barnes, George Arthur .... Heckington.
Barr, Bryce .... Largs.
Bindloss, George Warren ...... London.
Blakelock, John William......... Edinburgh.
Bland, Arthur Whitsed .... Walsall.
Blankley, George William ...... Arnold.
Blewett, William Thomas ...... Penzance.
Bostock, John .... Wilderspool.
Branch, Alfred Ernest............ Colchester.
Branson, Preston James .... Plympton.
Brearley, Wentworth James L. Farnworth.
Brislee, William Henry .... Liverpool.
Broad, Henry Reynolds .... Kidderminster.
Brown, Robert Wells .... Glasgow.
Buck, Edward Thomas .... Goole.
Butterworth, Robt. H. Smethurst Blackpool.
Cadman, Ernest S. Radford ... Horsley Woodhouse.
Casewell, Job Parry.............. Market Drayton.
Castell, Guy John Edward ...... Daventry.
Chantry, John Henry .... Horncastle.
Charlesworth, H. Hodgkinson... Tunstall.
Clarke, James .... Liverpool.
Clarke, Joseph .... Birmingham.
Clements, Robert James......... Kingsbridge.
Clough, Thomas .... Liverpool.
Coates, Robert .... Pickering.
Coleman, Joseph .... Birkdale.
Cooper, John....................... Castletown.
Cruickshank, Gavin Lang ...... Aberdeen.
Cumber, Edwin Guille............ Guernsey.
Dakers, John Israel.............. Newcastle-on-Tyne.
Darby, William .... Spalding.
Davies, Colin Campbell .... Llandyssil.
Davies, Henry .... Dowlais.
Davies, Oliver .... Pontypridd.
Davies, Roger Edward............ Corwen.
Dawson, Edwin, jun. .... Stamford.
Dick, David Laing .... Falkirk.
Dodgson, Fred Henry .... London.
Donach, James..................... Moffat.
Douglas, William Boyce .... Torquay.
Duggleby, Albert Waldby .... Lowthorpe.
Elmitt, William .... Lincoln.
Emmons, Charles.................. Kidsgrove.
Enderby, John Edward .... Spalding.
England, Reginald Arthur...... London.
Escritt, Harold Teal .... Driffield.
Evans, Abdiel Charles............ Ewell.
Evans, Frederic Ernest .... Lymm.
Everett, Walter John .... London.
Eyre, William Robert............ Ashbourne.
Fairburn, Henry .... Hutton Bonville.
Fanshaw, William John......... Wolverhampton.
Fardell, Ernest Matthew .... Leicester.
Featherstone, Robert Horne ... Derby.
Field, Ebenezer .... Cambridge.
Fraser, John Sutherland......... Forres.
Freeman, John..................... London.
Fuller, George Sydney............ Thornton Heath.
Gage, Leonard Charles .... Basingstoke.
Garner, David .... Garston.
Gatehouse, William .... London.
Green, Herbert..................... Hucknall Torkard.
Griffiths, Henry Thomas......... St. Clears.
Gwynne, Samuel .... Leek.
Hacon, Elizabeth Constance ... London.
Haden, Thomas Henry .... Barnsley.
Hague, John James............... Ashton-under-Lyne.
Haigh, Walter .... Halifax.
Hall, Allen Joseph .... Coventry.
Hall, John........................... Aberdeen.
Harris, Herbert .... Kirton Lindsey.
Harard, Henry Lewis .... Penclawdd.
Harvey, James .... Flintham
Hays, Frederick Arthur .... Birmingham.
Hayton, William Pattinson ... Wigton.
Heading, Charles .... Downham.
Hector, Alexander B. .... Aberdeen.
Henderson, Henry Alfred .... Wibsey.
Higson, Joseph .... Blackburn.
Hill, Blair .... Edinburgh.
Hodge, John George .... Galashiels.
Holbeche, Harry .... Stottesden.
Holt, Herbert Collins .... Bowdon.
Horne, George Herbert .... Scarborough.
Horne, John Kay.................. Accrington.
Horne, Joseph .... Aberdeen.
Hughes, John Alfred .... Holywell.
Huntley, Joseph .... Cirencester.
Hutchinson, Edgar .... Newark.
Jackson, Albert Ernest .... Ipswich.
Jackson, Ben Leslie.............. Longton.
Jackson, Oliver Lincoln .... Blackpool.
Johnstone, Edward Straus ...... Whaley Bridge.
Jones, David John .... Cefn Coed.
Jones, Frederick .... Coalville.
Jones, William Owen .... Market Drayton.
Jones, William Rowland. .... Hay.
Kay, Charles William .... Leeds.
King, Alexander William .... Ayr.
Kingston, Percy John .... London.
Kingston, William Richard ... London.
Knowles, Louis..................... Leicester.
Laughlin, Alfred William .... Ramsey, I.M.
Laurence, John, jun. .... Glasgow.
Lavery, Charles .... Dumbarton.

Laycock, James ....Bradford,
Litchfield, John Henry ....Ashford.
Lovegrove, Wallis Sheffield......Crawley.
Low, Alexander Taylor .... Alva.
McCorquodale, John Campbell...Dumbarton.
McDonald, James....................Dundee.
Macleod, Lewis.......................Inverness.
McMaster, Thomas ....Stranraer.
Mason, Joseph Edwin ....Bexley Heath.
Mate, Richard Arnold..............Crewe.
Mather, James Smith ....Arbroath.
Maxwell, John ....Roxburgh.
Morris, Ernest William . ...Market Harborough.
Morris, James Kneeshaw ......Scarborough.
Muddell, Claude ....Southend-on-Sea.
Munns, Henry Ernest.............Birmingham.
Murfet, Edward ....King's Lynn.
Naylor, Edward Alfred ....Scarborough.
Norton, Edward Thomas..........Stow-on-the-Wold.
Nursaw, Francis Theakston ...York.
Parsons, Alfred George ....Exeter.
Parton, John Henry ....London.
Perkins, Frank ....Newcastle-under-Lyme.
Perrett, Samuel ....Bridgwater.
Phillips, Arthur Sydney ....Mitcheldean.
Pick, Alfred ....Chester-le-Street.
Pierce, Michael........................Croydon.
Price, Charles John ....Devizes.
Pridham, Charles Clifford ....Bath.
Rawlinson, William Bright ....Harwich.
Rees, Joseph ....Brynamman.
Renshaw, Frank ....Rochdale.
Reynolds, Philip ....Spalding.
Rippon, Richard Waller ....Leamington.
Robinson, Raymond..................London.
Robson, Thomas ....Hartlepool.
Rossiter, Percy Alex. ....London.
Russell, John ....Broughty Ferry.
Ryott, Harry William ....Gilesgate Moor.
Saunders, Edmund Thomas ...Newport Pagnell.
Sayers, William Charles..........London.
Selle, Louis Sherwood ....Hull.
Shenston, Robert ....Kenton.
Sinclair, Matilda Anne ....Llandudno.
Smith, Henry ....Durham.
Smith, Robert ....Earlestown.
Smith, Walter Woodhouse.......Doncaster.
Stevenson, George Shields C....Portobello.
Strachan, John.........................Aberdeen.
Stuart, William ....Preston.
Sykes, John ....Southport,
Tabor, Thomas Slade ....London.
Taylor, Edward ....Weymouth.
Thom, James ....Edinburgh.
Thompson, James Ebenezer ...Hexham.
Tod, James A. ....Edinburgh.
Tomlinson, Charles Parker.......Peterborough.
Toone, Edwards Roberts..........Bath.
Trickey, Alexander Leslie ....London.
Wain, Charles Oliver ....Bolton.
Watt, Arthur ....Edinburgh.
Weatherston, Francis B...........Peebles.
West, Cecil ....Retford.
Wheatcroft, Hoyland ....Rotherham.
Wheen, Harold.........................Bridlington Quay.
Whitbread, Howard..................Loughborough.
Wilcock, Fred Anderton..........Bradford.
Wilkinson, Frank.....................Nottingham.
Williams, Chalmers ....Carmarthen.
Wilson, William Potter .... Haddington.
Wood, John William ....Darlington.
Wride, William Blake ....Shirley.
Young, Edward ....Sudbury.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates. Exam-ined.	Passed.	Failed.		Candidates. Exam-ined.	Passed.	Failed.
Aberdeen	10	5	5	Inverness	2	2	0
Birmingham	19	12	7	Lancaster	2	1	1
Brighton	2	0	2	Leeds	22	16	6
Bristol	7	6	1	Lincoln	6	5	1
Cambridge	5	2	3	Liverpool	16	11	5
Canterbury	2	1	1	London	40	24	16
Cardiff	14	6	8	Manchester	25	15	10
Carlisle	4	1	3	Newcastle-on-T.	7	4	3
Carmarthen	8	4	4	Northampton	3	3	0
Carnarvon	6	1	5	Norwich	6	2	4
Cheltenham	1	1	0	Nottingham	16	12	4
Darlington	6	4	2	Oxford	1	1	0
Douglas	3	2	1	Peterborough	9	7	2
Dundee	3	3	0	Sheffield	8	4	4
Edinburgh	19	12	7	Shrewsbury	5	3	2
Exeter	11	6	5	Southampton	5	4	1
Glasgow	14	10	4	Truro	2	1	1
Guernsey	3	1	2	Worcester	3	1	2
Hull	8	5	3	York	8	6	2

The questions for examination were as follows:—

Time allowed: Three Hours for the three subjects.

I. LATIN.

1. Translate into English:—

(i.) Cæsari quum id nuntiatum esset, maturat ab urbe proficisci. (ii.) Omnis civitas Helvetia in quatuor pagos divisa est. (iii.) His responsis ad Cæsarem relatis, iterum ad eum Cæsar legatos cum his mandatis mittit. (iv.) Septimo die, quum iter non intermitteret, ad exploratoribus certior factus est, Ariovisti copias a nostris millibus passuum iv. et xx. abesse. (v.) Hæc eodem tempore Cæsari mandata referebantur, et legati ab Æduis et a Treviris veniebant: Ædui questum, quod Harudes, qui nuper in Galliam transportati essent, fines eorum popularentur; sese ne obsidibus quidem datis pacem Ariovisti redimere potuisse: Treviri autem, pagos centum Suevorum ad ripas Rheni consedisse, qui Rhenum transire conarentur: his præesse Nasuam et Cimberium fratres.

2. Parse fully:—"Omnis civitas Helvetia in quatuor pagos divisa est."

3. In extract (v.) account for the mood of *transportati essent* and *potuisse*, and for the case of *obsidibus* and *his*.

4. Translate into Latin:—(i.) There remained one way by which they could go out. (ii.) He set out from the camp with three legions. (iii.) There is no doubt that you have acted very ill. (iv.) Having heard these things, he led his army to the banks of the river.

II. ARITHMETIC.

[The working of these examples, as well as the answers, must be written out in full.]

1. A person buys a tub of butter, weighing 3 qrs. 16 lbs., for £4 2*s.* 6*d.*; the weight of the tub is 10 lbs.; how much does the butter cost him per lb.?

2. What sum must be added to

$$2\tfrac{1}{3}+\frac{3\frac{1}{3}-\frac{1}{6}}{3\frac{1}{3}+\frac{1}{6}}-2\tfrac{5}{7} \text{ of } \tfrac{4}{19}$$

that the sum may be equal to 3?

3. From 37 take ·37 and ·037, add the two results together, and divide the sum by 370.

4. If $3\frac{1}{2}$ sacks of 3 bushels each cost 31*s.* 6*d.*, find the cost of $10\frac{1}{2}$ sacks of $2\frac{1}{2}$ bushels each.

5. At what rate per cent. will the interest on £600 amount to £70 in 2 years 4 months?

III. ENGLISH.

1. Define an *abstract noun*; and form abstract nouns from the following words:—*steal, just, good, know, consider.*

2. There are adverbs of time, place, manner, and degree. Mention one of each, and expand the one you

give into (i.) an adverbial clause, (ii.) an adverbial sentence.

3. Parse fully the following sentence:—

"Pause a while,
And let my counsel sway you in this case."

4. Write a short composition on one of the following subjects:—

(i.) Christmas-tide.
(ii.) Illustrated Newspapers.
(iii.) Letter-writing.
(iv.) The recent Campaign in Egypt.

NORTH BRITISH BRANCH.

EVENING MEETING.

The third evening meeting of the session was held in the Society's rooms, 119A, George Street, Edinburgh, on Wednesday evening, January 17, at 9 o'clock.

Mr. Alexander Napier, President of the Branch, in the chair.

The minutes of the former meeting having been read and confirmed,

The Secretary to the Branch intimated the following donations to the library:—

Journal of the Chemical Society, five parts to complete volumes.
From the Pharmaceutical Society.

Canadian Pharmaceutical Journal, two parts completing volume for 1882.
From the Ontario College of Pharmacy.

'Year-Book of Pharmacy and Transactions of the British Pharmaceutical Conference,' 1882.
From the Committee of Publication.

For these donations a vote of thanks was moved by the President, and cordially responded to by the meeting.

Mr. William Gilmour then read a paper entitled "Notes on the New Edition of the United States Pharmacopœia."

In the introductory remarks he referred to the constitution of the Committee of Revision as being the best calculated to produce a thoroughly practical work, since a large number of the members were practical pharmacists. He spoke of the duties assigned to the committee and the mode in which they had conducted their labours, and then proceeded to comment upon the Pharmacopœia itself. Some remarks were made on the omission of fluid measure, and the adoption of decimal parts by weight for solids and liquids, so that the use of metric or troy weights, according to the taste of the pharmacist, was practical. Under this heading the influence of the change on the strength of various preparations was brought out, and the exceptions to the rule instanced; in the case of pills, for example, where the quantities in troy and metric weights are given in parallel columns, the product in both cases being for a definite number of pills. In speaking of fluid extracts he referred to the concise yet full directions given regarding the degree of comminution required for the drug used; the choice of a menstruum best calculated to ensure exhaustion according to the nature of the drug, and the various circumstances modifying the percolation process. Regarding the articles of materia medica, additions and omissions were noted, and the concise designation given to each article by adopting the name of the species only, thus leaving out the generic name as well as the name of the part used. It was here remarked that a plentiful adoption of synonyms served to remove any doubt which might arise regarding any given drug. He then referred to the chemical portion of the Pharmacopœia, on which he will treat in a second paper.

The President, in moving a vote of thanks to Mr. Gilmour, said that he was not in a position to remark on the subject, not having read the new Pharmacopœia; he hoped, however, that when Mr. Gilmour brought forward his second paper, he would have an opportunity of discussing the matter.

Mr. Stephenson said that he was sure the meeting was much indebted to Mr. Gilmour for having brought this subject under their notice, and he cordially acquiesced in the President's motion. He had had an opportunity of glancing through the work, but as his acquaintance with it was only that of a few hours, he could not venture to speak of it in a detailed way. He had been anxious chiefly to see how far it corresponded with or diverged from the British Pharmacopœia, and the first difference he noted was the substitution of weight for measure (except to a very limited extent) and the adoption of decimal parts in all the formulæ. The advantages as well as the disadvantages of this change were obvious, but the latter might have been greatly lessened by having specific weights alongside the decimal parts. Then he observed that the minim admitted as the unit of measure for physicians in prescribing differed from ours. He did not know if this minim was introduced for the first time. If it was surely it would have been well to adopt ours, as the basis of it was quite arbitrary. Then the pulv. aromaticus was our P. cinnam. co., but with the addition of nutmeg, not a judicious one, he thought. Another important variation was in tinct. opii, which was ordered as *one* of powdered opium to ten (10) of product. He noted the entire absence of the juices of herbs, whether as succi or for the preparation of extracts, although there was a general formula for tinctures from fresh herbs. Percolation was almost uniformly enjoined, and it was puzzling to find that tinct. myrrh was made an exception. The directions for conducting the process were very elaborate and did not appear to make much allowance for the intelligence of the pharmacist. One of these details he took objection to, viz., the passing the menstruum through the substance until a measured quantity of product is obtained instead of pressing the marc, and making up the required measure afterwards, and so avoiding waste of spirit. He also referred to the preparation of resin of scammony from the gum resin instead of from the root as a wasteful process. He pointed out that in the fluid extracts spirit of different strengths was the solvent, that they were indeed concentrated tinctures while our own were more like concentrated infusions, spirit being only added as a preservative. He had noted also the entire absence of the geographical sources of all articles of vegetable and animal origin. He concluded by referring to the very copious tables of thermometric equivalents, solubilities, saturating powers, etc., which were appended to the work, but while admitting their value he thought it was open to question whether a national pharmacopœia was exactly the place for them.

Mr. J. R. Young said that he had pleasure in listening to Mr. Gilmour's paper, and to Mr. Stephenson's remarks on the new Pharmacopœia of their American brethren. Probably Mr. Gilmour would be able in his next paper to reply to Mr. Stephenson's criticism. He remarked that probably the best pharmacists are those of the United States, and although they may differ considerably from us, we must not suppose that all these differences are bad. He had often admired their way of dealing with galenical preparations, more especially their tinctures and the like. He was struck with the remark of Mr. Gilmour's that the methods of preparing the different alkaloids were omitted; probably this was due to the fact that there were many eminent chemists in the United States, and an assumption thereby that pharmacists did not require to prepare such articles as alkaloids.

The President remarked that he had observed the reason for the omission of directions for the preparation of aconitine was the varying nature of that body, some commercial specimens being 170 stronger than others; they, therefore, tend to adhere more closely to galenical preparations of the strong drugs, which he thought was a very wise tendency.

A paper was then read by Mr. Peter MacEwan, Secretary to the Branch, on—

Pungent Liniment of Iodine.

Some time ago, I had given to me for examination a few drachms of liniment of iodine, which emitted a pungent and irritating vapour when applied to the skin, the vapour smarting and inflaming the eyes very painfully. Complaints have frequently been made of this liniment, owing to its incomplete absorption by the cuticle and the subsequent volatilization of the iodine, which may in some circumstances cause irritation; but in the case which I cite, the vapour was distinct from that of iodine, and suggested that the liniment had undergone decomposition. Old specimens of the official liniment do not differ materially in odour from that of the preparation when freshly made, so that it would appear that the difference shown in the specimen under examination was due to some objectionable modification of the official formula.

From the well-known fact that methylated spirit is used in the preparation of certain liniments, it was natural to presume that the pungent liniment may have been prepared with it. One drachm of this liniment was, therefore, decolorized with potash solution and distilled. The distillate, subjected to Miller's process for detecting the methyl base, gave a faint mirror with nitrate of silver. Subsequent applications of the test, however, showed it to be untrustworthy. A quantity of the liniment was therefore prepared with methylated spirit for comparison with the specimen given to me. This, at the time of preparation differed but slightly from the official liniment, the naphtha odour being partially masked, but in three weeks it became pungent and in every way similar to the objectionable specimen.

In the course of several experiments, directed to ascertain the ingredients of the liniment influencing the decomposition, it was observed that when a small quantity of pure liniment was carefully dropped on a little water contained in a porcelain dish, a flocculent substance separated and floated on the surface, assuming in a few seconds a crystalline appearance. Under the microscope this was seen to be made up of colourless fan-shaped crystals. This particular form of crystal is not given by alcoholic solution of camphor or of iodine. The crystals are probably an iodated camphor, and are of interest here, from the fact that the pungent liniment does not yield them, but an oily like fluid which floats on the surface for a few minutes, afterwards sinking and adhering to the bottom of the dish. This fluid possessed in a high degree the pungency of the liniment. As a careful microscopic examination of the oily fluid and the water surrounding it showed entire absence of crystals, it was assumed that the camphor had in some way influenced the development of pungency. In corroboration of this supposition a quantity of methylated liniment was prepared without camphor, and in this no pungency has been developed in a period corresponding to that in which the liniment containing camphor became pungent.

It is well known that wood spirit, used to methylate pure spirit, contains several bodies as impurities which undergo slow decomposition in presence of any foreign matter. This fact suggested that it is these impurities and not the methyl alcohol which are decomposed in presence of camphor and iodine. To prove this a quantity of the liniment was prepared with rectified spirit to which 10 per cent. of pure methyl alcohol had been added, and no pungency has been developed in the preparation.

I have not, meanwhile, directed any experiments to determine the constitution of the pungent oily compound, as this paper is merely intended to show that methylated spirit is not a fit substitute for rectified spirit in the preparation of liniment of iodine. I may, however, remark that allyl alcohol is one of the impurities of wood spirit and the pungent and irritating nature of the iodo-allyl compounds would indicate the formation of some such body under the conditions already stated. This, however, I hope to ascertain in future experiment with allyl alcohol and the other bodies constituting the impurities referred to.

The President said that the meeting was much indebted to the Secretary for his interesting paper, and he had much pleasure in moving a vote of thanks to him. He did not think that the use of methylated spirit was at all common, particularly in the preparation of iodine liniment.

Mr. Gilmour seconded the motion, and remarked that he had his attention called to the subject some time ago when a specimen of iodine liniment, such as had been described, was shown to him; the pungency reminded him very much of essential oil of mustard. The paper now read recalled the matter to him, and he thought from what he had himself observed that the cause of the pungency was very probably what had been hinted at, namely, allyl alcohol. He did not think that anyone with a reputation to lose would think of preparing his iodine liniment with methylated spirit, knowing the exceedingly annoying odour which was developed in it.

Mr. J. R. Hill said that the paper was of special interest to him for it explained a circumstance which had lately come under his observation. A person had applied for a preparation of iodine to be used for a dog, and he had been unable to satisfy the person even with the pharmacopœial liniment, which was alleged not to be strong enough. This person gave him a small quantity of a preparation supplied by a veterinary surgeon, and which was comparatively weak in iodine, but had an extremely pungent odour, from which the person had judged its strength. This odour was at first thought to be due to oil of mustard, and a careful examination showed the presence of methylated spirit; Mr. McEwan's experience corroborated his own conjecture on this point. He thought that the suggestion made about the crystals referred to in this paper being an iodo-camphor compound was very probable. Similar crystals were given when an alcoholic solution of bromo-camphor was mixed with water, and the likeness exhibited by halogen compounds generally favoured this supposition. He threw out the suggestion that iodo-camphor is first formed in methylated liniment, and the subsequent action of this on allyl alcohol produces this pungency.

Presentation of a Bust of the late Mr. H. C. Baildon.

After the reading of the papers the attention of the meeting was called to a bust of the late Mr. H. C. Baildon, presented by his son, Mr. H. B. Baildon.

The President, in accepting the gift in the name of the Council of the Branch, said that all who had known the late Mr. Baildon knew how thoroughly he had identified himself with the Branch, and how he had interested himself regarding all matters affecting its welfare. As a President of the Branch he had been greatly esteemed by the members, and his cultured mind and gentlemanly bearing lent a dignity to all matters he took part in. It pleased him highly to think that the son of their late friend showed by the gift his interest in the Branch and his attachment of pharmacy, and he had much pleasure in moving a cordial vote of thanks to him, and expressed the gratification which the Council had in placing such a fitting memorial of their late co-worker beside those of others who had in their lifetime been true friends of the North British Branch.

Mr. Young, in seconding this motion, said that he did so with feelings of pleasure and regret, for he had been intimately acquainted with the late Mr. Baildon, and the striking likeness presented by the bust recalled to him many happy meetings. Although Mr. Baildon was of English birth and training, he had spent the greater part of his life in Scotland, and though he was an English gentleman to the last, he was sure that no one had had the interests of Scotch pharmacy more at heart than he had. It pleased him very much to see so fitting a memorial presented to the Branch, and he felt himself indebted to the donor for the handsome gift.

Messrs. Ainslie and Stephenson having made a few remarks, Mr. H. B. Baildon, replied. In the course of his remarks he said that he hoped he would be enabled to merit in some measure the esteem and respect which had been accorded to his father, and he could assure those present that he appreciated the honour which was conferred upon his father in the placing of a memorial of him within the rooms of the Branch.

Before the meeting separated, the members had an opportunity of examining a collection of specimens of new drugs, exhibited by Messrs. Thomas Christy and Co., London, and which had remained in the rooms after their exhibition before the Assistants' Association.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The seventh general meeting of the above Association was held at the Royal Institution on Thursday, January 18. The chair was occupied by the President, Mr. Joseph Woodcock.

The minutes of the last two meetings were read and confirmed, and the following donations announced:— The 'Pharmacopœa Germanica,' 1882, and the 'United States Pharmacopœia,' 1882, from Messrs. Evans, Sons and Co.; the 'Year Book of Pharmacy' from the members of the Pharmaceutical Conference; the *Pharmaceutical Journal* from the Society, and the *Canadian Pharmaceutical Journal* from the Editor.

The President, in proposing a vote of thanks to the donors, alluded particularly to the liberality of Messrs. Evans, Sons and Co., in presenting the new Pharmacopœias, which few had as yet been able to obtain.

The President then called upon Mr. Conroy to read his paper, entitled—

Lime Juice: its Properties and Uses.

Dr. Symes, in proposing a vote of thanks, said the Association was much indebted to Mr. Conroy for his interesting and practical paper. Practical papers were always valuable, but this one was particularly so, as probably no one had had more experience in testing lime juice than Mr. Conroy. He would like to know if the size of the limes named by Mr. Conroy was peculiar to Montserrat, as he had seen some limes which were about twice the size of ordinary lemons. He would also like to know whether Mr. Conroy had found lime juice to vary in citricity according to the season of the year. Lemons in summer time scarcely contained any citric acid, whereas in the winter they held about as much as limes. Regarding the preservation of lime and lemon juice, he believed that the former was certainly more readily preserved than the latter. About twenty years ago he had published in the *Pharmaceutical Journal* the results of some investigations which he had made in connection with this subject, and he then found that by clarifying the lemon juice, heating for about ten minutes at a temperature of 150° Fahr., and then corking quickly and sealing over with beeswax, the juice would keep well for many months without the addition of any alcohol. If heated over the temperature named the juice was apt to become brown. Juice thus bottled in the winter, when the citricity was at the highest, was available in the summer time for effervescing drinks, when lemons contained hardly any citric acid. Dr. Symes, while admitting the beneficial results of using lime juice on board ships as a preventive of and cure for scurvy, thought that the decrease of that dread disease was also due in some measure to the fact that in the naval service, and to some extent in the merchant service also, it was now felt that, if the sailors were to be kept healthy, they must have food supplied to them which contained in larger proportions the constituents of vegetable juices and such principles as creatine and creatinine, found in meat juice. Compressed vegetables, tinned meats and fruits were now more frequently served out to the men. In reference to the respective therapeutic properties of lime and lemon juice, he did not think that the larger number of cases of scurvy in the merchant service was altogether due to the inferior qualities of the lemon juice as compared with lime juice, but because on the vessels of the Royal Navy the men were bound to take the juice which was handed to them, whereas in the merchant service, when given, out it was frequently used by the men for washing the decks instead of being taken.

Mr. A. C. Abraham, in seconding the vote of thanks, asked whether the bottles used in the experiments were full or otherwise, as he found from experience that if lemon juice were bottled quickly after pressing, and before it had time to absorb any germs from the air, it would keep for a considerable length of time in an unimpaired condition. In reference to the fortifying of the juice in bond, he had always understood that rum was ordered by the Board of Trade, and not simply proof spirit. Rum contained a certain quantity of essential oil or ethereal compounds, which no doubt would have considerable preservative power; but that, of course, was a question which would hardly be thought of when the law was drawn up, and the authorities might not have considered the difference between rum and proof spirit of any importance.

Mr. A. H. Mason, said that the paper which had been read was one of peculiar value, as he did not think that in any previous investigations the large number of four thousand experiments had been made to prove the case. Regarding the samples upon which Mr. Conroy based his remarks, he would like to know if Mr. Conroy had tested the filtrate from the clarified samples in order to ascertain the amount of citricity left behind. It occurred to him that the idea of the essential oil of the limes having a tendency to preserve the juice, owing to its emulsification, was a very ingenious one, and was no doubt correct.

Mr. A. H. Samuel wanted to know whether Mr. Conroy had tested samples of lime juice other than Montserrat, as he thought it would be interesting to know how the citricity compared with the samples Mr. Conroy had spoken of. There was such an extraordinary difference of opinion among the different authorities as to citricity that he thought the observations of Mr. Conroy would be very valuable, as they formed a standard which would satisfy everybody as to the relative values of lime juice which was used in the merchant shipping service or otherwise.

Mr. Conroy, in reply, thanked the meeting for the very kind manner in which his paper had been received, and also for the vote of thanks which had been passed. In reference to the remarks of Dr. Symes, he said that he had only seen limes that were grown in Montserrat, and the description he had given was chiefly obtained from Risso and Poiteau's excellent work. The tables supplied were taken from analyses made in both summer and winter, and in his opinion the citricity did not vary much with the seasons, provided the fruit was collected at the proper time and not allowed to become too ripe. He had read Dr. Symes's paper on the preservation of lemon juice, but was of opinion that the therapeutic value of the juice was injured by the application of heat. Although agreeing with Dr. Symes that the nature of food supplied to sailors was of very great importance, it must not be forgotten that in the late British Polar expedition every attention was given to this point; still, because the lime juice was neglected, scurvy broke out to a most serious extent. In reply to Mr. A. C. Abraham, Mr. Conroy said that no special precautions were taken in filling the bottles, and they were not quite full. The Board of Trade only demanded that palatable spirit should be used, and though rum was generally used, any other spirit would be allowed, if good. Replying to Mr. Mason, he found that the filtration did not affect the citricity at the time, and in reference to Mr. Samuel's query, Mr. Conroy said that he had examined many other kinds of lime juice, but found that although the best of them ran very close in respect to citricity to the Montserrat juice, they were inferior in quality, and frequently contained salt and other impurities. He did not think that salt or salt water was always fraudulently added, but was of opinion that its presence was often due to the use of sea water in washing casks and other vessels.

The vote of thanks having been passed, the proceedings terminated.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The twelfth annual soirée in connection with this Association took place in the Town Hall, on Monday evening last, and was very largely attended. On the present occasion, the scientific exhibition which has usually formed a feature of these réunions, was dispensed with. The hall, however, was very tastefully decorated with mirrors, curtains, and various kinds of furniture for the recesses beneath the great gallery and orchestra, and floral decorations in the shape of plants, evergreens, palms, etc. The proceedings commenced at eight o'clock with a promenade concert. Dancing commenced at nine o'clock.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual dinner of the above Association was held on Wednesday evening last, at the George Hotel, when upwards of sixty chemists and druggists and their friends sat down.

The chair was occupied by the President (Mr. Councillor Fitzhugh), and the vice-chair by the Vice-President (Mr. Robert Jackson).

Amongst the visitors present were Mr. Councillor Lees and Mr. Councillor Gibson, of Manchester. The latter, in proposing the toast of the evening, viz., "Success to the Nottingham and Notts Chemists' Association," referred in eulogistic terms to the manner in which it was carried on, and expressed approval of the principles upon which it was founded. The Honorary Secretary (Mr. C. W. Warriner) briefly responded.

The other toasts given were "The Pharmaceutical Society," by Mr. Parker, responded to by Mr. Fitzhugh (Local Secretary); "The Town and Trade of Nottingham," by Mr. C. W. Bolton, responded to by Mr. I. H. Haywood; "The Officers and Council," by Mr. Beilby, responded to by the Vice-President; "The Visitors," by the President, responded to by Mr. Councillor Lees and Mr. George; "The Chairman," "Vice-Chairman," and "The Ladies."

Mr. Holgate again introduced to the notice of those present the claims of the Pharmaceutical Benevolent Fund, when the sum of five guineas was collected in the room.

During the evening the meeting was enlivened by songs and duets by Messrs. Castings, Pickerill, C. Taylor, and T. Selby, Mr. W. T. Cockrem ably acting as accompanyist. Donations were also announced from Messrs. Storey, Witty and Co., Oldfield, Pattinson and Co., Mr. Gibson, Mr. Mason, and Mr. Osbourne.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Wednesday, January 17, a lecture was delivered at the rooms of the above, No. 4, Halford Street, by Mr. J. Garrett on "Mercury" (analytical). The subject was well handled; the tests for the mercuric salts first, and those for the mercurous salts were brought before the audience in an instructive and interesting light, Mr. Garrett thoroughly working out the subject before be brought his lecture to a close.

Mr. E. Brien proposed and Mr. Vultz seconded a vote of thanks, which was heartily accorded to the lecturer.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, January 18, Dr. Gilbert, President, in the chair.

The President announced that the following distinguished chemists would be proposed for election, at the next meeting of the Society, as Foreign Members:—Beilstein, Cléve, Debray, Erlenmeyer, Fittig, Helmholtz, Mendeljeff, Lothar Meyer, Victor Meyer. A ballot for the election of ordinary Fellows will also be held at the next meeting (February 1).

The following certificates were read for the first time: A. C. Abraham, E. Bevan, C. N. Betts, F. J. Cox, A. Collenette, S. Dyson, W. T. Elliott, H. B. Fulton, C. G. Greenfell, B. F. Halford, D. Hooper, W. D. Hogg, H. F. Lowe, T. H. Leeming, J. E. Marsh, W. Newton, C. Rumble, F. Scudder, F. Watts, C. S. S. Webster.

Dr. Roscoe then communicated the substance of a paper entitled—

The Fluorine Compounds of Uranium. By A. Smithells.—Since the preparation of uranium oxyfluoride by Berzelius the above compounds have been investigated by Carrington Bolton, and more recently by Ditte; as the results obtained by these two chemists do not agree, the present experiments were undertaken to clear up the question. The green uranoso-uranic oxide U_3O_8, when acted upon by aqueous hydrofluoric acid, gives a voluminous green powder and a clear bright yellow solution. According to Bolton this green powder is UF_4, whilst the yellow solution furnishes on evaporation UO_2F_2. Ditte assigns to the green powder the formula UO_2F_2, and to the substance in the yellow solution the composition UF_6+8HF; he also represents the reaction thus: $U_3O_8+18HF=2(UF_62HF)+UO_2F_2+6H_2O+H_2$. The author endeavoured to collect the 2·6 litres of hydrogen which should be, according to Ditte, evolved from 100 grams of U_3O_8, but found that none came off. He finds that Ditte is also in error as regards the composition of the other bodies, which are, as Bolton stated, UF_4 and UO_2F_2 respectively. When UF_4 is heated in a closed crucible a white sublimate is formed; if, after five minutes, the crucible is allowed to cool, and the sublimate removed, a fresh sublimate is again formed on reheating, and so on until a residue is left of UO_2. This sublimate is isomeric with the body found in the yellow solution, and is called, therefore, a uranium oxyfluoride UO_2F_2. The author has also investigated the new fluorine compounds obtained by Ditte by fusing U_3O_3 with an alkaline fluoride, and which, he stated, had the composition UO_2F_24MF and $UOF_44MF+xH_2O$. The author concludes that these compounds have no existence, and that really only fluoxyuranates were obtained by Ditte.

The Secretary then read a paper—

On a New Method of Estimating the Halogens in Volatile Organic Compounds. By R. F. PLIMPTON and E. E. GRAVES.—The authors introduce a weighed quantity of the liquid into the tube of a glass Bunsen burner, the tube of the Bunsen is bent into a U; over the end of the Bunsen is placed a glass trumpet-shaped tube, the other end of which is connected with a U tube filled with pieces of glass; these are moistened with pure caustic soda solutions. A second U tube, similarly charged, succeeds the first; to the second U tube is joined a small wash bottle containing nitrate of silver. A Sprengel pump is connected with the wash bottle so that the products of combustion are sucked successively through the two U tubes, and finally bubble through the nitrate of silver solution. The gas having been lighted, the liquid is expelled from the weighing tube by gentle heat. After all the liquid has been thus driven off and burnt, the soda solution is washed out and boiled with sulphurous acid to reduce any chlorates, etc.; nitric acid is added and the solution precipitated with silver nitrate. The combustion usually takes fifteen to twenty minutes. About twelve analyses are given with liquids of various boiling points, the lowest being ethyl bromide boiling at 39°, the highest acetylene bromiodide boiling at 150° The results agree well with the calculated numbers.

Mr. W. A. SHENSTONE then read a short paper—

On a Modified Liebig Condenser.—The Liebig's condenser is placed vertically; to the lower end of the inner tube is fused a short piece of somewhat smaller glass tube, the end of this smaller tube projects upwards about half an inch into the condenser. In this way an annular ledge is formed between the inner wall of the condenser and the outer wall of this smaller tube. This annular space is drained by a narrow glass tube a few inches long, which is fused into the bottom of the condenser like a T piece. This narrow glass tube slopes gently downwards, and is furnished at its extremity with a stopper. The advantages are, first, that the apparatus requires less space on the table than the ordinary condensing arrangement, and secondly, that when substances have to be digested for some time and subsequently distilled, no shifting of the apparatus is required. Thus, in the preparation of formic acid by heating oxalic acid with glycerine, the stopper is inserted in the narrow T tube, any vapour rising into the condenser is condensed, trickles down, fills the annular space, overflows, and runs down into the flask. When it is wished to distil the product the stopper is taken out and the liquid, instead of running back into the flask, drains off from the annular space down the narrow T tube into the receiver. The apparatus is made by Cetti and Co.

The Secretary then read a paper—

On two new Aluminous Mineral Species, Evigtokite and Liskeardite. By W. FLIGHT.—The first mineral comes from the cryolite bed of Greenland. The author gives its formular as $Al_2F_3 + 2\ CaF + H_2O$; it resembles chalk or kaolin in its appearance. Liskeardite is obtained, as a white crystalline mineral with a tinge of blue, from Penzance; it has the formula $3\ R_2O_3As_2O_5 + 16\ H_2OR = Al$ and Fe^{iv}.

The author has made a very minute and careful determination of the water expelled at various temperatures.

The Secretary then read a paper—

On the Volume Alteration attending the Mixture of Salt Solutions. By W. W. J. NICOL.—The author has investigated the changes of volume in mixing various proportions of sodium and potassium chlorides, of potassium nitrate and sodium chloride, of sodium nitrate and potassium chloride, and of copper sulphate and potassium sulphate. The experiments show that when two salt solutions which cannot experience double decomposition are mixed, a change of volume takes place due to the different affinity of the salts for water; that double decomposition takes place in solution, and that the volume change is an index and even a measure of this decomposition.

The Society then adjourned to February 1.

ROYAL INSTITUTION.

THE PRIMEVAL ANCESTORS OF EXISTING VEGETATION AND THEIR BEARING ON THE DOCTRINE OF EVOLUTION.

BY PROFESSOR C. W. WILLIAMSON.

The second lecture of this course was delivered on Tuesday last. The following is an abstract:—

The living Lycopods or Club-mosses consist of two groups, the Lycopodia and the Selaginella, distinguished by their spores. The former group has only one kind of spore, each of which develops a "prothallus," which bears the two sets of organs corresponding to the pollen-grains and ovules of the flowering plants. This is the chief form occurring in cold and temperate regions. The latter group has two kinds of spores, viz., microspores, corresponding to the pollen-grain and the macrospore to the ovule of the higher plants. The group of the Selaginella chiefly abounds in the Tropical and warmer regions. Both groups have virtually the same structure, with the exception of the spores. The stem, which always branches dichotomously, consists of a mass of cellular tissue, in the centre of which is either a single bundle of vessels or there are several such bundles arranged side by side. In both cases, these bundles constitute a vascular axis enclosed within a true bark. On comparing the structure of one of those macrospores of Selaginella with that of the seed of a Coniferous plant we discover several definite features in which they agree so closely as to render a transition from the one to the other no difficult thing for Nature to accomplish. These recent forms are all of dwarf dimensions, and mostly of creeping habit. Though they are very abundant, and widely diffused over the globe at the present time, it is singular that they are very rare in a fossil state. One small form has been detected in Arctic beds of Tertiary age, and one or two that we have reason for regarding as of the same type are met with in the Oolitic beds of Yorkshire. Still finer examples have been discovered in rocks of Carboniferous age, in the coal-beds of the Franco-German frontier, near Saarbrucken, showing that their rarity in the oolites and yet newer beds was not due in all probability to their non-existence, but to their non-preservation, since it can scarcely be doubted that the carboniferous types have been connected with the living ones by a continuous line of descent. When we reach the Permian rocks, following the descending order, we meet for the first time with some of the magnificent arborescent genera so characteristic of the Palæozoic ages, and which evidently attained their grandest development during the Carboniferous epoch. During this age they constituted various vast forests, abounding in trees from 50 to 100 feet in height, with stems having a bulk corresponding to the mass of foliage which they had to support. Though there are several genera of these arborescent Lycopods, they are chiefly resolvable into two—the Lepidodendra and Sigillaria.

The Lepidodendron had a stem covered with the large leaf-scars which marked the former positions of the leaves on the young branches, but which had been much enlarged by the growth of the stem and branches. These scars are arranged in diagonal lines that wind equally right and left round the stem. The leaves, which were more or less elongated and narrowly linear, adhered long to the branches. The latter exhibited invariably the dichotomous subdivisions still so characteristic of the small living species. On turning to their internal organization we find how widely these stems and branches of the fossil forms differ from the recent ones. The youngest twigs of the former approached very closely in structure to that of the stems of the latter. They possessed a single small bundle of vessels enclosed in a thick bark. But very soon advancing growth developed this bundle into a cylindrical ring of vessels enclosing a small cellular pith, thus dividing the stem into a pith, a vascular zone which sent branches to the leaves, and a thick bark, to the exterior of which the leaves were attached by a pulvinus, or thickened base. As the stem or branch grew the vascular ring increased both in size and in the number of its component vessels, the pith growing in the same time and ratio. But after reaching a certain stage of growth, which stage was reached sooner or later in the case of various species, an altogether different structure was added to their stems and branches. The vessels of the existing ring were grouped irregularly and in no definite order. By the process of vegetable growth known as "exogenous," a new vascular cylinder was added to the exterior of the pre-existing one; its vessels were now arranged in regular radiating lines, and separated by cellular medullary rays, and additions seem to have been made to the outer border of these radiating laminæ, as long as the life of the plant endured. This new cylinder differed very little in any essential respect from those similarly produced in the Oaks and Elms of our own time.

French observers, followers of Brongniart, regard the growth of this second cylinder as a distinctive feature characteristic of the next plant to be noticed—the Sigillaria. This idea is altogether contradicted by innumerable facts revealed by our British discoveries. The only real difference between the Lepidodendron and the Sigillaria is seen in the exterior of the bark. In the former, as we have seen, the leaves are arranged on the branches in diagonal spiral lines; in Sigillaria they are arranged in vertical lines. All other supposed internal distinctions are merely due to differences of age. Sigillaria, like Lepidodendron, is an arborescent Lycopod.

Both these genera had the same kind of root. This was once believed to be a distinct plant, known by the name of Stigmaria Ficoides. These roots were, like the stems, of huge dimensions. Like the aerial branches, they branched dichotomously, and were clothed with large cylindrical rootlets, the organization of which bespoke clearly their Lycopodeaceous character. The fructifications of these trees are known to us by the name of Lepidostrobi, which were merely modified half abortive branches, at the base of each leaf of which was developed a little box (sporangium) filled with spores. Possibly some of these Lepidostrobi, like the Lycopodiums, had but one kind of spore; but a large number of them were certainly "heterosporous," *i.e.*, they possessed, like the Selaginellæ, both micro- and macro-spores; the sizes and appearance of both of which, notwithstanding the differences in the sizes of the parent plants, were almost absolutely identical in the primæval fossils and in the living plants. The peculiar branches which bore these fruits have long been known under the name of Haloniæ, and various functions have been attributed to them. It is now certain that they were the fruit-bearing, ultimate branches of some Lepidodendra, and probably of Sigillaria also. The stems, also, known as Ulodendra, are merely these branches from which the Lepidostrobi have fallen, leaving impressed upon the surface of the bark circular scars corresponding to the bases of the fallen fruits, but which, like initials cut long ago on the bark of some tempting Elm, have grown with the growth of the stem on which they were inscribed. That a large number of the fallen cone-like organs shed both microspores and macrospores is shown by the numbers of these two structures which both swell the bulk and improve the qualities of the Coals of which they form so important a part.

The plants just described reappear in the yet older Devonian rocks, but here they are associated with yet more anomalous and archaic forms, especially with the well-marked genus Psilophyton, so abundant in the Devonian strata of Canada. It appears to be Lycopodendrous, though widely removed from all living types. There is further evidence that some of these Palæozoic types were living in the age of the upper Silurians. Fragments have been found sustaining that conclusion.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, January 18, Mr. H. G. Greenish, Vice-President, in the chair.

Mr. F. Ransom read a paper on the "Detection of Strontium," which will be published in a future number of this Journal. A discussion followed, in which the Chairman, Secretary, and Messrs. Dymond and Haward took part. A vote of thanks was passed to Mr. Ransom.

Mr. Elborne then read a "Report on New Remedies," which will probably be published in a future number. The report was illustrated by specimens.

A discussion on the subject of the Report took place, in which the Chairman, Secretary, Messrs. Cripps, Haward and Ransom took part.

The Secretary then announced that the Executive Committee had appointed Mr. R. A. Cripps to be the Reporter on Practical Pharmacy for the ensuing session. The meeting then adjourned.

Parliamentary and Law Proceedings.

Poisoning by Chloral.

On Saturday, January 20, Dr. Diplock held a long inquiry at 29, Upper Phillimore Place, Kensington, as to the death of Mrs. Catharine Gape, the widow of Admiral Gape, aged 36.

Annie Godwin, cook in the service of Dr. Heffenden, said she was requested to go home with the deceased on Tuesday night. The deceased at that time complained of the death of a favourite dog. When they arrived home the deceased went up to her bedroom. Witness followed, and saw her put a chloral bottle on the mantelshelf, at the same time saying, "Oh, God, I'm dying!" Witness answered, "Nonsense, Mrs. Gape." The deceased, who appeared in very low spirits, added, "I have taken fourteen doses."

Dr. Heffenden said he had attended the deceased for some years. On Tuesday night he was sent for, and everything was done to restore the heart's action, but to no effect. Witness had never prescribed chloral for her.

The Coroner informed the jury that the chloral in the bottle was known as "Hunter's Solution of Chloral."

Annie Godwin, upon being recalled, said that the gas in the bedroom was barely alight when Mrs. Gape drank from the bottle.

After a lengthened deliberation the Jury returned a verdict, "That the deceased died from the effects of chloral, and that the said death was accidental." At the request of the Jury the Coroner added the following rider, and promised to forward it to the Home Secretary: "We are of opinion that some restrictions should be placed upon the sale of patent medicines that may be used as poisons."—*Daily News.*

The West Malling Poisoning Case.

At West Malling, on Wednesday, Mr. J. Rogers, one of the coroners for Kent, resumed his inquiry into the circumstances attending the death of Sarah Ann Wright, the daughter of a labourer residing at Malling, who, on December 14, last, died as alleged, from the administration to her by the Rev. J. H. Timins, the vicar of the parish, of a teaspoonful of oil of bitter almonds.

Dr. Pound added to his evidence that he did not agree with various theories advanced by Mr. Timins in his evidence. He was of opinion that if Mr. Timins had taken a teaspoonful of the same oil as caused the death of the deceased, it must have been fatal in his case; while he also believed that if when the girl cried out on swallowing the oil, or even when Mr. Timins had himself taken some of the oil, medical assistance had been called in, the girl's life would in all probability have been saved. As to the suggestion of apoplexy, when he made the *post-mortem* examination, he had in his mind the fact that death might have arisen from apoplexy, among other matters; but he had not the slightest doubt that death was due to prussic acid poisoning, and he had no difficulty in arriving at that conclusion. He could not have made a more searching investigation.

Dr. Pope expressed the same opinion as to the necessarily fatal effects of a teaspoonful of oil such as that given to the girl. He noticed at the *post-mortem* examination an enlargement of the thyroid gland, but there was nothing in that likely to cause death. He was in the house after the girl had taken the oil, and the mother told him Mr. Timins had given her something which made her cry, but this did not make him suspect anything. In hastily passing through the room and cursorily glancing at the deceased he saw nothing in her condition which would lead him to think she was approaching her end.

The Coroner, in summing up the evidence to the jury, said that the result of a *post-mortem* examination of the body of the deceased had been the discovery of prussic acid and of oil of bitter almonds. Such being the case he thought that, notwithstanding the statement by Mr. Timins at the last meeting, death was due to prussic acid poisoning, and not to natural causes. It was for the jury to consider whether or not Mr. Timins was criminally responsible for the administration of the poison, it having been suggested that he was not and that the death was due to misadventure. Mr. Timins had stated that he was originally a student of medicine at St. Thomas's Hospital, but that was some thirty-six years ago, and he never qualified. Since then the science of medicine had developed new theories and practice, so that what might then have been considered proper might now be obsolete. Mr. Timins too, had since been engaged in a very different profession. In order to enable a non-professional man to administer with safety in a case of emergency it was laid down by Lord Lyndhurst in Rex *v.* Webb, that it was necessary it should be at a place where proper medical assistance could not be secured. In this case no one could say that there was a question of emergency, and there were also two or three medical gentlemen resident in the place. That being the case, and death having been caused by the administration of oil of almonds by Mr. Timins, it would be for the jury to say whether or not he was criminally responsible. When the oil was purchased Mr. Timins said it was to be used externally, and they knew that the girl had been induced to drink it, although she did so with some reluctance. Mr. Timins had stated that he also took a dose, but he had admitted that he knew that the oil of bitter almonds contained a certain quantity of prussic acid. He had further stated that he mistook the poisonous for the non-poisonous oil on this occasion: but after he gave it to the girl he did not do what was unquestionably his duty. —send immediately for a doctor. For it was fair to assume that the poor girl's life might have been saved if he had done so.

The Jury, after some consultation, returned a verdict of manslaughter against the Rev. J. H. Timins. At the same time they expressed their belief that the oil of almonds was administered with no evil intent.—*Times.*

G. Brown.—If you refer to the *Lancet* for the 13th inst., you will see that a correction was inserted on p. 88.

"*Dispenser.*"—(1) You have omitted to give a copy of the prescription. (2) "Nut oil," expressed from the seeds of *Arachis hypogœa.*

W. C. M.—You must follow the usual procedure for gas analysis.

Devonia.—A ten volume solution will answer. See *Pharm. Journ.* for March 11, 1882, p. 747.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Permanganate of Potash Pills.

Sir,—I always held the Scotchman in profound veneration for his transcendant abilities; but after reading Mr. Mackenzie's letter of Saturday last, I was completely dumb, and held my breath in silent admiration of the Celtic soul of Mr. Mackenzie's elder apprentice in particular. The Saturday previous I felt very grateful to Mr. Martindale for his formula for a pill that had given me considerable trouble, now I am quite vexed with him for giving me so much trouble. Why, sir, we have been "fooling around" (as the Americans say) with cacao butter, vaseline, kaolin, and all sorts of things, when we have at hand a nice clean and simple medium on our dispensing counter. Really, Mr. Martindale, you might have known better, and not given us all this trouble for nothing; but now comes the question, How did he do it? One chemist I know tried it (before Mr. Mackenzie's letter). Result: Chemist with a burnt finger, and a charred mass in the mortar, accompanied by a display of fireworks on a small scale. Perhaps for the benefit of these poor ignorant men Mr. Mackenzie himself (not his elder apprentice) will kindly mix the mass, and then tell us how much permanganate remains in each pill; the result will, I think, astonish him.

I was asked fourteen days ago to prepare these pills and use conf. rosæ, and on my suggesting this was worse than useless, was left to find out the best excipient. My resort was cacao butter. This was subsequently verified by an appeal to Dr. Ringer. Cacao butter does certainly make a very nice pill, but is very difficult to make. If the molten mass could be poured into a small mould it would then be perfection.

Mr. Martindale's plan is by far the most practicable one I have come across yet (except, of course, that of Mr. Mackenzie's elder apprentice), the only danger being you are apt to get the pills rather large. This, of course, is avoided with a little practice.

Manchester. J. Hart.

Sir,—If the senior apprentice at 45, Forest Road, Edinburgh, had been experimenting in spontaneous combustion I can easily understand that he would use sugar and syrup to make up pills of permanganate potash. Let him try again and he will see the result and find the mass burnt up in less than three minutes. For my own part, I prefer to adopt the course followed by that cunning artificer in pharmacy, Mr. Martindale, of New Cavendish Street.

Norwich. Octavius Corder.

Sir,—I should not recommend any one to adopt Mr. Mackenzie's method of making permanganate of potash into pills with the aid of sugar.

Apart from the reducing action of sugar on such a substance as permanganate of potash, pills so made are liable to take fire should the pestle be used a little firmly.

Edinensis.

Sir,—I am sure the trade must feel deeply indebted to Mr. Mackenzie (and his intelligent senior apprentice) for publishing his formula for making the above pills.

I tried it and found that the mass "went off" in the mortar in a similar manner as with glycerine (mentioned by Mr. Martindale) only less violently.

I made excellent pills by using to 20 grains of the salt, 4 grains ung. resinæ and 1 grain p. gum. trag.

Chester. F. B.

Communications, Letters, etc., have been received from Dr. Dowse, Dr. Hesse, Dr. Thresh, Messrs. Cowdery, Macnaught Bros., O'Sullivan, Wright, Hutton, Robinson, W. C. M., R. J.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 583.)

Catechu, U.S.P. and P.G.—The U.S.P. still gives the preference to the extract of *Areca Catechu*, and the P.G. to that of *Uncaria Gambir* and *Areca Catechu*. The test that it should show a crystalline structure when examined in glycerine under a lens magnifying two hundred times cannot apply to the areca catechu, since Flückiger and Hanbury were unable to obtain crystals from it.

Catechu should not leave more than 15 per cent. of insoluble residue when treated with spirit or boiling water, nor yield more than 6 per cent. of ash.

Caulophyllum, U.S.P.—The rhizome and roots are official. This new addition is valued as a uterine tonic by the Eclectics,* but is regarded by Stillé and Maisch as "probably destitute of medicinal power" ('Dispensatory,' p. 373).

Cera Flava, U.S.P. and P.G.—The P.G. requires that beeswax shall be soluble in 300 parts of boiling alcohol, sp. gr. 0·830, with the exception of a very small brownish-yellow residue. Upon the cooling of such a solution a white crystalline paste is precipitated, and when the pale yellowish liquor has been filtered it should not be rendered turbid by water, neither should it more that slightly redden blue litmus paper. One part of wax digested for an hour with 300 parts of spirit, sp. gr. 0·96, and 1 part of caustic soda added, should give a clear liquid which, when cooled and filtered, is not precipitated by hydrochloric acid.

According to the U.S.P. cera flava should be soluble in 35 parts of ether and 11 of chloroform. Soap is detected by hydrochloric acid giving a precipitate in water in which the wax has been boiled, and paraffin is recognized by being left insoluble when 5 grams of wax are heated for fifteen minutes with 25 grams of sulphuric acid to 160° C., and the mixture subsequently diluted with water. For the detection of vegetable wax, resin, etc., a test similar to that of the P.G. is given, except that an aqueous instead of a spirituous alkaline solution is ordered.

Cetaceum, U.S.P. and P.G.—The P.G. has raised the melting point from 45°–50° in the last edition, to 50°–54° in the present one. One part of cetaceum should be soluble in 40 parts of boiling alcohol and water should precipitate nothing from the liquid filtered when cold.

Chelidonium, U.S.P.—It is difficult to understand the admission of this drug to the materia medica, more particularly since sanguinaria, which is said to possess the same active principle is retained. Chelidonium is, however, a favourite medicine with homœopaths, and is valued as a domestic remedy in the United States.

Chenopodium, U.S.P.—Chenopodium anthelminticum is made a variety of *C. ambrosioides*, L., and a description is now added.

Chondrus, U.S.P.—*Chondrus mammilosus*, Grev., U.S., is now official as well as *Chondrus crispus*, Lyngb., but the description given does not apply to the latter, which differs in having pedicellate fruit and a channelled stem to the frond. The latter plant is now generally referred to as *Gigartina* and the specific name spelt mammillosa.

Chirata, U.S.P.—Not only is the name altered from "Chiretta," but the name of the plant yielding it, which is now *Ophelia Chirata*, Griesb. No mention is made of the presence or absence of pith in the stem, nor of the relative thickness of its woody portion by which the much less bitter *Ophelia angustifolia* is distinguished from *A. Chirata* (*Pharm. Journ.*, [3], v., p. 481).

Chrysarobinum, U.S.P. and P.G.—The U.S.P. apparently intends a mixture of the chrysarobin of Liebermann and Seidler (*Pharm. Journ.*, [3], ix., 896) and chrysophanic acid, such as is usually met with in commerce under the name of chrysophanic acid, since it describes chrysarobin as "a mixture of proximate principles (commonly named chrysophanic acid)," and gives the test that sulphuric acid dissolves chrysarobin with a deep blood-red colour which does not apply, according to the above-named chemists, unless chrysophanic acid is present in it.

In the P.G., on the other hand, in which the tests given by Liebermann and Seidler to distinguish the two bodies are not adopted, chrysophanic acid would seem to be excluded, since it is required that the water in which chrysarobin has been boiled (1 part in 2000) should not give an acid reaction, nor be coloured by solution of sesquichloride of iron, and if shaken with liquor ammoniæ, should take one day to assume a purplish-red (coccineum) colour. Yet from the statement in the P.G. that chrysarobin dissolves in sulphuric acid, forming a solution of a colour from pale red to yellow, it would appear that allowance is made for traces of chrysophanic acid, since pure chrysarobin, according Liebermann and Seidler, dissolves in that liquid with a yellow colour. The P.G. directs that whenever chrysophanic acid is ordered for external use chrysarobin is to be dispensed, but gives no directions for its use in case the chrysophanic acid is intended for internal administration.

Cimicifuga, U.S.P.—The size of the rhizome as regards diameter (1 inch) is certainly larger than is generally met with in English commerce, ½ to ¾ inch being the usual width. The description of the internal structure, "a smooth fracture with a large pith," is scarcely definite enough, since the central portion is as firm and resinous as the bark and is not at all like ordinary pith.

Cinchona, U.S.P.; Cortex Chinæ, P.G.—"Cinchona," including "the bark of any species of cinchona containing at least 3 per cent. of its peculiar alkaloids," is official for the preparation of the infusion. No definition is given of the alkaloids intended by the word "peculiar," so that a bark containing cinchonine and cinchonidine, but no quinine, may be used provided the total yield of alkaloids amount to 3 per cent. In the U.S.P., under cinchona flava, *C. Calisaya* is still official for the preparation of the extract, fluid extract and tinctura cinchonæ; and under cinchona rubra, *C. succirubra* is ordered to be used in the preparation of tinct. cinchonæ co. The description of calisaya bark is not sufficiently definite to enable any one to detect the substitution of flat pieces of *C. Peruviana*, *nitida*, *australis*, or of *C. scrobiculata* in quills, for the official bark. The statement that the quills of *C. Calisaya* bark are "marked by longitudinal and transverse fissures *about one inch apart*," is not correct. *C. Calisaya* in flat pieces

* *Pharm. Journ.*, [2], iv., p. 52.

and *C. succirubra* in the same state containing the required percentage of the alkaloid rarely enter into retail commerce, and the Pharmacopœia, therefore, might well have omitted bark of this kind.

In the P.G. only the bark of the cultivated species, "especially *C. succirubra*," is official; only a brief description of the bark is given, and it applies more to *C. succirubra* than to any other species. The bark is required to contain alkaloids to the extent of 3½ per cent. and the presence of those proper to cinchona is determined by heating 0·1 gram of the powdered bark in a glass tube, when it should give a purplish-red tar; and that quinine is present is ascertained by the chlorine and ammonia test.

Cinnamomum, U.S.P.; Cortex Cinnamomi, P.G.—The U.S.P. permits the use of both Ceylon cinnamon and Chinese cinnamon (cassia bark); the latter is defined as the bark of one or more undetermined species of *Cinnamomum* grown in China. In the P.G. the barks afforded by species of *Cinnamomum* growing in Southern China now are alone official, exception being taken to such as are mucilaginous. This exception appears to be intended to exclude the bark known in the London market as cassia vera, and which occasionally arrives in large quantities.

It may be hoped that in a future British Pharmacopœia the mistake will not be made of permitting the indiscriminate use of two barks so distinct in flavour as those of *C. zeylanicum* and *C. Cassia*, under one name. The result must of necessity place dispensers of medicine in an awkward position. A patient who has had medicine containing tinct. cinnamomi, U.S.P., made up with tincture of the Ceylon species in one shop, and subsequently at another shop in which tincture of the Chinese drug had been used, would infallibly consider the difference in taste to imply that some error had occurred in dispensing the medicine.

Since chemists are allowed choice in the matter, the fact that the cassia bark is cheaper and that it is the only official kind in the P.G. will, it may be hoped, lead to uniformity in the use of that bark, and so prevent much annoyance both to dispenser and patient. In the next British Pharmacopœia there need be no difficulty in defining the botanical source of cassia bark (*Pharm. Journ.*, [3], xiii., p. 583.

Coccus, U.S.P.—No insoluble powder should separate when the insect is macerated in water, indicating absence of sulphate of barium, etc.

Colchici Radix, U.S.P.—Colchicum root which is of a dark colour internally and which breaks with a horny fracture should be rejected.

Colocynthis, U.S.P.; Fructus Colocynthidis, P.G.—The U.S.P. now adds a description which allows of the use of any commercial variety, except that of Mogador, and compels the use of recently dried mature fruits, by remarking that the seeds are brown. The P.G. omits any description of size and now gives the maximum dose as 0·3 gram.

Conium, U.S.P.—The fruit only is now official, and the division of the umbelliferæ to which it belongs is now mentioned. The plant is no longer represented in the P.G., coniine having been omitted.

Cornus, U.S.P.—The bark of the root is now alone official.

Creasotum, U.S.P.—The tests given in the U.S.P. seem to point to German beechwood creasote as the kind which is official, since it is stated that if 1 volume of creasote be mixed with 1 of glycerine a nearly clear mixture will result, from which the creasote will be separated by the addition of one or more volumes of water (*Pharm. Journ.*, [3], ii., 921; Watts' 'Dictionary of Chemistry,' viii., 580). Its boiling point should be 200° C., and most of it should distil over between 205° and 220° C. It should be soluble in 80 parts of water at 150° C. to a somewhat turbid liquid and in 12 parts of boiling water. It should not coagulate albumen or collodion. Besides the solvents mentioned in the B.P., chloroform, benzol, and disulphide of carbon are given.

Crocus, U.S.P., P.G.—The U.S.P. remarks that "saffron should not be mixed with the yellow styles." This must surely be a misprint for stamens, any unusual length of style being quite an exception, while stamens are present in the majority of samples, being much more easily extracted from the flower than the whole length of the style. It should not deposit any pulverulent matter when soaked in water. The P.G. gives a colour test as follows:—1 part of saffron macerated with 10 parts of water should give a liquor which will give a yellow colour to 10,000 parts of water. This test would probably lead to the discovery of the use of any artificial colouring matter insoluble in water, such as the dinitrocresylate of sodium, which has been used to impregnate marigold petals mixed with saffron (*Pharm. Centralh.*, December 28, 1882, p. 619). Saffron should not give more than 8 per cent. of ash on incineration, 5 to 6 being the usual amount according to 'Pharmacographia.' The percentage of moisture that saffron should normally contain is not mentioned in the U.S.P., although the presence or absence would make a considerable difference in the quantity used in making the tincture; in the P.G. it is estimated at less than 14 per cent.

Cubeba, U.S.P.; Cubebæ, P.G.—According to the U.S.P. cubebs should not be mixed with the nearly inodorous rachis or stalks, these are often present in considerable quantity. The remark that the fruit "is internally whitish and hollow" is, to say the least, an inadequate description. The P.G. also orders the removal of the *peduncle* of the fruits.

Cypripedium, U.S.P.—Now removed from the secondary list and a description added. The fluid extract is the only official preparation. This drug is sometimes confounded with valerian, being known to herbalists as American valerian, and being used for the same diseases as that drug. The difference between the two official species, *C. pubescens* and *C. parviflorum*, has been pointed out by Maisch (*Amer. Jour. Phar.*, 1872, p. 297).

Digitalis, U.S.P.; Folia Digitalis, P.G.—The U.S.P. now gives a description in which it is stated that the midrib is broad near the base, a feature which distinguishes it from the other leaves usually mixed with it, except primrose leaves. From these, however, the acute angle of the lateral veins and their decurrence into the petiole in digitalis leaves would serve as distinguishing characters. The P.G. directs that the leaves of wild plants should be used. The simple, not felted, character of the tomentum is also pointed out as distinctive. The leaves are to be collected when the plant is in flower. The U.S.P. does not give any time of collection, but only requires that the leaves should be collected from plants of the second year's growth. In view of the fact of the varying strength of preparations of digitalis, greater uniformity might probably be obtained either by following the example of the P.G., or by ordering the fresh leaves only to be used, or to be gathered when the plant is in flower, and by omitting the infusion. The maximum dose of the leaves is given as 0·2 gram.

(*To be continued.*)

BACTERIA IN THE SOIL AND THE AIR.

In the laboratory at Montsouris a series of observations has for some years been conducted on the bacterial germs present in the atmosphere and the soil, with especial reference to their relation to the spread of infectious diseases. Experiments were also made on the cultivation of bacteria in artificially prepared nutrient fluids.

The quantity of bacterial germs in the air varies with the time of year, with subordinate temporary fluctuations. It is also largely dependent on the weather, rain clearing the air to a large extent of the germs. While rain is actually falling the number of germs in the air is greatly reduced; it increases as the ground dries, and again diminishes when the drought has lasted for ten or fifteen days.

The following are the artificial nutrient fluids chiefly employed, with the means used for sterilizing them, and the degree to which they are then susceptible to the attacks of bacteria:—

Fluid.	Mode of sterilizing.	Degree of suscepti-bility.
Cohn's nutrient fluid.	Heat of 100° C.	0·05
White of egg . . .	Pasteur's gypsum filter, cold.	0·22
Normal urine . . .	Pasteur's gypsum filter, cold.	0·40
Normal urine . . .	Heat of 110°.	0·50
Neutralized urine .	Gypsum filter, cold.	0·90
Neutralized bouillon.	Heat of 110°.	1·00
Normal urine, diluted	Gypsum filter, cold.	1·80
Serum of blood, diluted	Gypsum filter, cold.	6·00
Juice of strawberry and grape . . .	Gypsum filter, cold.	9·50
Juice of cabbage, diluted	Gypsum filter, cold.	10·90
Juice of calf's flesh .	Gypsum filter, cold.	13·50

The kind of bacteria varied with the different fluids; but in the two years there was found an average of from 65 to 79 per cent. of micrococcus, 14 to 24 per cent. bacillus, and 7 to 8 per cent. bacterium. In the fluids obtained from plants the bacterium amounted to about one-third.

Experiments made at the same time and in the same way in Paris (at the Mairie of the 4th Arrondissement), showed a very much larger quantity of bacterial germs in the air. The following are the numbers from October, 1880, to September, 1881:—

	Paris.	Montsouris.
October	920	142
November	750	106
December	540	49
January	470	45
February	330	31
March	750	74
April	970	48
May	1000	80
June	1540	92
July	1400	190
August	960	111
September	990	105

With some variations, curves formed for the two places would nearly agree, the average at Paris being about ten times that at Montsouris. More exact curves, made for weekly periods, showed a still closer coincidence in the increase and decrease at the two places. The proportion of different forms was 93 per cent. micrococcus, 5 per cent. bacillus, 2 per cent. bacterium. Ammoniacal or urine ferments were also found in the air, and are probably a fruitful cause of infectious diseases. Pierre Miquel distinguishes three kinds of urine-ferments:—*Micrococcus ureæ*, *Bacillus ureæ* and *Torula ureæ*.

The number of bacterial germs found in the air of hospitals was enormous, amounting in the Hotel-Dieu to 5600 per cubic metre in the summer months. The following are the numbers for different months:—

	Men's ward.	Women's ward.	In the city of Paris.
March, 1881 . .	11,000	10,700	750
April	10,000	10,200	970
May	10,000	11,400	1000
June	4,500	5,700	1540
July	5,800	7,000	1400
August	5,540	6,600	960
September . . .	10,560	8,400	990
October	12,400	12,700	1070
November . . .	15,000	15,600	870

The diminution in the summer months Miquel attributes entirely to the better ventilation. The presence of hospitals in large towns he believes to be a most prolific cause of infectious diseases, such as small-pox, scarlet fever, diphtheritis, erysipelas, typhus, etc.

A very interesting comparison is drawn between the presence of bacteria in the air and the prevalence of infectious complaints. The weekly bacterial curves of Paris and the weekly curves of mortality published in the 'Bulletin de Statistique Municipale,' under the authority of M. Bertillon, show an almost complete agreement.

Another series of observations was devoted to the bacteria present in the soil. A gram of earth at the Observatory at Montsouris contained 750,000 germs; in the Rue de Rennes, 1,300,000; in the Rue Monge, 2,100,000.

THE BEHAVIOUR OF DISULPHIDE OF CARBON TOWARDS PERMANGANATE OF POTASSIUM.*

Some time ago, E. Allary proposed to purify disulphide of carbon by shaking it with an aqueous solution of permanganate of potassium, and subsequent washing. This announcement induced Eugene Obach, who had previously used this method without success, to study the behaviour of the two substances upon each other, under varying circumstances. We give an abstract of his results in the following:—

1. *Behaviour of permanganate of potassium towards pure disulphide of carbon.*

a. Pure disulphide of carbon, when shaken and left in contact with the solid permanganate, remains entirely unaffected.

b. If pure water be poured upon the pure disulphide, and solution of permanganate be dropped into it, until the water has a rose-red tint, on shaking the tint passes to onion red in a few minutes. If a little more permanganate is added, the same thing happens. And if the water be separated, the disulphide washed with water and then again covered with fresh water, a new addition of permanganate will again show a reduction. After the treatment has been repeated four times, the reduction takes place very slowly.

If light is excluded from these manipulations, the reduction is greatly retarded.

c. If the previous operations are repeated with water containing a small amount of sulphuric acid, the reduction takes place comparatively more rapidly. Naturally, the result is not an onion-red colour, but perfect colourlessness.

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* From *Journ. f. pract. Chem.* Reprinted from *New Remedies*, January, 1883.

d. It was noticed that the longer the water had been allowed to remain in contact with the disulphide, the more energetic was the reduction. Two experiments were made under otherwise identical conditions. In one of them the permanganate was added immediately after the water had been added, and the results corresponded with what has been described above. In the other experiment, the water was left in contact with the disulphide for fifteen hours, and, on opening the flask, a distinct odour of sulphydric acid was perceptible, which was confirmed by the reaction with lead paper. This odour entirely disappeared after the treatment with permanganate.

e. As it was suspected that contact with water developed sulphydric acid even from pure disulphide of carbon, three flasks were partly filled, respectively, one with the pure disulphide, the other with pure water, and the third with a mixture of the sulphide and water. In each of the flasks was suspended a strip of lead-paper. After one hour, the strip in the third flask showed traces of the formation of the disulphide, after four hours it was brown, and later it turned completely black. The other strips remained uncoloured, although, after *very long* standing, there was perceptible a faint trace of discloration in the strip over the pure disulphide, undoubtedly owing to the presence of water in the paper, which had been moistened with solution of acetate of lead.

f. After every treatment of pure disulphide with permanganate, the disulphide was tested for free sulphur by means of metallic mercury, and the water was tested for sulphuric acid by means of chloride of barium. Sulphuric acid was always found present; free sulphur was sometimes found developed in the disulphide.

The occurrence of free sulphur was found to be dependent on the fact whether sulphydric acid was present, already formed in the disulphide while standing under water, or whether it was freshly given off from the water on the addition of permanganate. In the former case, free sulphur could be detected, but not in the latter. In fact, any disulphide of carbon, which originally has been quite free from free sulphur, may develop the latter either by the decomposition of any sulphydric acid contained in it by permanganate, or even by exposing the disulphide for a comparatively short time under water, to sunlight.

g. Commercial disulphide of carbon contains various impurities which may be—

Solid, chiefly consisting of free sulphur.

Liquid, fetid, sulphurated oils belonging to the allyl series (like oil of garlic, mustard, etc.).

Gaseous, also mostly fetid, among them chiefly sulphydric acid.

h. Neither solid permanganate nor its solution can remove free sulphur or the sulphurated oils; but it quickly and completely removes any sulphydric acid.

PURIFICATION OF COMMERCIAL DISULPHIDE OF CARBON.*

In the course of the paper, from which the preceding article is abstracted, E. Obach gives his method for purifying commercial disulphide of carbon. This method is mainly suitable for purifying smaller quantities for use in laboratories, and may not be quite applicable on a large scale, since it is somewhat circumstantial. But it will always furnish a pure product, unless very abnormal impurities should be present.

The crude liquid is first separated from any water which may be present, freed, by means of a dry filter, from mechanical impurities, and at once filtered into a capacious flask, in which a few pieces of burnt lime are contained. The liquid is next distilled from a water-bath heated to 70°–80° C. until only a small residue remains, which contains nearly all the free sulphur and a portion of the fetid oils. The distillate, in most cases, contains sulphydric acid, caused by the decomposing action of the lime upon some of the foreign sulphur compounds; besides, some fetid oils and a trifle of free sulphur. It is now shaken with coarsely powdered permanganate of potassium (about 5 gm. per litre), and left in contact therewith for some time, *until the sulphydric acid is removed.* The liquid poured off from the permanganate contains still some of the sulphurated oils, and a little *more* sulphur than before the treatment with permanganate. It is now briskly shaken, in a stoppered flask, with a small quantity (a few c.c. per litre) of pure mercury, *until all free sulphur is combined*; next, 25 gm. of mercuric sulphate (per litre of disulphide) are added, and the whole mixture again shaken. The reason of this mode of manipulation is this, that the mercuric salt acts more rapidly and easily upon the sulphurated oils, if the free sulphur has previously been removed. A still better way is to pour off the disulphide from the metallic mercury before treating it with the salt. The odour will indicate when *all the fetid sulphurated oils have been removed.* The disulphide is now poured off from the salt into a flask containing some pieces of porous chloride of calcium, and distilled immediately into the bottle in which the pure product is intended to be kept. The bottle must be perfectly dry, and provided with a well-ground stopper. During the last operation, day-light should be excluded. A very good way is to keep the disulphide in bottles (say of about five-pint capacity) which are themselves kept in tin boxes, blackened internally. On pouring out a little of the liquid, only the lid of the box is removed, and light can strike only a small portion of the liquid.

It is particularly to be observed that the above described processes must be performed in the precise order mentioned, since each successive manipulation is intended not only to remove an impurity already present in the disulphide, but, at the same time, also the impurity produced by the previous reagent.

The author fears to trust to the method of purification recommended by Friedburg,* viz., shaking with fuming nitric acid, since he suspects that the disulphide will obstinately retain at least traces of acid vapours.

Disulphide of carbon contaminated with sulphydric acid—but otherwise pure—acts with comparative rapidity upon metallic silver, mercury, and copper, *in presence of air*, with formation of the corresponding sulphides. If air is excluded, silver remains entirely unaffected, mercury is but very slightly affected, but copper is always distinctly coloured. If disulphide of carbon, containing sulphydric acid, is to be tested for free sulphur (the latter being present only in small quantity), this should be done in a perfectly filled bottle with exclusion of air. In this case, the blackening of metallic mercury does not proceed from the sulphydric acid, but from the free sulphur. Alkaline solutions of lead-salts decompose the vapour of the disulphide (and also various allyl-compounds) after a longer or shorter period with formation of sulphide of lead. Hence they cannot be employed as reagents for sulphydric acid.

PYROLEINE.†

Dr. Don Jaime Arbós y Tor, Professor of Physics and Chemistry in Buenos Ayres, has published the results of some investigations on the products of the distillation of fixed oils under certain conditions, which he believes will be serviceable towards proving the identity and purity of at least some of them.

If 2 parts of glycerin are distilled with 1 part of a fixed oil, both substances undergo decomposition, the

* From the *Journ. f. prakt. Chem.*, 26, 299. Reprinted from *New Remedies*, January, 1883.

* *Ber. d. Deutsch. Chem. Ges.*, 1875, 1616; 1876, 127.

† From *Revista Farmaceutica* (Buenos Ayres), 1882, Nos. 17–20. Reprinted from *New Remedies*, January, 1883.

glycerin losing 2 molecules of water and passes into the receiver as acroleine, forming the denser layer. The upper layer contains the *pyroleine*, an oily, limpid liquid of an acid reaction. If a little be taken up by the points of the index-finger and thumb, previously moistened with water, it imparts to them an extraordinary degree of slipperiness. It is insoluble in water and completely soluble in a little alcohol. When treated with an excess of alcohol, it becomes turbid, and precipitates an oil which is soluble in ether and in an excess of pyroleine. The alcoholic solution of pyroleine, treated with acetate of lead, appears like an emulsionized fat.

Pyroleine from olive oil, obtained as the upper layer in the receiver by distilling together 2 parts of glycerin with 1 part of olive oil, possesses a penetrating odour, a dark blackish-brown colour by reflected light, and a deep red colour by transmitted light. On exposing it for ninety-eight hours to a temperature of 10° R. (54·5° F.), it begins to crystallize, forming a number of small grains which fuse at 13° R. (61·2° F.). After these have once been formed, the remaining liquid portion has a dark brown colour by reflected and a red colour by transmitted light. It is soluble in a small quantity of alcohol, communicating to it a reddish-yellow colour, which, on addition of an excess of alcohol, turns to straw-yellow, while the liquid itself becomes turbid, and there is deposited an intensely red oil soluble in ether and in an excess of pyroleine.

The alcoholic solution of pyroleine obtained from olive oil, when treated with ammonia, immediately turns dark-brown, and, after twenty-four hours, separates into a lower, transparent layer of a golden-red colour, and a very small supernatant layer of oil, but little coloured and turbid, remaining in this condition for forty-eight hours.

Nitric acid turns the liquid dark, and, after standing, causes a dark-brown oily layer to rise. After twenty-four hours, the lower layer is a rose-red liquid, and the upper one an oil, blackish by reflected, and deep red by transmitted light.

Treated with sulphate of copper, it forms a dirty-green precipitate and, after one hour, the supernatant liquid has a slightly green colour by reflected, and a dark rose-red colour by transmitted light.

Dr. Arbós concludes that any olive oil which yields a "pyroleine" having the above reactions is pure.

If a mixture of 20 parts of glycerin, 9 of olive oil, and 1 of oil of sesame be distilled, the mixture will be found to foam considerably, and the receiver will contain two layers, the lower one of which is glycerin unaltered, but having a yellowish tint.* The lighter portion is "pyroleine," in form of a limpid oil, insoluble in water, of an acid reaction, a dark-red colour, and a faint, inoffensive odour.

When allowed to stand at rest, at 10° R. (54·5° F.), it forms small, striated grains. The remaining liquid mass has a dark-greenish colour by reflected, and a dark-red colour by transmitted light. At 17° R. (70·2° F.), the crystals melt.

The alcoholic solution of this pyroleine, when treated with ammonia, becomes turbid, acquires a yellowish tint, and, after forty-eight hours, separates a light upper layer of a solid and yellowish oil.

Treated with nitric acid, the liquid assumes a reddish colour, gradually turning dark; on standing, a black oil rises, and, after twenty-four hours, there are two layers, a light yellowish liquid, and an oily layer of a dark cherry-red by reflected, and a scarlet colour by transmitted light.

* Dr. Arbós adds a note that an amount of 5 per cent. of oil of sesame in olive oil is sufficient to prevent the development of acroleine from glycerin during this distillation.

[It appears to us that the facts stated by Dr. Arbós need re-investigation and further confirmation. We lack the time to do so, ourselves, at present; but we would recommend the subject to some of our readers.—Ed. N. R.]

When treated with platinic chloride, it becomes turbid and, after a while, separates into two portions, the denser being golden-yellow, and the other red; after twenty-four hours, the oily layer has a greenish-red tint by reflected, and a dark-red colour by transmitted light.

Sulphate of copper produces a precipitate of a dirty-green colour; after one hour, the supernatant liquid has a dark reddish-brown tint by reflected, and a very dark colour by transmitted light.

Acetate of lead renders it very turbid, and forms with it a sort of fatty emulsion which, after twenty-four hours, becomes pasty.

If a mixture of 20 parts of glycerin, 10 of olive oil, and 1 of cotton-seed oil be distilled, the receiver will contain two layers, of which the lower one is yellowish acreoline. The mixture does not foam up during the distillation. The "pyroleine" obtained in this case is acid, has a reddish tint, and a peculiar odour, which is quite penetrating during the distillation, and irritant to the fauces.

When exposed at a temperature of 10° R. (54·5° F.), for twenty-four hours, minute crystalline grains are formed, which melt at 20° R. (77° F.). As long as the grains exist, the liquid portion has a buff colour by reflected, and a reddish-yellow colour by transmitted light.

The alcoholic solution of this pyroleine, treated with ammonia, becomes turbid and acquires a dark-brown colour, which, after twenty-four hours, becomes golden-yellow, surmounted by a very small oily layer of the same tint.

Nitric acid turns the liquid dark, and, after standing, a blackish oil separates. After twenty-four hours there will be a yellowish liquid and a layer of oil, of a clear carmine colour, by reflected, and a bright scarlet colour by transmitted light.

When treated with platinic chloride, it becomes at once turbid, then divides into two layers, the denser being golden-yellow, and the upper one dark yellowish-brown. After twenty-four hours it becomes quite limpid, and has a reddish colour by transmitted light.

Sulphate of copper forms a precipitate of a dirty-greenish colour; after one hour, the supernatant liquid has a greenish colour by reflected, and an olive-brown colour by transmitted light.

The foregoing results may be summarized in a table, as follows:—

Reactions.	Pyroleine from		
	Olive Oil.	Olive and Sesame Oil.	Olive and Cotton-seed Oil.
During distillation the mixture	Does not foam.	Foams.	Does not foam.
Odour of pyroleine	Faint.	Inoffensive.	Peculiar, penetrating, irritating the throat.
At 10° R. it crystallizes after	96 hours.	40 hours.	24 hours.
The liquid portion, by reflected light, is	Somewhat dark-brown.	Dark-greenish.	Buff-coloured.
By transmitted light	Red.	Dark-red.	Reddish-yellow.
The alcoholic solution is	Reddish-yellow.	Reddish.	Golden-yellow.
When treated with ammonia, set aside for 24 hours	Separates much oil, but slightly coloured and turbid, remaining so 48 hours.	Separates a very small quantity of solid yellowish oil after 48 hours.	Separates a very small quantity of solid yellowish oil after 48 hours.

Reactions.	Pyroleine from		
	Olive Oil.	Olive and Sesame Oil.	Olive and Cotton-seed Oil.
Nitric acid colours it	Brown.	Reddish and then blackish.	Blackish.
On standing, the supernatant oil is	Dark-brown	Black.	Black.
The liquid becomes, after 24 hours	Reddish	Light yellowish.	Yellowish.
And the supernatant oil by reflection	Blackish.	Dark cherry-red.	Bright carmine.
And by transmitted light	Deep-red.	Scarlet.	Bright scarlet.
Platinic chloride produces two layers, the denser being	Muddy-red.	Red.	Dark yellowish brown.
After 24 hours, liquid clears and, by transparent light, is	Deep-red.	Dark-red; and greenish-red by reflection.	Reddish.
Sulphate of copper leaves a supernatant liquid which is	Dark-greenish.	Bottle-green.	Greenish.
And by transmitted light	Dark buff-reddish.	Very dark reddish-brown.	Olive-brown.

NOTE ON THE DETECTION OF STRONTIUM.*

BY F. RANSOM.

The accurate separation of the three metals, barium, strontium and calcium, is not unfrequently attended with some difficulty. The usual method for their detection is framed upon the difference in solubility of their respective salts; more especially the sulphates and chromates.

It is well known that with very dilute sulphuric acid or similarly weak solution of sulphate in water, barium may be immediately and entirely separated. With strontium salts a somewhat similar result occurs, but it is necessary to stir the solution and set aside for some time. With calcium salts the difference is still more marked, the sulphate produced being to an appreciable extent soluble in water, and thus forming the readiest test for strontium after the removal of barium.

Another test solution, which is invariably used in the detection and confirmation of these metals, is that of yellow chromate of potassium. As with the sulphates just mentioned, so also the chromates formed on adding this test vary in solubility, and this gradation occurs in the same order. Barium chromate is insoluble, calcium chromate is very soluble, while strontium occupies the intermediate position. This latter case is most liable to be overlooked, and to the facts connected with it, I wish specially to refer.

On adding a solution of potassium chromate to a dilute solution of strontium nitrate, I obtained, contrary to expectation, a marked turbidity, and on applying a gentle heat this increased to a dense precipitate. To what extent of dilution and under what conditions this test is available, were the objects of the following experiments:—

A 5 per cent. solution of pure chromate of potassium was prepared and used throughout, the mixture being well shaken after each addition of this solution. The nitrate was chosen as being one of the commonest salts of strontium, and readily obtainable in a pure condition. Of this salt, aqueous solutions of definite strengths varying from 40 per cent. to ·25 per cent. were prepared. With the 10 per cent. solution an immediate precipitation of strontium chromate was obtained, and on setting aside for three hours this had so much increased as to convey a solid appearance to the whole contents of the tube. On applying heat to a similar solution immediately after admixture the same result was obtained as previously noticed after standing. On using more dilute solutions an immediate precipitate or turbidity appeared until reaching 1·25 per cent., which latter showed no indication until boiling, when precipitation again took place. Descending to still weaker solutions and applying heat distinct turbidity was obtained until reaching ·25 per cent., when only slight cloudiness was observable. A peculiarity in these most dilute liquids was that the slight precipitate formed became aggregated into circular discs adhering closely to the glass.

In order to compare these results with those obtainable by treating a calcium salt in the same manner, a 20 per cent. solution of calcium chloride was prepared, and to this was added the solution of potassium chromate. No precipitate was formed in the cold, but after boiling a slight turbidity was observed. This, however, unlike the slight precipitates with very dilute solution of strontium nitrate did not aggregate into discs, but remained diffused in the liquid.

From these results it is evident that under ordinary conditions strontium is partially precipitated as chromate from comparatively dilute solutions, and that this precipitation is largely increased by the application of heat. Calcium chromate, on the other hand, is practically not precipitable even from strong solutions and with the aid of heat.

The next question which arises is whether this comparative insolubility of strontium chromate is liable to affect its detection in the ordinary mode of analysis of metals in the fourth group, where barium is firstly removed with potassium chromate. In this case, however free acetic acid is sure to be present, having been used to dissolve the precipitated carbonates. To determine this experiments were performed similar to those already described, but acidulating the solution with acetic acid previously to adding the potassium chromate. With this alteration very different results were obtained.

A 5 per cent. solution under this treatment did not produce the least turbidity even after boiling, and even with a 20 per cent. solution no immediate effect was apparent, although considerable turbidity occurred after the application of heat. With a 40 per cent. solution distinct turbidity appeared, immediately increasing to a marked precipitate when heated.

From this it is evident that there is no danger of losing a sufficient amount of strontium to interfere with its subsequent detection in the presence of acetic acid, provided that the solution has been kept cold.

Finding that strontium chromate which was previously precipitated is now kept in solution with the acid, it might be supposed that on neutralizing this with ammonium hydrate, precipitation would again occur. The experiment was therefore repeated with the 10 per cent. solution of nitrate in presence of acetic acid, and finally ammonia added until the colour changed from orange to yellow, and the liquid was slightly alkaline. The bichromate was now reduced to neutral chromate, and the acetic acid converted into ammonium acetate. The result, however, differed materially from that obtained in the first case. Instead of a dense precipitate only a turbidity appeared, increasing to a moderate precipitate on the application of heat. Testing more dilute solutions, only a slight precipitate fell with the aid of heat from the 5 per cent., and below this no visible effect could be obtained.

* Paper read at a Meeting of the School of Pharmacy Students' Association, January 18, 1883.

From this it appears that although precipitation occurs somewhat more readily than in the presence of free acetic acid, yet the ammonium acetate which is present retains in solution the larger portion of the strontium chromate that is formed.

To briefly sum up we may therefore say—

Firstly, that strontium salts in solution may be detected by the addition of neutral chromate of potassium, and the subsequent application of heat, provided that we are dealing with a simple solution of strontium nitrate not more dilute than ·5 per cent.

Secondly, the presence of free acetic acid prevents this precipitation, especially in the cold.

Thirdly, this latter condition is not materially altered when the free acid is entirely neutralized.

Lastly, in the usual method for the detection of the three metals, barium, strontium and calcium, care must be taken to add excess of acetic acid when dissolving the carbonates, in order that free acid may be present and thus prevent the precipitation of strontium with potassium chromate.

Precipitation of Strontium Chromate.

Strength of Solution $Sr\,2NO_3$.	$Sr\,2NO_3+K_2CrO_4$.	$Sr\,2NO_3+K_2CrO_4$ +heat.	$Sr\,2NO_3$ $+HC_2H_3O_2$ $+K_2CrO_4$.	$Sr\,2NO_3$ $+HC_2H_3O_2$ $+K_2CrO_4$ +Heat.	$Sr\,2NO_3$ $+HC_2H_3O_2$ $+K_2CrO_4$ $+NH_4HO$.	$Sr\,2NO_3+HC_2H_3O_2$ $+K_2CrO_4+NH_4HO$ +Heat.
40 per cent.	Solid after eight minutes.	Solid.	Turbidity.	Precipitate.	Solid.	Solid.
20 per cent.	Solid after quarter hour.	Solid.	No immediate effect.	Considerable turbidity.	Considerable precipitate.	Dense precipitate.
10 per cent.	Solid after half hour.	Solid.	No effect.	Slight turbidity.	Turbidity.	Precipitate.
5 per cent.	Immediate turbidity; nearly solid after three hours.	Solid.	No effect.	Very slight turbidity.	No effect.	Slight precipitate.
2·5 per cent.	Immediate turbidity (slight).	Dense precipitate.	No effect.	No effect.	No effect.	No immediate effect. Turbidity after standing.
1·25 per cent.	No immediate turbidity.	Precipitate.	No effect.	No effect.	No effect.	No effect.
·5 per cent.	No effect.	Turbidity aggregating into circular discs adhering to tube.	No effect.	No effect.	No effect.	No effect.
·25 per cent.	No effect.	Turbidity aggregating into discs as above.	No effect.	No effect.	No effect.	No effect.

PREPARATIONS OF ERGOT, BASED UPON THE LATEST SCIENTIFIC INVESTIGATIONS OF ITS MOST VALUABLE MEDICINAL CONSTITUTENTS.*

BY C. S. HALLBERG, CHICAGO.

Ergot of rye ranks undoubtedly among our most largely used and important remedies. Like opium and cinchona, it plays a *role* in relieving human suffering, specific in its character and not easily displaced by any other agent. But unlike these, although the history of ergot is even more ancient and in its universal occurrence is familiar even to the less well informed, our chemical and pharmaceutical knowledge of it is far behind that of these two contemporaries. So much more is this to be wondered at since, owing to its occurrence where it is encountered every day, and its occasional presence in the "staff of life" has been followed by the most serious consequences. Long after its therapeutic value was conceded its constituents were little known, very erroneous conclusions were arrived at by those to whom the credit of its first chemical investigation is due and upon these were based processes for the various pharmaceutical preparations. It is only necessary to compare the product ergotin, formulated by Bonjean and Wiggers respectively, to see the lack of uniformity in the views held by these investigators. These two processes were so radically different that the products were equally distinct in physical and therapeutic properties. The first mentioned aimed at presenting those constituents soluble in diluted alcohol *only*, as being of the most value, to the exclusion of the fixed oil, alcoholic extraction and other well recognized disturbing principles; in Wiggers' process the matter soluble in diluted alcohol, considered the most important by Bonjean, was rejected and the poisonous products claimed to represent the most valuable medicinal properties of the drug. Although ergot is largely obtained in this country, it is small in grain and cannot favourably compare with the large grain Spanish, which, though commanding a greater price, is to be preferred when it can be obtained fresh and free from worms. This ergot presents a dark pearl colour, and when of good quality should present a smooth fracture with a curved violet line; it must not be spongy or yellowish. The preservation of ergot is rather difficult, particularly of the powdered, and different means have been devised to prevent it becoming worm eaten, etc., such as heating before bottling, and addition of camphor, ether and chloroform. Hager has proposed:—

Pulvis Ergotæ Purificatus, which is prepared as follows: Ergot in coarse powder is first exhausted of its fixed oil, by means of percolation with deodorized benzin, it is then extracted with strong alcohol which displaces the benzin and takes up about 2 or 3 per cent. of a black resinous matter and the poisonous alkaloid *ergotinina*. The alcohol is recovered by distillation, and the ergot is spread out in shallow pans set in a warm place so that any remaining odour of benzin may be dissipated. The original process consists only in freeing the ergot from the fixed oil, but the subsequent percolation with alcohol is desirable, as it displaces the greater portion of the benzin, extracts the asphalt-like resin, thus rendering the ergot more readily exhausted with water, and deprives it of the poisonous principle. The purified ergot thus obtained loses from 25

* Read at the third annual meeting of the Illinois Pharmaceutical Association.—Reprinted from the *American Journal of Pharmacy*, January, 1883.

to 30 per cent. in weight, and is therefore of correspondingly greater strength than the crude drug. Unlike the ordinary powdered ergot, this article can be preserved in glass-stoppered bottles for any reasonable length of time, according to the writer's experience, owing probably to the fact that it does not contain any ergotinina to the decomposition of which the rapid spoiling of ergot is due. The coarse powder will be found very convenient for the preparation of wine, infusion, etc., and the finely pulverized can be administered in substance. The petroleum benzin used in this process is the commercial sp. gr. 716. The mode of deodorizing it is as follows: To the benzin add gradually with agitation about 3 per cent. sulphuric acid diluted with an equal quantity of water; after standing decant from the black tarry residue. Wash the benzin with water to which has been added sufficient carbonate of soda to neutralize the acid, decant and then wash repeatedly the benzin, lastly separate carefully from the water or distil. This yields a product possessing very little taste or odour, and will be found very useful in the laboratory and for domestic use.

Oil of Ergot.—The yield of fixed oil from ergot ranges from 25 to 30 per cent. It is very heavy, dark-brown in colour, almost odourless, and sometimes separates, upon standing, stellate tufts of a pearl colour supposed to be *cholesterin.* The oil yields an orange-yellow soap. It has been lately recommended for skin diseases, and the soap could possibly be used to advantage. The writer has used several hundred pounds of the oil as a *lubricator* for machinery and found it *unequalled.*

To determine if the oil contained any alkaloid, it was agitated with very little dilute sulphuric acid; the acid liquid concentrated and an excess of caustic soda added, which threw down a cinnamon-brown body. This precipitate was washed with water, in which it seemed insoluble, and citric acid added. Upon further standing well-defined crystals were formed, which were coloured orange-yellow by sulphuric acid; *but showed no precipitation with alkaloid reagents.* This substance was supposed to be *sclerocrystallin* which, according to Dragendorff, is of no medical importance.

Alcoholic Extractive.—The asphalt-like resinous mass above referred to, extracted with strong alcohol, which, according to Hager, is only fit to burn up, was examined with a view to isolate the alkaloid ergotinina. It was broken up, some soda added and extracted with ether and the ethereal liquid mixed with water, but sufficient soap was held in solution to prevent the liberation of the ether, which should contain the alkaloid, the mixture forming a thick emulsion which after long standing did not show any signs of separation. The production of this rare alkaloid was therefore temporarily abandoned and its isolation is undoubtedly coupled with great difficulties as the most thorough pharmaceutical chemist, Dragendorff, failed in it and is of the opinion it is almost impracticable. The ethereal solution previous to the addition of water left upon evaporation acicular crystals which corresponded in tests and appearance to sclerocrystallin.

Fluid Extract of Ergot.—The official process of the last pharmacopœia was based upon too general a method without any regard for the extraction of the active constituents or their preservation. The addition of acetic acid previous to the concentration of the weak percolate was unnecessary and irrational, as the active principle being itself an acid, an alkali would have been better adapted to prevent its volatilization if fugitive. The alcoholic strength of the menstruum was too great, as it extracted none of the *scleromucin* which is only soluble in alcohol of 40 per cent. and under. The glycerin and the high alcoholic percentage were favourable to the extraction of the oil and the ergotinina, which were possessed of undesirable, if not actually poisonous, properties. The menstruum adopted in the new pharmacopœia will undoubtedly be as *aqueous* as possible to insure a permanent product. Alcohol of 40 per cent. yields a very good preparation representing the drug *fairly,* but still containing more or less fixed oil and alcoholic extractive. The writer is, therefore, of the opinion that the ergot should first be freed from oil and resin, before a fluid preparation can be made from it, representing *all* the valuable medicinal constituents of the drug to the exclusion of inert matter and those principles possessed of undesirable qualities.

Fluid Ergot.—Upon the investigations of Dragendorff, Podwissotzky, Blumberg and others having been made public, new processes were adopted for preparations that would conform to these theories. The writer constructed a formula for a preparation termed fluid ergot, in contradistinction to the officinal fluid extract. As this article has proved during several years' increasing use its superiority over the ordinary fluid extract, and clinical experience sustained the views held in regard to it on theoretical grounds, the process for its preparation might be of interest. The powdered purified ergot, prepared as above, is digested with twice its weight of water at 150°F., for twenty-four hours and expressed, the residue is again macerated in warm water for twelve hours. After settling, the expressed liquids are strained and evaporated separately, when both together measure one-half as much as the ergot employed; they are mixed and sufficient alcohol added to make the liquid of 25 per cent. alcoholic strength, or one-third as much as the aqueous solution. After standing the liquid is filtered and the gummy residue washed with so much 25 per cent. alcohol as to make the filtered liquid measure three-fourths or 75 per cent. of the amount of crude drug employed (volume for weight). To this glycerin is added to make the finished preparation represent the amount of crude ergot originally used, pint for pound. As will be seen, this preparation contains 18 per cent. alcohol, rendering it unobjectionable for hypodermic use. Fluid ergot is an opalescent, amber-coloured liquid possessing a peculiar musty odour. It remains pretty clear unless exposed for a long time to the light or atmosphere. It should, therefore, be kept in small well-filled bottles in a dark place. As stated above, the writer introduced this preparation immediately after the Dragendorff and Podwissotzky investigation; similar products at once appeared under different names, and Hager in his 'Supplement' gives a process for what he terms *extract. secalis corn. purif.* or *ergotina rationaliter parata.* The ergot, according to this process, is extracted with benzin and alcohol, and then exhausted with water, and the liquid concentrated to one-half the bulk of the drug; here the similarity ceases, as Hager employs sufficient alcohol to make the mixture represent 60 per cent. alcohol by volume which precipitates the gum, etc., but also *scleromucin* and renders it necessary to again recover the alcohol by distillation. After this is accomplished the liquid is transferred to a dialysator and dialysed. This part of the process the writer thinks is entirely unnecessary, and almost, if not entirely, impracticable, as decomposition sets in very rapidly in dilute aqueous solution of ergot. The formula for a preparation termed M. Yvons' Solution of Ergotin, appears in Lloyd's 'Supplement to the American Dispensatory.' In this process the crude ergot is extracted with water acidulated with tartaric acid, which is *irrational.* Moreover, the amount of alcohol used in precipitating the aqueous solution is *too* great (70 per cent.), being even more than Hager employs, that all the *scleromucin* and part of the *sclerotic acid* is in danger of being thrown out of solution. Further, to the finished preparation salicylic acid is added to preserve it from change, which is not desirable. After a series of experiments the writer has come to the conclusion that the gummy matter is precipitated with 25 per cent. of alcohol, and as this is all that is necessary to free the liquid from, the employment of more spirit would not be desirable in administration, or entail redistilling, and what is of greater importance the scleromucin, which ranks second in medicinal value of all the constituents of ergot, would not be represented in the preparation. The previous exhaustion of oil, and especially the alcholic extractive favours the easier precipitation of the inert matter with a small percentage of alcohol.

In the commencement of this paper the different methods in preparing ergotin were referred to as indicating the conflicting views held by the various framers of the processes for its preparation. The subject had received scarcely any attention till C. Lewis Diehl's article in the *American Journal of Pharmacy* of Nov. 1881. Mr. Diehl points out the indefinite instructions in Bonjean's original process, in regard to the amount of alcohol used in the precipitation, making also comparative experiments with Carles' and the formula official in the German pharmacopœia. The fact that no difference in yield of ergotin resulted between Carles' and Bonjean's method, in which 77 and 65 per cent., respectively, of alcohol was used, may be accounted for on the theory that all the scleromucin had been precipitated when the alcoholic strength had reached 65 per cent., and that no further precipitation took place to any great extent, till the sclerotic acid is thrown down, which does not commence till the alcoholic strength reaches 80 per cent. The large yield of ergotin obtained by Mr. Diehl by the method of the Phar. Ger. is accounted for by the fact that the alcoholic strength did not exceed 30 per cent., and the preparation contained therefore *all* the *scleromucin* and a great proportion of oil and resinous matter, which are not precipitated till the alcoholic strength reaches 40 per cent. The presence of oil was also shown by the fluidity of the preparation and the resinous matter by its colour. An ergotin of firm pilular consistence cannot be obtained by these methods unless the ergot is previously extracted with benzin, and, still better, subsequently with strong alcohol. The extraction of oil and resin (?) is not advocated on the ground *alone* of rendering the ergot more readily extracted by water, although free from oil, the drug is more readily disintegrated as it lacks that horny surface, but *more* on account of that the *ergotin* will be more concentrated and of better *consistence.*

Sclerotic Acid.—In preparing some sclerotic acid, an opportunity presented itself to determine whether the *purified ergot* was more readily exhausted with water than the crude drug. Ten pounds of purified ergot was macerated and expressed with three times its weight of water in three equal portions, the liquid concentrated to five pounds and alcohol added to bring the mixture to 50 per cent. and filtered. The filtrate was concentrated to a syrup in consistence and alcohol added to make the liquid of 85 per cent. alcoholic strength. The sclerotic acid was quickly precipitated and obtained quite pure after washing with 85 per cent. alcohol. It was of a slate colour, but soon turned brown. Ten pounds of crude ergot in coarse powder was macerated for twelve hours with water, packed in a percolator and eight pints of percolate obtained, again macerated and a second similar quantity of liquid received, alternate maceration and percolation was enforced till the drug was exhausted, which was scarcely accomplished when thirty-two pints of fluid had been recovered. When the orifice was opened after the second maceration quite an explosion took place, indicating the formation of carbonic acid gas, and the process must therefore be watched. The liquids obtained were treated in the same manner as above, nearly 25 per cent. of matter being precipitated and rejected; when the alcoholic strength reached 85 per cent. the sclerotic acid was thrown down, but so contaminated with resinous matter that subsequent washing with alcohol failed to purify it; comparative estimation of the acid was therefore abandoned. Ergotin is largely used in pills and prescribed in pretty large doses, it is therefore desirable to have a preparation of firm consistence and as concentrated as practicable. The following formula is therefore proposed as yielding a product possessing these advantages. The purified ergot as above is exhausted with water as in the preparation of fluid ergot, and the liquid evaporated till one-half the volume of the ergot used, alcohol is added to 25 per cent., after standing filtered and the filter washed with 25 per cent. alcohol. The alcohol is recovered and the aqueous solution evaporated to pilular consistence. The yield is about 15 per cent. of the drug used. This ergotin will be found to keep well, it is not very hygroscopic and one grain represents about six grains of ergot. It can be mixed with sugar-of-milk in various proportions, when of hard consistence and the desiccation completed until it is sufficiently brittle to be triturated to a fine powder. By adding sufficient sugar-of-milk to replace the inert matter of the drug, namely 85 per cent., saccharated extract of ergot is obtained. It was on account of the difficulty experienced in preparing this in a powdered form, which led the writer to extract the fat primarily from the drug. By adopting this procedure all impediments are removed to obtain an extract in the powdered form with even less proportion of sugar-of-milk than the above.

In conclusion, the writer will state that there is no doubt that this extraction of fat from crude drugs with a cheap solvent like benzin can be carried on to a considerable extent, and the extract subsequently obtained can be reduced to, and preserve its pulverulent condition without difficulty, rendering the admixture of absorbent powders in such *great* and *deceiving* proportions unnecessary. But great care should be exercised that the active principles of the drug are not also *even partially* extracted. The extraction of fat, in nux vomica, with benzin, seems, according to some authorities, coupled with danger of dissolving some of the alkaloids, although the writer thinks this is due *more* to an excessive use of the solvent employed. In order to extract the fat from a drug by benzin it is not necessary to have it in fine powder, nor subject it to the action of the solvent by long maceration, as the fat is rapidly taken up. In the main an equal portion, volume for weight, of the benzin is sufficient, and this can be lessened by increasing the height of the column of the drug operated on. With ergot, however, no precaution is necessary, as the alkaloid is sought to be discarded, and the benzin has no action on sclerotic acid of scleromucin.

FERROUS CITRATE AND ITS DOUBLE AND SECONDARY SALTS.*

BY R. ROTHER.

When two or more dissimilar elementary molecules unite, the force which holds each individual molecule together is redirected and distributed in a coincident aggregate whereby the compound molecule is maintained. When the utmost power of all the molecules is exerted the proportional energy of each is termed the atomicity, quantivalence or simply valence of the particular element implied. Since all forces, being modes of motion, are interconvertible, there must be stages during the conversion when the prior and post-prior states are no longer of a kind. Neither is the post-prior mode like the new condition of which it is the immediate antecedent. These peculiar and highly interesting phases may be termed transition forces. They are the dynamic analogues of the states of aggregation that intervene between the solid, liquid, gaseous, and ultra-gaseous conditions of matter. When chemism begins to merge into mere cohesion the bonds of atomicity suffer a further and continuous subdivision no longer definitely characterized in terms of quantivalence. This transitory state may therefore be properly distinguished as ultra-valence. It becomes evident in such cases where compound molecules of saturated valence still continue to combine, and where elementary molecules coalesce with seemingly abnormal capacities. In the opposite direction we also find that many elements most usually do not exert their full atomic power. Such instances are termed apparent valence. This important condition is most thoroughly representative of chemism at its climax. Apparent valence generally gives rise to

* From the *American Journal of Pharmacy*, Jan. 1883.

compounds of the greatest stability owing to the fact that the intra-molecular affinities have been subjected to fewer subdivisions than in the states of higher atomicity. In chemical notation some difficulty is experienced in expressing the formulas of compounds containing the same element in different degrees of valence. Although the atomicity is most usually noted by indices, a much more striking and definite notation would be acceptable. To illustrate a change in that direction the ferrous condition might be indicated by Fo, the ferric by Fi, and the ferrate by Fa. Other elements of varying atomicity could be similarly treated. In course of time ultra-valence will probably command commensurate notice. The chemical notation used in pharmacy is often conveniently abbreviated, especially to avoid writing out in full the complicated formulas of the acids of carbon. But the system employed is not only confusing, but erroneous. The abbreviation for citric acid, for instance, was written Ci, and in its combinations it still appeared as Ci. Now the proper and consistent plan is to designate the radicles only in shortened forms, and hence citric acid may be written H_3Ci.

On a former occasion when treating of ferro-ferric or ferroic citrate the writer obtained the formula for ferrous citrate from a faulty source, stating it to be a triferrous salt, thus, Fe_32Ci. When recently operating on definite quantities of material the writer, however, found that it is a diferrous citrate, thus, $Fe_2H_2Ci_2$, or FeHCi, that is, in fact, a double citrate of iron and hydrogen, or, properly, a hydroferrous citrate. Correctly speaking, a double, triple, etc., salt is invariably derived from a single acid by substitution of the basic hydrogen by one or more basic radicles partially, or by more than one basic radicle wholly. But when the conditions are reversed, that is, when one basic radicle unites with more than one acid radicle, secondary, tertiary, etc., salts are formed. Yet further, when a multiplicity of both acid and basic radicles converge to form a compound molecule then secondary double salts, tertiary triple salts, etc., are produced.

Ferrous citrate, when prepared by boiling citric acid with metallic iron, is a dingy white and sparingly soluble salt. Prepared, however, by acting on ferrous hydrate or carbonate with citric acid it dissolves rapidly in the generated ferric citrate formed by atmospheric oxidation and produces one of the numerous ferroic citrates. Owing to this peculiarity ferrous citrate was credited with such solubility as to be even deliquescent.

One equivalent of ferrous citrate treated with one equivalent of hydrosodic carbonate yields a very soluble apple-green amorphous double salt, the sodio-ferrous citrate FeNaCi, which is readily obtained in elegant scales. But when one equivalent of ferrous citrate is acted on by two equivalents of the carbonate a very soluble grass-green amorphous secondary double salt is formed, the sodio-ferrous hydrocitrate.

$$FeNa_2Ci(OH) \text{ or } \begin{array}{l} Fe\text{—}(OH) \\ \quad \diagdown \\ \qquad \diagdown \\ \qquad Na_2 = Ci. \end{array}$$

Ferrous citrate heated with even four equivalents of sodic phosphate is not entirely dissolved, but the solution is deeply green, and on cooling yields a large crop of spiny crystals of sodic phosphate. Addition of citric acid to the heated mixture immediately separates a copious transparent green gelatinous precipitate, which requires a very large proportion of sodium citrate for solution. It is therefore evident that ferrous citrate cannot be successfully treated with sodic phosphate alone.

If two equivalents of sodio-ferrous hydrocitrate are mixed with two equivalents of sodic phosphate an abundant precipitate of ferrous phosphate, together with a deep green solution, results. An equivalent of citric acid now added dissolves the precipitate completely, or, if incorporated previous to the sodic phosphate, prevents the precipitation.

The admixture of one equivalent of sodic phosphate to two equivalents of sodio-ferrous citrate also occasions a precipitate of ferrous phosphate, redissolved by an equivalent of citric acid, or prevented when this is previously added.

Both of the above cases, therefore, show that half as much more citric acid as these double salts already contain counteracts the formation of precipitates insoluble in the presence of sodic phosphate. The resulting splendidly emerald-green solution contains two very remarkable amorphous salts, the one a double citrate of sodium and iron, the other a citro-phosphate of these metals. Their generation is represented by the following equation:—

$$2\,(FeNaCi) + H_3Ci + Na_2HPO_4 = FeNa_2H_2Ci_2 + FeNa_2H_2CiPO_4.$$

The hydro-sodioferrous citrate and citrophosphate may also be written thus:—

$$\begin{array}{lcl} Fe = Ci & \qquad\qquad & Fe = PO_4 \\ \quad / & & \quad / \\ Na_2 & & Na_2 \\ \quad \backslash & & \quad \backslash \\ H_2 = Ci & & H_2 = Ci \end{array}$$

This saline mixture admits of scaling, but not so readily and elegantly as the sodioferrous citrate above described.

The object in preparing these compounds was to employ them in the various phosphatized and citrated mixtures where permanency of solution is a desideratum. Hence their behaviour towards phosphoric acid is interesting.

Phosphoric acid, when added to any of these salts in moderate proportion, discharges their colour to a great extent, but wholly when added in sufficient excess. The acidulated solution is apparently permanent; however, with a certain inferior proportion of acid, a slight precipitate of ferrous phosphate appears; but the sodioferrous citrate comports itself, in a particularly special manner, distinct from all the rest of these compounds. A sufficient excess of phosphoric acid added at once to this salt produces a clear, permanent and perfectly colourless solution; yet, when phosphoric acid is added in such amount as to leave the solution lightly green, a profuse cream-coloured granular precipitate of the noteworthy triferrous phosphate, $Fe_3(PO_4)_28H_2O$, is produced. This precipitate, when once formed, requires a much larger proportion of phosphoric acid for solution, and also considerable time. Chlorhydric acid dissolves it more freely, yet slowly. Nitric acid attacks it with difficulty after much time. Normal monad citrates are also indifferently active. The reason for its formation under such peculiar conditions is that the salt which yields it contains no hydrogen.

Ferrous citrate is best prepared by heating for about three hours, or until reaction ceases, 56 parts of very fine iron filings with 210 parts of citric acid and a nearly constant 1500 parts of water. As the iron always contains carbon, the quantity will practically have to be about 60 parts. Since the citrate only serves to prepare the soluble forms, any amount of iron in excess is immaterial.

The sodioferrous citrate is prepared by adding to the ferrous citrate of the above process 84 parts of hydrosodic carbonate, heating until effervesence ceases, setting the solution aside till the carbonaceous residue has subsided, decanting the clear liquid, evaporating it to a syrupy consistence, and spreading it on glass or porcelain plates to dry. A definite solution can also be kept on hand.

The sodioferrous citrophosphate is prepared by adding 105 parts of citric acid and 179 parts of sodic phosphate to the product of the preceding process, and proceeding in a similar manner as there directed.

The ferroic citrate above mentioned is a very useful compound, and could, perhaps, in many instances, supplant the ferric citrate. Nevertheless, a complete conversion of the ferrous into ferric citrate would be very desirable. At one time the writer deemed it impossible to convert the ferrous citrate by means of nitric acid, but recent quite successful trials show that it can be done. If 45 parts of nitric acid is added to the ferrous citrate above obtained, and carefully heated to dryness, perfect transformation is effected.

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POLARIZATION OF LIGHT AND ITS PRACTICAL APPLICATIONS.

IT was a well-deserved compliment paid to Mr. D. CORNELIUS O'SULLIVAN when the Council of the Institute of Chemistry invited him to deliver before the members of its guild and their friends a lecture upon the "Polarimeter and its Practical Applications." If to a minor degree those feelings of reluctance and misgiving which the lecturer confessed himself to have at first experienced still existed, they must surely have been dispelled by the unmistakable signs of appreciation which were manifested by a large and attentive audience. A description of a NICOL'S prism formed a convenient and rational starting point as affording a means by which there could be obtained a single beam of polarized light producing a single image. Two such prisms used together constitute respectively the polarizer and analyser. On placing the prisms one before the other light passes only when the vibrations in the image transmitted by the one are parallel to those transmitted by the other. If now the analyser be turned, the light will be seen to fade, and will be totally extinguished when at right angles to the polarizer. Those instruments which have been devised for the purpose of determining the position of polarized flames are known as polarimeters, and in their construction are dependent on the phenomena produced by plane and circular polarization.

If a ray of light be caused to pass through a plate of quartz, cut perpendicular to the axis, it is divided into two, the vibrations in each being circular and in opposite directions. Hence the terms right-handed and left-handed are applied to the direction of the circularly polarized ray. To distinguish between the two kinds of rotation it is only necessary to imagine oneself looking in a direction opposite to that in which the light is moving; if the plane of vibration be from left to right its rotation will be left-handed and if the conditions be reversed it will be right-handed. Further, it is important to remember that the different coloured rays after leaving the quartz enter the analyser in a condition of plane polarization. It was here observed by the lecturer that a very delicate test for determining the displacement of the plane of polarization was by the use of a bi-quartz arrangement. This consisted in placing side by side two parts of a quartz plate, one being right-handed and the other left-handed quartz. The change of colour in the one would therefore be from red to violet, while in the other this order would be reversed. A uniformity or identity of colour would be observed at the point of transition between the violet and the red. This is known as the neutral tint—*teinte sensible*—and the slightest change in the plane of polarization is followed by the appearance of one of the two distinctive colours (red or violet). Following these observations came a description of JELLET'S prism and saccharimeter; CORNU'S prism; the JELLET-CORNU; LAURENT'S semi-quartz disc; the LAURENT-SAVART'S prism; the WILD and HOFMANN—Quartz Wedge Compensators; the SOLEIL; SOLEIL-DUBOSCQ; SCHEIBLER. The various modifications introduced in these instruments with the object of determining with greater precision the amount of change of the plane of polarization produced by the interposition of an optically active substance here received a merited share of consideration. BIOT'S law, which affirms that the angle of deviation is proportional to the length of the column of liquid and to the quantity of substance contained in that given column, was declared to be true only when the substance was examined under uniform conditions. The rotatory power of a body was alleged to vary in accordance with the solvent employed, the presence of inactive bodies, and the temperature of its solution at the time the observation was recorded. The lecturer appeared less happy in his efforts to explain the meaning of the terms *absolute* and *apparent* specific rotatory power as applied to liquids and solids in solution optically active. The employment of specific rotatory power as a means of testing the purity of those organic bodies which possess the power of displacing the plane of polarization received but an insignificant share of attention, direct reference only being made to quinine and to the terpenes generally. The practical value of the polarimeter in its application to purposes of investigation was little more than hinted at in a passing allusion to the hydration of lactose.

The decomposition of lactose by dilute sulphuric acid into two well-defined bodies, galactose and dextrose, each possessing a rotatory power corresponding to +83·3 and +56° respectively, was instanced as an illustration of the usefulness of prismatic analysis in discriminating between simple bodies and mixtures. At this stage the lecturer, outstripped by the lapse of time, was unavoidably compelled to suppress many important facts, the headings of which found a place in his published syllabus. The hope that the lecture would be published in a complete form found expression through the Chairman, Dr. ODLING, and was unanimously endorsed by the audience. It is not, therefore, too much to expect that the substance of Mr. O'Sullivan's lecture will shortly appear in the form of a monograph and will be placed at the disposal of those who are associated with the Institute of Chemistry.

THE CALENDAR OF THE PHARMACEUTICAL SOCIETY.

The 'Calendar' of the Pharmaceutical Society for 1883 is now ready and copies may be obtained from the Secretary. We observe that this useful annual has now reached no less than 500 pages, for a list of the contents of which we refer to an advertisement on another page.

In addition to the lists of members and others connected with the Society, the donors and subscribers to the Benevolent Fund, the Charter and the three Acts of Parliament directly referring to the establishment and functions of the Society, the 'Calendar' contains abstracts from numerous Acts of Parliament and General Orders issued by Government Departments, the provisions of which are of importance and interest to pharmacists generally. The questions set at the four Preliminary examinations in 1882, all the papers given last year in the competitions for the Jacob Bell Memorial Scholarships, and for the School of Pharmacy prizes are also published in the 'Calendar.'

Once more we must reiterate that we should be glad if the Society's 'Calendar' were more widely known and more frequently consulted, as many of our correspondents would thus be saved the trouble of seeking elsewhere the information it contains, which has been specially compiled for the class to which our readers belong.

POISONING BY MISADVENTURE.

Another of those deplorable cases of fatal poisoning which raise a doubt whether the victims were sufficiently aware of the dangerous character of the preparations they have administered to themselves has during the week formed the subject of an inquest held by Dr. Danford Thomas at Paddington. The medical evidence went to show that death resulted from an overdose of a narcotic preparation. Though it was, of course, impossible to say whether that had been taken intentionally or not, we must of necessity concur in the regret expressed that the practice of taking these dangerous sleeping draughts is so much on the increase.

We desire also to direct attention to the remark of the Coroner that the law would seem to encourage this practice, for though a person going to a chemist's shop and asking for anything which was known to contain poison, would not be supplied with it without signing his name and address, it is possible to purchase patent medicines containing any amount of poison without the least restriction or safeguard. We gladly take the opportunity of endorsing the opinion expressed by the Coroner that in this respect the law is most defective and ought to be amended.

THE NEXT EVENING MEETING.

An Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, February 7, when the following papers are to be read :—

"A Research on the Alkaloid Gelsemine and some of its Crystalline Salts." By A. W. Gerrard, F.C.S.

"Aromatic Spirit of Ammonia." By Dr. Thresh.

"An Apparatus for Continuous Extraction." By Wyndham R. Dunstan and F. W. Short.

"The Assay of Nux Vomica." By Wyndham R. Dunstan and F. W. Short.

"The Constitution of Liquor Sodæ Chloratæ." By Wyndham R. Dunstan and F. Ransom.

"The Action of Chlorine upon Solutions of Sodium Carbonate." By Wyndham R. Dunstan and F. Ransom.

The next meeting of the Chemists' Assistants' Association will be held on Tuesday evening, Feb. 6, at 9 o'clock precisely, at University Chambers, 53, Conduit Street, W., when a paper will be read by Mr. W. Temple Cooper, Jun., on "Practical Hints on the Examination of Urine."

* * *

Some drysalters and grocers who were recently charged at Strassburg with the sale of adulterated saffron escaped conviction through two curious technicalities. As by the French law, which still rules the practice of pharmacy in Elsass-Lothringen, saffron can not be sold for medicinal use by others than pharmacists without incurring a penalty, it was held by the local tribunal that these sales must have been made for tinctorial purposes; and on the further ground that grocers commonly sell carthamus under the name of saffron, as a substitute for use in dyeing, the accused were aquitted.

* * *

Two medals of gold and two of silver have been placed at the disposal of the National and Central Horticultural Society of France to be awarded to the authors of the best essays on the popular names of plants, especially of those that are cultivated.

* * *

The curious theory has been put forward recently by Dr. W. A. Hammond, of New York, that the seat of instinct is in the medulla oblongata, his argument being based among other observations upon the capacity in acephalic monsters for suckling and similar instinctive acts, providing the medulla be present.

* * *

The *Sanitary Record* mentions the prosecution of a New York grocer for selling as pure cream of tartar a mixture consisting of 92 per cent. of ground gypsum and 8 per cent. of tartaric acid. After more than a day spent in raising and disposing of technical objections, amongst which was one as to the Pharmacopœia being quoted in evidence, a fine of ten dollars was imposed.

* * *

According to some returns recently quoted by Sir J. Fayrer the number of human beings known to have met their death through snake bites in India during the year 1881 was 18,610. Of these deaths 9204 occurred in the Bengal Presidency alone.

* * *

In a discussion on the question of "women pharmacists" in the United States it has been stated that since the year 1868 eleven ladies have graduated from the department of pharmacy in the University of Michigan, but of these nine are not now practising pharmacy. The *Weekly Drug News and American Pharmacist* remarks upon this: "What woman is capable of doing must not be confounded with what she does. . . . After fifteen years the foremost college of pharmacy in the country has been successful in graduating two women who are following the profession.

* * *

The *British Medical Journal* states that in Wisconsin any druggist, apothecary or vendor of medicine is liable to a fine of ten dollars and costs for refilling a prescription marked, "No duplicate."

* * *

Referring to a case of death by poisoning at Poplar, through the substitution of carbolic acid obtained for disinfecting purposes for a medicine, the *British Medical Journal* remarks that "there ought surely to be some method of treating carbolic acid, either by colouring the liquid strongly, or by the use of strongly smelling powders in lieu of liquid, which should put an end to such frequent disasters."

* * *

In a criticism upon the new United States Pharmacopœia, after referring to the preponderance of pharmacists on the Committee of Revision, Dr. Squibb remarks, rather pathetically, that "the prevailing drift of the times seems to be for the medical profession to turn over its most valuable and most practical interest to pharmacy, and that pharmacy as a trade takes no more advantage of this unsafe and unwise drift, is highly creditable to the leaders of that branch of medicine." But Dr. Squibb admits that of the resulting volume "it can hardly be said with too much emphasis that it seems to be by far the best Pharmacopœia of the time." This is a candid admission from the medical gentleman who failed to persuade the American Medical Association to undertake the work.

* * *

The occasion of the resignation by Professor Bentley of the post he has for so many years held as Dean of the Faculty of the Medical Faculty of King's College is to be made the opportunity by many of his old pupils to present him with a memorial of their regard and esteem. The Treasurer of the Fund is Professor John Wood, F.R.S.

* * *

According to the *Lancet* the annual drug bill of one of our largest metropolitan hospitals includes among its items ten tons of linseed meal for poultices, £125; lint, £443; cotton-wool, £183; carbolic acid, £223; carbolized muslin, £180; spirit of wine, £585; potassium iodide, £80; silver nitrate, £111; quinine, £300; cod liver oil, £190; bismuth preparations, £93.

* * *

The "Southall Choral Society" gave its first vocal and instrumental concert on Saturday last at the Priory School rooms in Birmingham. There was a large attendance, and the programme was well sustained by the ladies and members of the choir.

* * *

At the meeting of the Society of Chemical Industry, to be held at the Chemical Society's Rooms, Burlington House, on the 5th inst., Mr. A. H. Allen, of Sheffield, will read a paper on "The Chemistry and Methods of Examining Fixed Oils."

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN EDINBURGH.

January 24, 25 *and* 26, 1883.

Present on each day—Mr. Carteighe, President; Messrs. Ainslie, Baildon, Clark, Gibson, Gilmour, Kinninmont, Nesbit and Stephenson.

Professor Maclagan was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

24*th.*—*Four* candidates were examined. *Two* failed. The undermentioned *two* passed, and were declared qualified to be registered as Phamaceutical Chemists:—

Foggitt, John Blackett ....Thirsk.
Gilbert, William John ....Ventnor.

MINOR EXAMINATION.

24*th.*—*Eight* candidates were examined. *Four* failed The undermentioned *four* passed, and were declared qualified to be registered as Chemists and Druggists:—

Boyd, Alexander ....Glasgow.
Brown, John ....Stirling.
Buchanan, John ....Bonnyrigg.
Crawford, Thomas ....Leith.

25*th.*—*Eleven* candidates were examined. *Five* failed the undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Harris, Stephen...... ....Droitwich.
Hudson, William ....Sunderland.
Ivatt, Albert.........................Cottenham.
Jary, Joseph James ....South Shields.
Jenner, Harry Albion ....St. Leonards.
Mackenzie, James Calder ......Grantown.

26*th.*—*Ten* candidates were examined. *Six* failed. The undermentioned *four* passed, and were declared qualified to be registered as Chemists and Druggists:—

Pirie, William ....Arbroath.
Raine, Ralph William............Newcastle-on-Tyne.
Stirling, George ....Dunoon.
Turner, Alexander ....Dumfries.

Provincial Transactions.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Wednesday, January 24, 1883, a lecture was delivered in connection with the above Association, on "Flowers: their Structure and Arrangement," by Mr. F. W. Lewitt.

In the absence of the President, the chair was occupied by Mr. J. Garrett.

In the course of an instructive lecture Mr. Lewitt drew attention to the difficulty which has been experienced in endeavouring to define a flower, and pointed out some of the definitions which had been made by botanists. The arrangement of flowers on the axis of growth was shown and the structure of the different parts and their functions were displayed and by the aid of diagrams ably brought before the audience.

The Chairman proposed a hearty vote of thanks and, upon Mr. G. M. Winter seconding it, in a few appropriate remarks, it was accorded to the lecturer.

Proceedings of Scientific Societies.

SOCIETY OF CHEMICAL INDUSTRY.

The Present Condition of the Soda Industry.*

BY WALTER WELDON, F.R.S.

About a fortnight ago, the *Times* spoke of the manufacture of soda by the Leblanc process as being, "to some extent, a dying industry." Although I hope to show this evening ground for believing that that industry is not going to die just yet, it has certainly for some time past been in a condition by no means satisfactory to the greater number of those whose capital is engaged in it. For manufacturers of soda by the Leblanc process recent years have been years, in very many cases of loss, and in not a few cases of disaster. Of twenty-five alkali works which were in operation in the neighbourhood of Newcastle-on-Tyne a very few years ago, only thirteen are in operation now; and of the other twelve,† not fewer than eight have been actually dismantled, in utter despair of its ever again being possible to manufacture soda in them by the Leblanc process except at an absolute loss. The alkali-making districts of Lancashire have advantages over the Newcastle district in respect alike of the price of salt, of facilities for supplying the American market, and of nearness to certain of the great English centres of soda consumption; but, nevertheless, even in Lancashire some seven or eight alkali-works are standing idle, and but few of the others are working up to their full capacity. In Belgium, where there are five or six works which formerly made soda by the Leblanc process, matters are even worse, since in that country the manufacture of Leblanc soda has entirely ceased. The only other European countries in which the soda-industry as yet exists are France, Germany and Austria. In these countries the soda-manufacture is protected by the import duties which are stated in the following table:—

Import Duties per Ton.

	France.	Germany.	Austria.
	Francs.	Marks.	Florins.
Soda-ash	41	25	12
„ crystals	19	15	8
Caustic soda	64	40	40
Bleaching powder	35·5	30	15

—duties which, I believe, more than compensate for the greater cost of raw materials in those countries than in England; while in all these countries there is, moreover, a large demand for that bye-product of the Leblanc process, hydrochloric acid. Notwithstanding that the French, German and Austrian manufacturers of Leblanc soda have thus two very sensible advantages over their fellow manufacturers in this country, they have nevertheless grave cause for anxiety: the French manufacturers, indeed, in part owing to a special circumstance which I will mention presently, having reason to regard the future, not only with alarm, but even with dismay.

From information kindly supplied to me by manufacturers in all the countries in which the soda-industry is practised, I have been enabled to draw up a statement of the present total soda-production of the world, and of the proportions in which that production is divided between the Leblanc process and the ammonia process. In drawing up the following table, I have converted all the figures supplied to me, alike those for soda-ash, those for crystals, those for caustic soda, those for bicarbonate, and those for black-ash sold as such, into terms of pure Na_2CO_3:—

Present Soda Production of the World.

	Leblanc Soda.	Ammonia Soda.	Totals.	Ammonia Soda per cent. of Total Soda.
Great Britain	380,000	52,000	432,000	12·0
France	70,000	57,125	127,125	44·9
Germany	56,500	44,000	100,500	43·8
Austria	39,000	1,000	40,000	2·5
Belgium	...	8,000	8,000	100·0
United States	...	1,100	1,100	100·0
Total...	545,500	163,225	708,725	23·0

This table shows that the total quantity of soda now being manufactured annually is nearly 710,000 tons, and that of this quantity more than 163,000 tons are produced by the ammonia process.

I need scarcely say that it is to the very rapid growth of this latter process that is mainly due that condition of the Leblanc process which I have endeavoured to indicate.

Although it is now more than forty-seven years since the ammonia process was first proposed by Dyer and Hemming, it is less than seventeen years since that process was first realized industrially. As an industrial process, capable of being worked continuously and with satisfactory commercial results, the ammonia process dates only from 1866, being the year in which M. Ernest Solvay, of Brussels, began to produce ammonia soda at works which he had established for the purpose at Couillet, near Charleroi. M. Solvay has now two other ammonia soda works in operation,—one in France, at Varangeville-Dombasle, near Nancy, and one in South Germany, at Wyhlen, in the Grand Duchy of Baden,—and by his courtesy I am enabled to place before you the following statement of the quantities of ammonia soda which he has manufactured in each completed twelve months from the 1st of May, 1866:—

		Tons.	
1866—67	...	179	Couillet only.
1867—68	...	465	
1868—69	...	719	
1869—70	...	940	
1870—71	...	1,862	
1871—72	...	2,805	
1872—73	...	3,423	
1873—74	...	3,980	
1874—75	...	4,678	
1875—76	...	5,768	Couillet and Dombasle.
1876—77	...	11,579	
1877—78	...	19,247	
1878—79	...	25,023	
1879—80	...	32,326	
1880—81	...	42,669	Couillet, Dombasle, and Wyhlen.
1881—82	...	53,400	

These figures come down to the 30th April last. Since that date, however, M. Solvay has increased his production by nearly 60 tons per day, or 21,000 tons per annum, so that he is now making ammonia soda at the rate of very nearly 75,000 tons a year. He is thus making ammonia soda on nearly three times the scale on which he was making it four years ago, and on nearly twice the scale on which he was making it only two years ago. In France and Germany, M. Solvay's great success has tempted other manufacturers into the field, and, although none of them

* A paper read before the London Section of the Society of Chemical Industry, at the Chemical Society's Rooms, Burlington House, London, January 8, 1883.

† The quantity of salt decomposed in these twelve works was about 67,000 tons a year. The quantity decomposed in the thirteen works still in operation is about 220,000 tons a year.

are as yet large makers, their total production amounts to fully 35,000 tons per annum, raising the total Continental production of ammonia soda to about 110,000 tons per annum out of a total production by both processes of 275,000 tons. Of the total soda now being made on the Continent, therefore, about 40 per cent. is being made by the ammonia process. While the quantity of Leblanc soda made in France has neither increased nor diminished during the last few years, the quantity of Leblanc soda made in Germany and Austria has increased by several times the quantity formerly made in Belgium; so that not only these 110,000 tons of ammonia soda per annum, but also fully 25,000 tons per annum of Leblanc soda, have been added, comparatively recently, to the soda production of the Continent: going partly to supply increased consumption, but largely to diminish importation from England. And of this vast increase in the Continental production of soda,—four-fifths of which increase is due to the ammonia process,—two-thirds have sprung into existence within the last five years, and a large part of those two-thirds within only two years.

In England, within the last two years, the production of ammonia soda has been nearly trebled. The ammonia process is practised in this country as yet only by one firm. In 1873 it was not in operation in this country at all. In that year our Honorary Foreign Secretary, Mr. Ludwig Mond, arranged with M. Solvay for the right to work under his patents in this country, and in the following year, in conjunction with Mr. J. T. Brunner, Mr. Mond began to make ammonia soda at Winnington, near Northwich. Messrs. Brunner and Mond began on a very modest scale, their production in 1875 not exceeding 2500 tons; but in 1878 their production rose to 10,000 tons; in 1880 it was 18,800 tons; and it is now at the rate of not less than 52,000 tons per annum, or at very nearly three times the rate of only two years ago.

The competition of the ammonia process with the Leblanc process has thus attained its present degree of seriousness only very recently indeed. It has come upon the makers of Leblanc soda almost like a thunderbolt out of a clear sky.

And, serious as that competition is already, it is about to become even more serious still. Not only is it to be expected of the existing ammonia soda works that those of them which have recently so greatly increased their production will go on increasing their production, and that those of them which have more recently started will grow as the older ammonia soda works have grown, but new ammonia works are being built. M. Solvay, who has already, as I have said, a work in operation in South Germany besides his French and Belgian works, and who is already by far the largest soda-maker in the world, will soon have a work in operation in North Germany also, at Bernburg, near Stassfurt; and he is now, moreover, erecting a work in Russia, and also a work in the United States, and is on the point of commencing the erection of a work in Austria, so that by-and-by he will be making soda in no fewer than seven distinct works, in six different countries. In addition to all this, a large work to make ammonia soda, not on M. Solvay's system, but on a system modified from that practised at Dieuze, is being erected near Stassfurt by the Company of Buckau; an ammonia soda work is building, and will be started in the spring, at Favorznow, near Cracow; and one is about to be built at Siebenburgen, in Transylvania,—not to speak of the intention of Messrs. Bell Brothers to build an ammonia soda work at Middlesbro. The new works which are thus in course of construction, and some of which are nearly completed, will throw on the market more ammonia soda, to the extent of not less, from the commencement, than from 65,000 to 70,000 tons a year.* For Leblanc soda makers, it is thus as though ammonia soda had latterly rained from the skies during two days out of every three, and the shower were now on the point or becoming continuous.

While face to face with so serious an amount of competition, actual and imminent, on the part of the ammonia process, the Leblanc process pure and simple is now further threatened with what is surely the "most unkindest cut of all," namely, with competition from the Leblanc process itself—combined with the extraction of copper from Spanish pyrites.

To explain how this has come about, I must remind you that the sulphuric acid used in the Leblanc process is now invariably manufactured from the sulphur of pyrites; that the pyrites used in this country is now almost exclusively either Spanish or Portuguese pyrites, containing two to three per cent. of copper and very small quantities of silver and gold; that after most of the sulphur has been burnt off from the pyrites, as the first step in the manufacture of sulphuric acid, the residual "burnt ore," or "pyrites cinders," as it is called, is treated by the wet way for the extraction from it of copper, and in most cases now of gold and silver also;* and that what remains when these have been extracted is an almost pure oxide of iron, which finds a ready sale for use for various purposes in connection with the manufacture of iron and steel. The supply of this cupreous pyrites is for the most part monopolized by three great companies—the Tharsis Company, the Rio Tinto Company, and Messrs. Mason and Barry. These companies not only supply nearly the whole of the pyrites used in the manufacture of sulphuric acid in England, but the Rio Tinto Company also supplies annually some 60,000 tons of pyrites to Germany, and is also beginning to send pyrites into Austria. None of the three companies, however, has been able to sell an ounce of pyrites in France.

The reason of this is that in France itself there are two large deposits of pyrites, both belonging to soda-makers: one belonging to the Compagnie de St. Gobain, and the other to MM. Pechiney et Cie. Each of these companies itself uses its own pyrites; and the former of them supplies with pyrites the greater number of the other alkali-makers in the North of France, while the latter

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* As no complete list of ammonia soda works has yet been published, it may be interesting here to give one. The following list includes all the works now actually in operation:—

England:—
Winnington
Sandbach

Germany:—
Wyhlen
Duisburg
Inowrazlaw
Grevenberg
Dieuze
Trotha
Heilbronn
Nürnberg
Rothenfelde

France:—
Dombasle
Giraud
Sorgues
St. Denis
Lille

Belgium:—
Couillet

Austria:—
Boszko

United States:—
Bay city

Ammonia soda works are now being built in the following localities:—

Austria:—
Favorznow
Siebenburgen
?

Russia:—
Beresniki

Germany:—
Stassfurt
Bernburg

United States.—
Syracuse.

There is a reason why the locality of the work which M. Solvay is about to build in Austria may not yet be published.

* A German analysis of Rio Tinto pyrites gives the following results per 1000 kilos:—

495 kilos sulphur.
430 ,, iron.
30 ,, copper.
10 ,, lead.
26 grammes silver.
180 milligrammes gold.
150 grammes bismuth.

supplies with pyrites all the other alkali-makers of the South of France. It has obviously been impossible to sell Spanish pyrites to either of the two great soda-making firms, each of which thus has pyrites and by no means dear pyrites of its own, and each of which is a large seller of pyrites to other soda-makers; and the other French soda-makers, for the most part, have been precluded from even considering the question of changing to Spanish pyrites, if only by reason of the French habit of contracting for the supply of raw materials over very long periods. A French manufacturer's contract for raw materials is generally a contract for fifteen years; and most of the French soda-makers are now obtaining their pyrites under contracts which have yet a considerable time to run.

Under these circumstances the Rio Tinto Company has taken a remarkable step. To understand the motive to this step, it must be borne in mind that while French pyrites does not contain copper, and so has scarcely any value beyond that of the sulphur which it contains, Spanish pyrites has a considerable value in addition to its sulphur value. While the value of Spanish pyrites for the sulphur in it is equal to that of the best non-cupreous pyrites, its value for copper is greater than its value for sulphur, and, not to speak of its value as regards precious metals, it has also a considerable value for its iron. In this country, the cinders left after as much as possible of the sulphur of non-cupreous pyrites has been burnt off are considered to have no value at all; and even in France,—where the import duty on cast-iron is greater than the present price of Glasgow pigs, and where all forms of iron are therefore appreciably more valuable than in this country,—the cinders of non-cupreous pyrites are not worth more than three francs per ton. They always contain sulphur, and sometimes contain phosphorus. The cinders of cupreous pyrites, before treatment for the extraction of copper from them, also contain sulphur, and in larger quantity than the cinders of non-cupreous pyrites; but the treatment to which they are subjected for the extraction of their copper removes the whole of their sulphur, and also the whole of their phosphorus, if they have contained any, leaving a residual oxide of iron of great purity. This residual oxide, or "purple ore," as it is called, now sells in this country for 12*s.* per ton, and in France it would doubtless command a higher price.

Now, in this country a state of things has grown up under which the manufacturers of Leblanc soda derive no advantage from the value for copper and iron of the pyrites which they employ. The treatment of the cinders of cupreous pyrites has become in this country a separate industry, practised only in a few instances by alkali-makers themselves, but practised for the most part by companies or individuals who do not themselves make soda, but who either buy from soda-makers the cinders of pyrites of which the soda-makers have bought both values, the copper value as well as the sulphur value, or themselves buy both values, selling only the sulphur value to the soda-makers, or else buy direct from the pyrites sellers the copper value only: the pyrites sellers in such cases selling the copper value of their pyrites to one purchaser and its sulphur value to another. It is an industry which yields fair commercial profits, so that soda-makers may be incurring actual loss, while those who deal with the cinders of the pyrites from which the soda-makers have burnt off sulphur are at least making a living. And while the treatment of the cinders of Spanish pyrites is fairly profitable in this country, the greater value of iron and iron ores there than here would doubtless render it more profitable in France. It is true that coal is more costly in France than in England; but the quantity of coal required for treating pyrites cinders is not great.

The course, then, which the Rio Tinto Company is taking is this. Unable to sell its pyrites to the French Leblanc soda-makers, it has determined that the Leblanc soda made in France, or at least a large part of it, shall nevertheless be made by means of Rio Tinto pyrites, and to this end it has promoted a subsidiary company, "La Compagnie d'Exploitation des Minerais de Rio Tinto," which company is to make Leblanc soda in France and elsewhere, relying for its profits neither on soda nor on chlorine, but on copper and oxide of iron. For this company, soda and chlorine will be simply bye-products, which it will be glad to sell at a profit, if that may be, but which, if that may not be, it will be content to sell at the bare cost of manufacturing them. It will manufacture them only for the sake of converting Rio Tinto pyrites into pyrites cinders.

This new company proposes to operate upon an enormous scale. It has a capital of 1,200,000 pounds sterling, of which one-half is already paid-up, and there is talk of its building in France no fewer than five great works: one of which, designed, and to be managed, by Englishmen, it has already commenced, in the neighbourhood of Marseilles. The result cannot but be very grave for the existing French Leblanc soda-makers, and must inevitably affect the makers, both of Leblanc soda and of ammonia soda, in this country also.

Moreover, this new company will not confine its operations to France. Not only will it take Spanish pyrites to the United States, and there make sulphuric acid, extract copper, and obtain "purple ore,"—large quantities of which at present go from England to America,—but it will also build a large soda-making and copper-extracting work,—which will certainly affect the English alkali trade,—in the neighbourhood of Antwerp. The Leblanc process will thus be re-introduced into Belgium, not as a substantive process, but simply as a part of a combination of processes for the utilization of cupreous pyrites.

To such complexion has the Leblanc process come at last. Originally, soda was its only commercial product, the hydrochloric acid produced during the first stage of it being turned to no account. In time a demand grew up for chlorine, that hydrochloric acid began to be utilized, and the manufacturers of Leblanc soda now sent into the market two products, by each of which they gained profits. Then their soda ceased to be profitable, and became a kind of bye-product, which they continued to make only because they could not otherwise make chlorine. Now, Leblanc soda gives no profit at all, and chlorine none to speak of; and both have come to be regarded as secondary products, to be made only incidentally, and only because making them is essential to the application to certain ores of the wet method of extracting copper.

Returning to the ammonia process, when that process first began to threaten them, the makers of Leblanc soda comforted themselves by two considerations: one of which was that the ammonia process must itself tend to check its own extension, by reason of the loss of ammonia inseparable from that process so increasing the demand for ammonia as to materially raise the price of that body. They knew that the constantly increasing demand for ammonia for the purposes for which it was already employed had doubled its price within twenty years; and they thought that every further extension of the ammonia soda process must still further increase the market-value of ammonia, until at length the ammonia process would cease to have any advantage over the Leblanc process. So far, however, from that anticipation having been realized, despite the immense extension which the ammonia soda process has recently undergone, the price of ammonia is now beginning to fall. The delusion that it was impossible to collect the ammonia given off from coke-ovens without spoiling the coke is at last giving way before accomplished facts; ammonia is now being obtained commercially not only from coke-ovens, but also from another source, wholly unforeseen and unexpected; and the time, moreover, seems at last to have dawned when there will be collected and utilized as ammonia at least a portion of the nitrogen of nearly all the fuel burnt either for industrial or for domestic purposes.

In France, ammonia has been collected from coke-ovens for a number of years past.* It is fully ten or twelve years since M. Carvés said to French coke manufacturers: "I wish you to try my system of making coke, but I do not ask you to risk one farthing in doing so. If you will permit me, I will build coke-ovens in your works at my own expense. I will guarantee you against all risk of the coke produced being of inferior quality; so that, if I fail, you shall be no loser. If I succeed, I will ask you for no money royalty, nor will I ask you to pay me for the coke ovens: I will only ask that you shall give me for a short term of years one-third of those products which I shall condense, but which, at present, you do not condense." This offer was accepted by some of those to whom it was addressed, with results quite satisfactory both to them and to M. Carvés. Quite recently, coke-ovens on the Carvés system have been erected in South Durham, and about three months ago ammonia from them began to appear in the market.

This fact, however, is not nearly so important as something which has been done simultaneously in North Durham. While the Carvés system of making coke gives important results, it has the disadvantage of requiring coke-ovens of a special construction. It could thus extend only in proportion as the existing coke-ovens were replaced by new ones; and replacement of the present ovens by Carvés ovens would naturally be a slow process. For a method of collecting ammonia and other volatile products from coke-ovens to obtain wide application rapidly, it must be a method applicable to existing coke-ovens; and a method applicable to existing coke-ovens at a very slight expense, has been recently devised by an English inventor, Mr. John Jameson, of Newcastle-on-Tyne. His method has now been in operation for nearly six months at the works of our vice-president, Mr. Hugh Lee Pattinson, at Felling, near Gateshead; and Mr. Pattinson authorizes me to state that he has "reason to be abundantly satisfied with the results." The products condensed are the products of the distillation of coal at a very low temperature. They include, per ton of Northumberland steam coal operated upon, an average of 11 gallons of oil, and ammonia equal to 12 pounds of ammonium sulphate. The oil is a crude paraffin oil, of 0·9 sp. gr., containing from 8 to 10 per per cent., according to the coal employed, of solid paraffin. The yield of oil will probably not be greatly increased; but it is expected that the yield of ammonia, the appliances for collecting which at Felling have hitherto been imperfect, will be increased considerably. There is also obtained, per ton of coal treated, from 12,000 to 15,000 cubic feet of combustible gases. The coke obtained is fully equal, both in quantity and in quality, to that obtained by coking the same kind of coal in the ordinary way. The cost of applying the system to existing coke-ovens does not exceed £30 per oven. Licences for applying it to 100,000 tons of coal per annum have already been applied for, and there is every prospect that its application will extend very rapidly.

While during the last few months ammonia has thus begun to be collected from English coke-ovens, it has also begun to be collected from Scotch blast-furnaces. In Scotland, there are some handred and twenty blast-furnaces which are worked with raw coal. Some months ago a member of the firm of William Baird and Co., who happens to be also a director of a gaswork, Mr. William Ferrie, was struck by the idea that the methods employed for separating ammonia and tar from crude illuminating gas might be used for separating the same bodies from the gases from blast-furnaces in which raw coal is used; and although the volume of the gases from such furnaces, per ton of coal employed, is about thirteen times greater than that of the gases obtained by distilling the same kind of coal in retorts—is not less, that is to say, than 130,000 cubic feet—Mr. Ferrie's idea has been put into execution with complete success. From two of the sixteen blast-furnaces at the Gartsherrie Ironworks ammonia and tar have been regularly collected for some months past, and preparations are in progress for collecting them from the other fourteen blast-furnaces there. The quantity of ammonia at present being obtained at Gartsherrie is the quantity corresponding to about 18 cwt. of ammonium sulphate per day, being at the rate of 20 lb. of ammonium sulphate per ton of coal consumed. The other products condensed from the blast-furnace gases have more resemblance to ordinary gas-tar than the corresponding products obtained from the Felling coke-ovens. They are products of the distillation of coal at a temperature intermediate between the temperature at which distillation goes on in those coke-ovens and the temperature at which it is performed in gasworks; and, though the value of the blast-furnace tar has not yet been fully ascertained, it is believed to be nearly as valuable as ordinary gas-tar, though not quite. The results thus obtained at Gartsherrie have led to endeavours at other Scotch ironworks to accomplish the same object in other ways; and experiments to this end are in progress at the Monkland Ironworks, the Summerlee Ironworks, the Airdrie Ironworks, and others; so that we may fairly expect that the time is not far distant when all the ammonia and all the tar which are evolved from Scotch blast-furnaces will be collected and sent into the market.

Each of these one hundred and twenty Scotch blast-furnaces consumes, on an average, 50 tons of coal per twenty-four hours. The total quantity of coal consumed in them per annum is thus $50 \times 120 \times 365 = 2{,}190{,}000$ tons. The quantity of ammonia yielded per ton of coal being, as I have said, the quantity corresponding to 20 pounds of ammonium sulphate, there can thus be obtained per annum from these one hundred and twenty blast-furnaces a quantity of ammonia corresponding to nearly 20,000 tons of ammonium sulphate, worth, at the present selling price of that commodity, not less than £400,000.

Large, however, as is this quantity, it is only one-tenth of the further quantity which can be obtained from English coke-ovens. The quantity of coal coked annually in England is not far short of 20,000,000 tons, and if Mr. Jameson's system were applied to the whole of our coke-ovens, with the result of collecting, per ton of coal treated, the same quantity of ammonia as is obtained from the Gartsherrie blast furnaces, there would be obtained from this source per annum the quantity of ammonia corresponding to 180,000 tons of ammonium sulphate, at present worth more than three and a half millions sterling. Nor is even this all; for I shall have to speak in a moment of another possible, and I believe probable, source of ammonia, even more extensive still.

Now, of the ammonia employed by the ammonia soda maker, he loses from one-fiftieth to one-fortieth part. As he has to employ from one and a half to one and three-quarter equivalents of ammonia for each equivalent of sodium carbonate finally obtained, we may take it that he loses about one twenty-third of an equivalent of ammonia for each equivalent of sodium carbonate manufactured. In terms of ammonium sulphate, being the terms in which the loss of ammonia in the ammonia soda process is usually stated, this loss corresponds to about five and a half parts of ammonium sulphate per hundred parts of sodium carbonate produced. The total annual loss of

* Not, however, I find, to any considerable extent. The only system of collecting ammonia from coke-ovens which is in use in France is the Carvés system, and that is in use only in three works—at Tamaris, at Terre Noire, and at Bességes. The total quantity of coke produced in Carvés ovens in France is 300 tons per day, and the total quantity of volatile products condensed from these ovens per day consists of 6 tons of tar and ammonia equal to from 2 to 2½ tons of ammonium sulphate. The coal used in the works in question is much less nitrogenous than ordinary English coal.

ammonia in the manufacture of the 163,000 tons of ammonia soda now being produced per annum thus corresponds to just about 9000 tons of ammonium sulphate. This is, no doubt, a large quantity of a commodity worth £20 per ton; but, in comparison with the extent of the new sources of ammonia which have just begun to be turned to account, it is utterly insignificant. It is less than one-twentieth part of the quantity capable of being yielded by blast-furnaces and coke-ovens in Great Britain alone, and is a smaller fraction still of the quantity which, I believe, can be obtained from another source which has yet to be mentioned. We may, therefore, be quite certain that the progress of the ammonia soda process will not be hindered or limited by any difficulty as regards supply of ammonia.

(*To be continued.*)

CHEMISTS' ASSISTANTS' ASSOCIATION.

The first paper for the second half-session 1882-83 of this Association was read on Wednesday evening, January 17, by the President, Mr. W. A. Wrenn, entitled "Half an hour with the Plants used in Perfumery." The chair was occupied by the Vice-President, Mr. C. Parkinson.

In his opening remarks Mr. Wrenn alluded to the controversy which has existed as to the propriety of pharmacists to engage in the manufacture and retailing of perfumes and toilet essences, or whether it would be more advantageous (the matter of £ *s. d.* excepted) to leave the sale to the perfumer proper. The flowers and fruits yielding essential oils most prominently mentioned were bergamotte, cloves, jasmin, lavender, narcissus, orange, pelargonium, rose, tuberose and violet. When referring to the oil distilled from the fruit of *Citrus Bergamia*, Mr. Wrenn exhibited some crystals obtained from the following mixture, which had been allowed to remain for two months, with occasional agitation.

Take—

Ess. bergamotte . . .	40	cubic centimetres.
Spirits of wine . . .	5	„
Acid nitric (sp. gr. 1·200)	10	„
Water	45	„

The crystals were said to resemble those of terpin hydrate as obtained by Mr. R. H. Parker from turpentine, detailed in a paper read before the British Pharmaceutical Conference last year. Reference was also made to substances used in perfumery, such as musk, ambergris, etc. In the preparation of essence of musk the author recommended the addition of a small quantity of acetic acid to prevent the accumulation of ammoniacal gas. The use of benzoic acid in cases in which essences were not made from French pomades was noted as increasing the lasting fragrance of the perfume.

The paper, which was profusely illustrated by samples of pomades, essential oils, flowers, etc., kindly supplied by numerous well-known Grasse perfumers and their London representatives, was listened to by a full complement of members and visitors.

A lengthy discussion followed, in which Messrs. Alcock, Braithwaite, Glen, Millhouse, Palmer, Parkinson, Wyatt, and others took part.

A vote of thanks to the President, proposed by Mr. Sangster, and seconded by Mr. Cooke, brought the meeting to a termination.

ROYAL INSTITUTION.

The Primæval Ancestors of Existing Vegetation and their Bearing on the Doctrine of Evolution.

BY PROFESSOR C. W. WILLIAMSON.

The third lecture of this course was delivered on Tuesday last. The following is an abstract:—

The living Equisetums constitute a very distinct group, the members of which exhibit very slight variations from a common type, either of appearance or of organization. The British species vary in height from 1 to 5 or 6 feet, but some South American forms are as much 20 feet in height; but even these tallest examples rarely attain an inch in diameter. The most conspicuous external characteristic of the order is seen in the leaves. These spring from each node of the stem or branch in verticels, in each of which the bases of the leaves are coalesced for fully half their length from a cylindrical sheath. In most of the species branches are also given off from the nodes. Turning to their internal organization, we find that in the Equisetaceous stem the vascular element is reduced to a lower condition than in any other of the vascular Cryptogams. The pith is usually hollow at its centre, whilst at its periphery it is perforated by a ring of vertical canals, which branch at each node, so that those of each internode are vertically intermediate to those of the respective nodes above and below. This alteration in the position of these internodal canals is important, since it reappears in the most ancient fossil forms. Immediately external to each canal we find a very small number of scalariform vessels, the sole representatives of the developed vascular zones of the higher plants. In British forms we usually have but one or two such vessels at each of the outer angles of the canal. In some South American forms these vascular bundles are rather more developed, but are always insignificant. Externally to this ring of vascular bundles is an ample bark enclosed within an epidermal layer, which is more or less silicified.

The reproductive system of the Equisetums is very distinctive of the order. The spore-bearing structures are often at the upper extremities of each of the stems indiscriminately. In some species they are only found on specialized branchless stems. In every case the fruit is a strobilus or cone, in which the several verticels of leaves are peculiarly modified. Each leaf of each verticel stands out at right angles from the central stem or axis, and terminates in a flattened shield-like expansion, from the margin of the inner surface of which there projects yet more internally a ring of cellular bags, or "*Sporangia.*" Each of these bags is filled with small spores of very distinctive forms. Each spore has four radiating arms, with club-shaped extremities. When unripe these arms closely embrace the central spore. When ripe, they uncoil themselves, and thus, occupying more space, they burst the walls of the enclosing *Sporangium* and make their escape. Each spore when germinating develops a small branching *Prothallus.* These Prothalli are usually diœcious; the smaller ones bearing *Antheridia* or male organs, representing pollen sacs, and the larger ones bearing *Archegonia* or female structures. Some few are monœcious, both antheridia and archegonia being found on the same Prothallus. These prothalli develop young *Spongonia* or bud-bearing organs, and then wither. The spongonium then develops into the spore-bearing plant known as the Equisetum.

This modern type of Equisetum seems to have existed from a remote period of the world's history, being found in but slightly modified forms in the Tertiary, Cretaceous, Oolitic and Triassic strata. In the latter bed they attained to much more gigantic dimensions than is reached by any living forms, both as regards height and diameter. On reaching the Carboniferous strata we leave behind us the true Equisetums which are now represented by the grander forms known as Calamites, but in the rhœtic and triassic beds, between the base of the Oolites and the Peruvian and Carboniferous strata, we find a genus Schizoneura, intermediate in some respects between the Equisetums and the Calamites. In its young state it has the coalesced sheathing verticles of leaves of the Equisetums; but at an early age each verticellate sheath spilts longitudinally into two or more free leaves, approaching the verticels of free leaves, devoid of sheaths, characteristic of the foliage of the Calamites.

This latter genus assumed an aborescent form both in its growth and organization. We now understand much of its structure, from that of its smallest twigs up to stems of considerable magnitude. That it sometimes exceeded 30 feet in height is certain, whilst specimens exist which when living must have been from 2 to 3 feet in diameter. The young twigs were purely cellular in structure, but a series of vertical canals, like those of the Equiseta, ran from node to node. Almost simultaneously with the formation of these, woody wedges began to be developed externally to each of these canals and the cellular pith became fistular or hollow, except at such node. Outside the vascular layer was a uniform bark.

In this early state of growth the Calamite seems to have had regular verticels of small branches given off from at least several of its uppermost nodes, which branches have verticels of free, more or less, linear leaves; but it rapidly underwent further changes. Immediately external to the vascular zone was a cambium layer, which added a succession of exogenous growths to that zone, which thus attained to considerable dimensions. A second, more external zone, capable of forming new growths, existed near the outer part of the bark, and which developed a very dense layer of prosenchyma, approaching somewhat closely to the Bast of modern barks. The ordinary Calamites found in sandstones are usually but the inorganic casts of the central cavities of the pith, and may always be recognized by the transverse constrictions at the nodes. These constrictions have no existence, even at the exterior of the vascular zone, still less so outside the Bark. The specimens found in shales also represent similar casts of the pith, invested by a thin layer of coal, which is the sole and insignificant residue of the thick tissues of the pith, wood and bark, nearly the whole of which have disappeared. Most of the verticellate branches also have been arrested in their growth, those that underwent permanent development having an unsymmetrical arrangement, giving the matured stem a very different aspect from that of the young growth.

Many verticellate-leaved plants have been mixed together under the names of *Asterophyllites*, *Annularia*, *Sphenophyllum*, etc. That some of these were leafy branches of Calamites is most certain. Equally so that many of them were not, as is proven by the peculiarities of their internal organization. We have not yet learned to distinguish the true calamitean leaves from what are not calamitean, in the case of those structureless specimens of which the external form alone is preserved. This is also the case with the calamitean fruits. We possess a large number of Strobili under the names of *Volkmannia*, *Bruckmannia*, *Calamastachys* and others, each of which possesses some features in common with those of living Equisetums, and from each of which forms these Equisetums may have derived one or other of their peculiarities; but this portion of the subject will require much further investigation before it will be finally understood. Two things, however, are certain. One is that these most ancient Equisetiform plants had no appendages to their spores corresponding to the elastic club-shaped *Elaters* of the living Equisetums. The other is that some of them were Heterosporous, *i.e.*, possessed both male and female spores like many of the Lycopods and other Cryptogams, which is not the case with any known living Equisetum. The latter are but the degraded representatives of a once magnificent race of forest trees which culminated in the carboniferous age.

Parliamentary and Law Proceedings.

Prosecutions under the 17th Section of the Pharmacy Act.

At the Petty Sessions, Northampton, on Wednesday, January 24, before W. Coulson, Esq. (Mayor), Chairman, and a full bench, Mary Ann Carter, 42, Leicester Road; Alfred Hughes, 49, Bearward Street; Thomas Welford, 11, Upper Mounts, and Thomas Cattell, 34, Wellingborough Road, appeared in answer to a summons charging them for unlawfully selling poison in a packet, the cover of which did not set forth the name and address of the seller of the same.

Mr. Henry Glaisyer, Solicitor, Birmingham, prosecuted on behalf of the Chemists and Druggists' Trade Association of Great Britain. Mr. A. Andrew, Solicitor, Northampton, appeared for the defendant Cattell, the other defendants appeared in person.

Mr. Glaisyer said the summonses had been issued under the 17th section of the Pharmacy Act, 1868, which enacted—"It shall be unlawful to sell any poison either by wholesale or by retail, unless the box, bottle, vessel, wrapper or cover in which such poison is contained be distinctly labelled with the name of the article and the word 'poison,' and with the name and address of the seller of the poison." Mr. Wright came to Northampton on January 16, and visited the shops of the defendants where he purchased one pennyworth of oxalic acid which was labelled "Oxalic Acid—Poison. J. H. Blunt and Son, Wholesale and Retail Druggists, etc., 46, Drapery, Northampton." The defendants had no right to sell oxalic acid or any other poison scheduled under the 17th section of the Pharmacy Act, as they were not registered as chemists and druggists.

Mr. Andrew pleaded guilty on behalf of his client.

The Mayor remarked that oxalic acid was used a good deal in the shoe trade, and informed the defendants that only registered chemists and druggists had a right to sell it.

Mr. Glaisyer said he had brought the defendants there in order that publicity might be given to the law.

A fine of 1s. and costs was inflicted in each case.

Review.

A Dictionary of Medicine, including General Pathology, Therapeutics, Hygiene, etc. By various Writers. Edited by Richard Quain, M.D., F.R.S., etc., etc. London: Longmans. From the Publishers.

It will take a long time to fully appreciate the value of Dr. Quain's 'Dictionary of Medicine.' It stands alone in the great world of literature, and will for many years mark an epoch in the medical literature of the nineteenth century. We do not believe that anything comparable to it has previously existed. It is true that Dr. Copland wrote a dictionary of medicine, whic cost him a life's labour, and as a book for reference it had a large circulation and unquestionably a deserved reputation. When, however, the science of medicine of to-day is compared with what it was when Dr. Copland lived we see what a hopeless task it must be for any man to try to accomplish unaided this truly great work with which Dr. Quain's name is so honourably associated. We find many of the articles are written by Dr. Quain himself, and by his co-workers Dr. Mitchell Bruce and Dr. Roberts, to whom Dr. Quain generously admits in the preface that he is greatly indebted. Yet, the battle has been Dr. Quain's, and he must ever be looked upon as the victorious general who has not only planned, but worked out, even to the minutest detail, the entire work of this herculean and successful literary campaign. It is truly a campaign which has extended over eight years of Dr. Quain's life, and scarcely a day of this somewhat long period of time has passed without something being done towards its accomplishment. It is truly a lasting monument of indefatigable and unwearying labour, and we should not be doing our duty either to the profession which it represents or to its respected and esteemed editor, if we did not preface this notice of the work with words of cordial congratulation. The articles are generally well written, with a terseness and conciseness which is most commendable, though not easily attainable. Some few have apparently been in hand some time, even years, and might with advantage be re-written for the next edition. In looking over the army of contributors we find the names of men of the highest position in the sphere of medicine and men who are known to do well everything which they undertake to do, and this we maintain is the best guarantee which can be given that their work is well done, not only with regard to the highest scientific truth, but with moral truthfulness, earnestness and sincerity.

There are a hundred and fifty-eight contributors, and among these we find the time-honoured names of James Paget, Erasmus Wilson, Joseph Fayrer, William Jenner, W. B. Carpenter, Murchison, Parkes, Henry Thompson, Spencer Wells and Miss Nightingale. It is curious and important to notice how prominently specialism manifests itself in every page of this work. The specialist who, twenty years ago, was denied and almost tabooed as though he were some impostor or quack, now ranks foremost in the best literary work of our time. We find excellent articles by Mr. Brudenell Carter, "On the Diseases of the Eye and its Appendages;" by Dr. Jones, of New Orleans, "On Yellow Fever;" by Sir Henry Thompson, "On Diseases of the Bladder;" by Dr. Playfair, "On Diseases of the Womb;" by Miss Nightingale, "On Nursing, and the Training of Nurses;" by Mr. Spencer Wells, "On Diseases of the Ovaries;" by Erasmus Wilson, "On Eczema;" by Dr. Roberts, "On Gout;" and by the late Dr. Silver, "On Diabetes." Dr. Grainger Stewart's carefully written article "On Diseases of the Kidneys" is unique, and it is surprising to find that he has been able to treat so important a subject with such thoroughness and completeness in so small a space. We are pleased to find so great an authority advocating local blood-letting and dry cupping in active congestion of kidney, a mode of treatment deserving more attention than is usually admitted by the dreamy and hazy therapeutics of this period. Dr. Wiltshire's contribution "On Blood-letting" deserves attention, and at every point of importance it develops the practical mind of the author. He says:—"It is almost certain (we would say it is quite certain) that in either extreme there is an evil, and that we may have recourse in certain cases to abstraction of blood with some degree of that success which formerly led to its extensive use if not its abuse." The late Dr. Pearson Irvine gave a very interesting article "On the Causes of Disease," and in speaking of heredity as a prolific source of predisposition to disease. he says, "There is amongst men not only an inheritance of such prominent diseases as phthisis, but of peculiarities in the manner they meet and pass through minor ailments. Thus in families with a 'nervous history' we meet with predisposition to headaches of nervous type, irregularities of digestion in the form of diarrhœa and vomiting, and a multitude of conditions which have of late been ascribed to vasco-motor disturbance. The members of some families live long in spite of exposure to almost every exciting source of mischief, and contrast most favourably with others, who, as far as one can determine, have all things in their favour." We quote these observations merely as an indication of the nature of the article. Dr. Bastian writes a short but good article on "Bacteria." It is well known that Dr. Bastian is not a believer in the germ theory of disease, and he even doubts that germs have an essential share in fermentation. He says, "The vital or germ theory of fermentation would be broken down and become untenable whenever it is shown that fermentation can originate independently of the bacteria and their germs, which appear as part of the process. Similarly the germ theory of disease would be refuted if it could be shown that some of the morbid processes in question would originate in the absence of the living organisms which subsequently appear as part of the pathological products. The question of 'spontaneous generation' comes, therefere, to be inextricably mixed up with the question of the truth or falsity of the germ theory of disease, so that the study of the latter, to the neglect of the former, can only end in vagueness and uncertainty." Dr. Lauder Brunton, in his article on tonics, gives a bit of advice which may prove serviceable. He says, "In administering tonics care should be taken to ascertain that the case is suitable, for in very many cases of apparent debility the imperfect functional activity of the body or of its parts does not depend upon insufficient nutrition but upon imperfect removal of the products of waste. The proper treatment in these cases is not to give tonics but to remove the waste products by cholagogues, purgatives and diuretics." All the articles "On Nervous Diseases" are well written, but we would draw the special attention of our readers to the very valuable contribution "On Epilepsy," by Dr. Brown-Séquard, and "On Epileptic Insanity," by Dr. M. G. Echeverria, and at the same time we must admit that we regret not to find the respected name of Hughlings-Jackson amongst this class of contributors. Dr. Green gives an exhaustive article on "Pneumonia," and Dr. Powell and Dr. Williams deal with the subject, of "Phthisis. Dr. Gee writes on "Tubercles." Sir James Paget has something to say upon his old love "Pathology." Sir William Jenner writes upon one of his favourite themes, "Deformities of the Chest." Dr. Broadbent writes upon "Fevers," treating the subject with the authority of experience, and he does not fail to remind us that quinine and salicylic acid are valuable therapeutic agents to reduce temperature. Mr. Simon writes on "Contagion," and Dr. Southey "On Personal Health;" both of these articles must be of great interest to those engaged in the study of "Preventive Medicine." It will be a grand day for science and a day of comfort and happiness to living beings in general when the generation and propagation of disease germs can be snuffed out of existence and when health shall reign supreme. It need scarcely be said that this day has not arrived, but the future lies before us and who is there bold enough to predict what shall or what shall not come to pass? To attempt anything like a review of this Dictionary is as impossible as it would be out of place in the columns of this Journal, but the work is one which could not be passed by without some notice and we do hope that sufficient has been said of it to commend it to the highest consideration of our readers.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Permanganate of Potash Pills.

Sir,—As permanganate of potash pills seem to be attracting some attention and no one has as yet suggested the method which has appeared to me best, I venture upon offering you a few lines which I extract from notes for the next edition of my 'Pharmacy.'

"There are a few chemicals occasionally prescribed in pills which are more or less subject to decomposition by contact with organic matters; the silver salts may be taken as common examples and permanganate of potash as an extreme case of this kind. The latter body is best made up with China clay and water.

"No. 27.

"℞ Potassæ Permangan. . . . . . . gr. xxiv.

"Ft. pil. xii.

"Add China clay in powder, 36 grains; water, 18 dropss

"A good pilular mass is thus obtained which keeps it physical and chemical condition satisfactorily, and disintegrates promptly in water, yielding the permanganate unchanged."

I do not know why any one should add grease to clay when water is all that is required to make it "as plastic as clay," and the absence of organic matter is desirable.

Newcastle. Barnard S. Proctor.

A RESEARCH ON THE ALKALOID GELSEMINE AND SOME OF ITS CRYSTALLINE SALTS.*

BY A. W. GERRARD, F.C.S.

The alkaloid under notice is yielded by the *Gelseminum sempervirens*, or Carolina jasmine. The natural order of the plant is doubtful, being placed by De Candolle in the Loganiaceæ, by Decaisne in the Apocynaceæ. The drug found its way into regular medical practice through the eclectics, and is now official in the United States Pharmacopœia.

In this country it has attained a good reputation for the treatment of toothache and neuralgia. The part of the plant used is the root, from which are prepared a tincture and liquid extract, also a resin called gelsemin. A detailed account of the history, characters and composition of the plant will be found in a valuable paper by E. M. Holmes, in the *Pharmaceutical Journal*, December 18, 1875.

The first communication within my knowledge, having reference to the chemical constituents of gelseminum root, was contributed by Kollock to the *American Journal of Pharmacy*, 1855, p. 203, the principal facts elucidated being, that it contained gelseminia, dry resin, volatile oil, fatty resin and a yellow colouring matter. This was followed in 1869, with a paper by Eberle, who examined the woody portion of the root for alkaloid, and states, "The wood of the root can be safely asserted, from careful experiment, to be free from alkaloid." This observation I have corroborated. In 1870 an important addition was made to our knowledge of its constituents by Dr. Wormley, who discovered the presence of an interesting highly fluorescent body, which he named gelseminic acid. At the same time he described the physical characters and chemical reactions of the alkaloid gelsemine.

In 1876 Professor Sonnenschein communicated to the *Berichte d. deutschen Gesellschaft, Jahr.* ix., the results of analyses of gelseminic acid and the alkaloid gelsemine. For the alkaloid was found the formula $C_{11}H_{19}NO_2$, and for its hydrochloride $(C_{11}H_{19}NO_2)_2HCl$. No simple crystalline salts were obtained by either Sonnenschein or Wormley. For gelseminic acid Sonnenschein gave the formula $C_{30}H_{34}O_{19}$ and claimed its identity with esculin. This claim has since been controverted by Wormley.

Five years ago, I prepared some gelsemine for physiological use, and particularly noticed that the published processes for its extraction did not yield a product that could be called pure, as it was more or less coloured yellow or brown. I also observed that traces of gelseminic acid persistently adhered to the alkaloid, as evidenced by the fluorescence of the latter in the presence of alkalies. At this time I was strongly impressed with the above defects, and doubted not that if gelseminia could be obtained in a sufficient state of purity (possessed as it is of such strongly basic characters) its salts could be made to crystallize. The small quantity of alkaloid at my command did not admit of many experiments, and these were without result. Later on, I prepared the alkaloid in small quantity, and obtained one of its salts in microscopic crystals, sufficiently well defined to determine me to make an investigation on a larger portion of material. I am now able to state I have prepared in the crystalline form the pure alkaloid and a number of its salts.

Method of Extraction.—Twelve kilogrammes of well-powdered root were exhausted with alcohol, which left after distillation 1703 grams of soft extract. The extract, on resting, separated into two strata.

The superstratum, green in colour and having the appearance of an oleo-resin, was removed and found to be practically insoluble in water; it was well shaken with dilute hydrochloric acid to remove traces of adhering alkaloid, and the acid solution mixed with the substratum. The substratum, containing the alkaloid, was diluted with water until it ceased to precipitate resin, and left a clear bright brown solution, which was evaporated at a temperature below 60° C., treated with ammonia in excess and thoroughly washed with ether. The ether solution, now containing the gelsemine and beautifully fluorescent from the presence of gelseminic acid, was decanted and exposed a short time to allow excess of ammonia to escape. Hydrochloric acid was next added in fractions with agitation until the fluorescence was destroyed, a certain indication that the whole of the alkaloid had been removed from the ether. The hydrochloride of gelsemine had now separated from the ether, forming a layer of pale yellow amorphous precipitate, which upon separation was subjected to several reconversions, until the last traces of colour and fluorescence had disappeared, the product being 20·2 grams of perfectly white hydrochloride of gelsemine. It may here be mentioned that the pure alkaloid obtained from the hydrochloride by alkali, and chloroform or ether, holds its solvents tenaciously, and requires the heat of a water-bath to effectually remove them. During their removal the gelsemine swells into vesicles which, on cooling, can be easily powdered.

Properties of Gelsemine.—It is a brittle transparent solid, crystallizing with difficulty from alcohol. Boiling water sparingly dissolves it, the solution on cooling becoming faintly turbid from separation of gelsemine. It softens at 38° C. and becomes fused at 45° C. Heated on platinum it ignites, burning with an orange-yellow flame and leaving no trace of residue. Solutions of its salts have a distinctly but not powerfully bitter taste, and give with potash or ammonia white precipitates soluble in excess. If the solution containing excess of ammonia be exposed to the air, as the ammonia is eliminated the gelsemine separates in granular crystals. The pure base gives no colour reaction with strong nitric acid, and the mixture is scarcely changed in colour by heating. Strong sulphuric acid has no apparent reaction upon it; but if to the mixture a little manganic oxide be added and rubbed with a glass rod, a deep crimson red is obtained, passing to green. This reaction is exceedingly delicate, and can be easily shown by dissolving 1 milligramme of pure gelsemine in 10,000 milligrammes of strong sulphuric acid, then adding a few milligrammes of manganic oxide. It can be even demonstrated with a solution of 1 in 100,000. If the preceding reaction is performed upon the pure alkaloid, the colour is sufficiently intense to cause it to be mistaken for strychnia; but if a parallel experiment be carried on with strychnia the two alkaloids cannot

* Read at an Evening Meeting of the Pharmaceutical Society, February 7, 1883.

be mistaken, for the strychnia gives an intense purple, passing to red. Picric acid gives a yellow crystalline precipitate; gold chloride, a yellow amorphous precipitate, soluble in boiling water, separating on cooling, partly in crystals. Platinic chloride gives a yellow precipitate, soluble on boiling.

REACTIONS ASCRIBED TO GELSEMINE.

	Gerrard.	Sonnenschein.	Wormley.
Strong nitric acid . . .	No reaction.	Yellow-green colour.	Brownish-green, changing to deep green colour.
Strong sulphuric acid. .	No reaction.	Yellow-green, passing to reddish-brown colour and upon heating to dark red.	Dissolves with a red or brown colour which after a time assumes a pinkish hue. Warmed it acquires a chocolate or violet colour.
Sulphuric acid and manganic oxide	Gives a damask red colour, passing to green or blue.		
Strong sulphuric acid, and bichromate of potash in crystal . . .	A crimson evanescent redness passing to a green colour.	A cherry-red colour, changing a little to violet, which soon form a bluish-green spot.	Reddish-purple streaks along the path of the crystal.
Gold chloride	Yellow precipitate, soluble when heated.	Yellow precipitate, not altered by heat.	
Platinum chloride . . .	Amorphous yellow precipitate, soluble in water on heating.	Amorphous yellow precipitate, soluble in water on heating.	
Potash mercuric iodide .	White precipitate, which dissolves on heating and separates on cooling.	A white precipitate, which dissolves on heating and separates on cooling.	

The following salts were prepared and obtained in crystals. Hydrochloride, hydrobromide, sulphate and nitrate. The hydrochloride is a moderately soluble salt, separating from water as an apparently amorphous powder, consisting really of small granular crystals. It is sparingly soluble in cold, more soluble in hot alcohol; from the latter it separates slowly in prismatic crystals. The hydrobromide crystallizes more readily from water and alcohol than the hydrochloride, forming prisms. The sulphate and nitrate were freely soluble in water and alcohol, and crystallized indifferently on spontaneous evaporation.

Since the alkaloid I obtained differed in important respects from that experimented upon by others, and was evidently in a higher state of purity, it was thought desirable to submit it and some of its compounds to combustion.

Three determinations of nitrogen were made by the absolute method, from the pure alkaloid, and the following percentages by weight calculated:—7, 7·3 and 6·9.

Four combustions with cupric oxide and copper of quantities varying from ·100 to ·200 gram gave the following percentages of carbon and hydrogen:—

	C.	H.
1.	70·4	7·2
2.	70·1	7·3
3.	70·3	6·9
4.	70·45	7·3

Taking the oxygen by difference these figures admit the construction of the following formula for gelsemine, $C_{12}H_{14}NO_2$, for which theory requires 70·6 C, 6·86 H, 6·86 N, and 15·68 O.

The chlorine was estimated from the hydrochloride, and 8·1 per cent. found, showing the composition of this salt to be $(C_{12}H_{14}NO_2)_2HCl$, which requires 7·96 per cent. chlorine. In like manner, the hydrobromide was found to yield 16·21 per cent. bromine $=(C_{12}H_{14}NO_2)_2HBr$, which requires 16·3 per cent.

The platinum and gold salts of the alkaloid were purified and burnt; the former gave 16·7 per cent. platinum, the latter 36·9 per cent. gold, pointing to a composition for the former of

$$(C_{12}H_{14}NO_2)_4(HCl)_2PtCl_4,$$

for the latter $(C_{12}H_{14}NO_2)_2HCl(AuCl_3)_2$, these requiring respectively 16·4 platinum and 37·4 gold.

The main features of this as differing from previous researches show—(1) that the alkaloid gelsemine can be obtained in a state of purity as a crystalline colourless solid, forming crystalline salts with acids, and giving no colour reactions with nitric or sulphuric acids; (2) that the pure base has the formula $C_{12}H_{14}NO_2$, thus differing greatly from the formula obtained by Sonnenschein, who, it is certain, must have used an impure substance, as shown by the colour reactions his alkaloid gave with nitric and sulphuric acids.

Forensic Note.—In cases of poisoning by gelseminum, where the resin, extract, or tincture have been employed, no difficulty need be experienced in detecting its presence, all these preparations containing gelseminic acid, which imparts its powerful blue fluorescence to any mixture on the addition of an alkali. When the alkaloid gelsemine has to be sought, its isolation can be effected by any of the methods followed for strychnine, especially taking advantage of the fact that gelsemine like strychnine is not destroyed by strong sulphuric acid. After isolation, and showing its alkaline and alkaloidal nature, its most special reaction would be the red colour with sulphuric acid and manganic oxide. These characters alone should scarcely be deemed sufficient evidence of its presence. In addition, its physiological action should be sought and demonstrated; if this be obtained it may be concluded gelsemine is present.

The Physiological Action of Gelsemine. By Dr. G. Rouch.

The results at which I have arrived are somewhat doubtful, so that I submit them without being too positive as to their significance.

If 2 to 5 milligrams of the hydrobromide of gelsemine in aqueous solution are injected into a red frog (*Rana temporaria*) there is observed a slight shaking and some manifestations of excitability which pass frequently unperceived; there is a notable loss of vivacity and the animal does not jump so easily; placed on his back he turns himself over with difficulty and is not long before he remains completely torpid. This condition, which begins ten to fifteen minutes after the injection, is about complete in half an hour.

The difficult respiration set up on the administration of the drug becomes speedily normal in all cases where the dose has been a weak one; nevertheless it may continue for a long time, especially as regards the hyoidiene region. In the particular case to which I refer, I cannot estimate it, a portion of the dose having been spilt. When the movements have quite disappeared the posterior limbs quite relaxed are drawn towards the body, but the anterior limbs are in a peculiar position. They are sometimes in the form of a bow, and crossed under the sternum, thus lifting the anterior region; occasionally they are divergent on the sides of the body, the forearms bent at right angles on the arms, and the hands resting on the ground. They keep this position whatever may be the posture given to the animal, and in the first case if he is turned on his back they form a bow into which the finger can be introduced and the animal lifted. The animal may die in this position after several hours, or the next day, the heart being the last to stop. If the dose is weak this state may last several days.

From the beginning the frog seems to have lost voluntary power, it remains completely inert, but the reflex movements are kept up longer, the contact of a corrosive liquid producing co-ordinate movements which end subsequently to the complete paralysis.

The above results do not change if one of the posterior limbs is preserved by the ligature of the iliac artery, the two members lose their reaction equally, and on the other hand the electric excitability of an induced current, even very feeble, on the sciatic nerves, produces tetanus of equal intensity on both sides, and this happens several hours after the complete paralysis, whilst the heart has almost stopped. This would lead us to conclude that the hydrobromate of gelsemine has a paralysing action on the excito-motor centres.

In experimenting on the green frog (*Rana esculenta*) I observed quite different toxic manifestations. As I have not been able to repeat these experiments I shall give them with reserve.

After toxic effects almost similar to those I have described in the case of the red frog,—less violent, however, and with greater allowance made for the medullary hyperexcitability,—I found two days after injection the animal breathing in the position described above, lifted up by the anterior limbs crossed in a circle under the sternum, but different from what I had seen before by a notable reflex hyperexcitability. A blow on the vessel which contained it produced a tetanic extension of the posterior limbs, the two limbs parting forcibly in complete extension, the fingers like a fan, sometimes simultaneously, sometimes one after the other, but diverging and not approaching the middle line as with strychnine. These manifestations resemble rather the symptoms of picrotoxin, or the beginning of the intoxication by brucia. These tetanic contractions are of very short duration, but are unique for each excitation and rarely spontaneous. The tetanus can be reproduced by a shock of the vessel; a blow on the table would not be sufficient. Occasionally the animal utters a little cry. These symptoms lasted three days, improving gradually until they had completely disappeared, and the animal executed voluntary movements which allowed it to escape.

One can only be astonished at such a different action. The dose stands for nothing in the present case, for I have kept a red frog slightly intoxicated which did not give similar phenomena, any more than others which had received considerable doses. I am thus brought to admit there is a different susceptibility in the two species of frogs. The experiments of Messrs. Prevost and Wintzmie on brucia had led them to analogous results, although inversely.

I should have liked to have analysed all these toxic manifestations and to have defined more clearly what belongs to different parts of the nervous system. I would also have liked to repeat my researches on warm-blooded animals; but I have sacrificed what I had left of the gelsemine on a guinea pig, without result. I prefer, then, to leave the facts which I have thus crudely demonstrated to be decided by a future study.

Paris, January, 1883.

Action on the Eye. By Prof. J. Tweedy, F.R.C.S.

Though less irritating and more prompt in its action than the earlier preparations, I could not in any case with the crystallized gelsemine obtain distinct paralysis of accommodation such as follows the instillation of a solution of atropine. As with the earlier preparations, I found the dilations of the pupil preceded by a brief contraction stage, accompanied with a zone of ciliary injection. The contraction and ciliary injection passed away with equal steps.

COMPLETE EXHAUSTION OF NUX VOMICA.*

BY R. ROTHER.

Tincture of nux vomica is an important and useful preparation, and by virtue of its active principles a very powerful one. Definiteness in its construction should therefore be one of its prime features. It is questionable whether the primitive method at present in use really secures a saturated solution. Neither the strychnine or the other alkaloids are free, since the great excess of igasuric acid insures compounds which, although soluble in alcohol, are but sparingly soluble in water. Now, by reason of a peculiar gummy substance contained in nux vomica, insoluble in alcohol, in which the alkaloidal compounds are imbedded, alcohol can only exert a surface action, and hence will be effective in a measure in proportion to the fineness of the powder. Although water or weak alcohol softens and permeates the horny body, either of them fails to extract the now sparingly soluble igasurates. It is therefore evident that nux vomica cannot be exhausted by any form of alcohol. Acidulated alcoholic menstrua

* From the *American Journal of Pharmacy*, January, 1883.

are equally powerless, because igasurates, like tannates of the alkaloids, are indecomposable by weak acids.

Seeing that the gummy matter is the chief obstacle to exhaustion, the writer sought to decompose it, in a preliminary operation, by means of dilute sulphuric acid. Failing with this, ammonia was tried with a little success; but having accidentally added some borax to the ammoniacal mixture a rapid coagulation was noticed. Upon this, powdered nux vomica was mixed with borax and percolated with a menstruum composed of equal measures of alcohol and water, and, although absolute exhaustion of the powder was readily achieved, the percolate possessed such an obstinate turbidity that the process, otherwise so satisfactory, was yet a failure. Boric acid, applied in a similar manner, was as inefficient as other acids previously tried. It was next resolved to test potassium citrate, which insured a satisfactory product, and absolute extraction of the drug. Deeming a simpler saline body more appropriate and obtainable, the writer resorted to sodium chloride, and attained, above all others, the most perfect result.

It is remarkable what a solvent action a saline substance has on the active constituents of nux vomica; the horny matter is speedily softened, permeated and extracted without becoming in the least mucilaginous or distended. The weak alcoholic saline menstruum percolates the powder with such freedom that this must be very firmly packed, and the flow of the percolate further regulated with appropriate checks. The thorough exhaustion is effected, in all probability, by reason of a double decomposition occurring between the igasurates and the sodium chloride in the presence of weak alcohol, resulting in the generation of strychnium chloride, brucium chloride and sodium igasurate, all of which being very soluble in diluted alcohol. When this solution is diluted with water a retrograde decomposition sets in, the igasurates of the alkaloids are precipitated, and sodium chloride remains in solution.

From a consideration of the above cited results the following facile formula for an absolutely representative tincture of nux vomica is obtained.

Take of—Nux vomica, in fine powder . . 8 troy ounces.
Sodium chloride . . . . 6 drachms.
Alcohol,
Water . . . . of each $1\frac{1}{2}$ pint.

Dissolve the sodium chloride in the water; then add the alcohol, and mix them. Upon two troy ounces of the nux vomica, contained in a large capsule, pour two fluid ounces of the menstruum, and mix them by means of a pestle; then gradually add the remainder of the nux vomica, and thoroughly mix the whole as before. Pack this mixture very firmly into a cylindrical glass percolator, and pour on of the menstruum little by little until, in the course of six to eight hours, the liquid has descended to the bottom of the column. Now suspend the operation, and after twelve hours pour on more of the menstruum, and regulate the flow at the exit so that after twenty-four hours two pints of percolate may be obtained. To avoid a trace of turbidity, which is liable to appear in the first fluid ounce of percolate when the menstruum is added too rapidly at first, $1\frac{1}{2}$ drachm of the sodium chloride may be mixed with the nux vomica before packing, and the remainder dissolved as before. The finished tincture contains $\frac{1}{4}$ grain of sodium chloride in 15 minims.

DELPHINIUM AJACIS.

From experiments with acetic and aqueous infusion of the larkspur, Dr. Benvenuti draws the following conclusions:—The flowers of the *Delphinium Ajacis* possess an insecticide action, and are to be preferred to other remedies of similar action on account of cheapness and absence of smell. They have a marked anæsthetic action, are excitant, rubefacient, astringent and antizymotic. Dr. Benvenuti thinks this remedy has many points of resemblance to carbolic acid and iodoform.—*Louisville Med. News.*

A BILL

INTITULED AN ACT TO REGULATE SALES OF POISONOUS ARTICLES, ALSO TO FURTHER REGULATE THE SALE OF POISONS AND ALSO TO ALTER AND AMEND THE PHARMACY ACT, 1852, AND THE ACTS AMENDING THE SAME.

Preamble.—Whereas it is expedient for the safety of the public that sales of poisonous articles should be regulated, also that any seller or keeper of an open shop for the retailing, dispensing or compounding of poisons and medical prescriptions should possess a competent skilled knowledge, and also that sales of poisons should be further regulated. And for the purposes aforesaid or some of them it is expedient that the provisions contained in the Act passed in the 15th and 16th years of the reign of Her present Majesty intituled an Act for regulating the qualification of Pharmaceutical Chemists, hereinafter described as the Pharmacy Act, 1852, and in the Acts amending the same, should be amended, Be it enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal and Commons in this present Parliament assembled, and by authority of the same, as follows:—

1. *Definition Clause.*—Words importing the singular number only shall include the plural number.

2. *Regulations to be observed in the Sale of Poisonous Articles.*—It shall be unlawful to sell by retail any poisonous article for the time being in the Schedule of poisonous articles hereto, unless the box, bottle, vessel, wrapper or cover in which the same is contained be distinctly labelled with the name of such poisonous article and the word "poisonous," and with the name and address of the seller thereof. And the Council of the Pharmaceutical Society of Great Britain may, from time to time, declare by resolution that any article ought to be added to the said Schedule of poisonous articles, and shall submit the said resolution for the approval of the Privy Council. And if such approval shall be given such resolution and approval shall be advertised in the *London Gazette*, and on the expiration of one month from the advertisement any article named in any such resolution shall be deemed to be added to the said Schedule.

3. *Regulations on Sales by wholesale of Poisons in Part 1 of Schedule A. to the Pharmacy Act,* 1868.—Notwithstanding any exception or thing in section 17 of the Pharmacy Act, 1868, contained, every seller by wholesale of any poison for the time being in the first part of Schedule A. to the Pharmacy Act, 1868, shall keep a record in writing of the name of such poison, the quantity sold, the name and address of the purchaser, and the date of the sale, and shall preserve such record for twelve calendar months.

4. *Labelling of Patent Medicines being or containing a Poison.*—It shall be unlawful to sell by wholesale or by retail any patent medicine or any article bearing a patent medicine stamp (herein comprised in the words patent medicine), being or containing a poison within the meaning of the Pharmacy Act, 1868, unless the box, bottle, package or vessel in which the same is contained, the wrapper, if there be only one, or the outermost wrapper if there be more than one, be labelled with the name and

address of the first seller of the same, the name of the patent medicine and the word "poison."

5. *Penalties for certain Offences.*—Any seller acting in contravention of either of the preceding sections shall, upon a summary conviction before two justices of the peace in England or the sheriff in Scotland, be liable to a penalty not exceeding £5 for the first offence, and to a penalty not exceeding £10 for the second or any subsequent offence.

6. *Duly Qualified Keepers of Open Shops Entitled to Remedies in certain Cases.*—In case a duly qualified keeper of an open shop for the sale of poisons is exposed to a penalty in respect of a sale by retail of a patent medicine not prepared for sale by him by reason of the box, bottle, package, vessel, or wrapper in which the same is contained not having been duly labelled in the manner hereinbefore provided, he shall, after having paid the same, be entitled to be indemnified in respect of the same, and any costs properly incurred by him in relation to the offence or conviction, or his defence thereto, by the owner of the said patent medicine, or by any intermediate seller of the same, and every intermediate seller shall be entitled to be indemnified over by the first seller of the said patent medicine, or any intermediate seller of the same: provided always that in claiming such indemnity the seller must prove that he purchased the said patent medicine not knowing it to be otherwise than properly labelled, and sold it in the same state in which he purchased it, and any seller or owner from whom such indemnity is claimed may prove that the conviction was wrongful, or that the amount of costs awarded or claimed was unreasonable.

7. *Persons Keeping Open Shops to be liable for their Assistants, Apprentices and Servants.*—All the provisions of the Pharmacy Act, 1868, which apply to sales of poisons, and all the provisions of this Act which apply to sales of poisonous articles, or to sales of poisons whether as patent medicines or otherwise, or to medicines compounded from medical prescriptions, shall be deemed and taken to apply to any seller on whose behalf any sale is made by any assistant, apprentice or servant, and such assistant, apprentice or servant shall be deemed to be the agent of the seller on whose behalf any such sale is made.

8. *Regulation for Conducting Branch Businesses.*—It shall be unlawful for a duly qualified keeper of an open shop for retailing, dispensing or compounding medical prescriptions or poisons to keep open shop in more places than one, unless he shall engage and employ at each branch shop a person who would himself be a duly qualified keeper of an open shop for retailing, dispensing or compounding medical prescriptions or poisons, and such person is *bonâ fide* occupied in such branch shop, provided always that each partner in a duly qualified partnership may keep a separate open shop for retailing, dispensing or compounding medical prescriptions or poisons.

9. *Duly Qualified Persons to sell Medical Prescriptions and sell Poisons.*—It shall be unlawful to sell by retail, or to keep open shop for retailing, dispensing or compounding medical prescriptions or (whether as patent medicines or otherwise) poisons within the meaning of the Pharmacy Act, 1868, and any Act amending the same, unless the seller and the keeper of any such open shop be a pharmaceutical chemist, or chemist and druggist, or a medical practitioner entitled to and acting within the exemption concerning certain medical practitioners made by section 1 of "The Pharmacy Act (1868) Amendment Act, 1869," or entitled to and acting within the exemption concerning certain executors, administrators and trustees made by section 16 of the Pharmacy Act, 1868, provided, nevertheless, that nothing in this section contained shall extend to or interfere with the business of wholesale dealing in patent medicines, nor with the business of wholesale dealers in selling poisons in the ordinary course of wholesale dealing, or of any member of the Royal College of Veterinary Surgeons of Great Britain, or person holding a certificate in Veterinary Surgery from the Highland and Agricultural Society in Scotland, or whose name appears on the Register of "existing practitioners" under the Veterinary Surgeons Act, 1881, in dispensing medicines for animals under his care.

10. *Persons keeping Open Shop must, on Application, Inform the Registrar of the Name or Names of Proprietor or Proprietors, and Penalty for Non-Compliance.*—The Registrar of the Pharmaceutical Society of Great Britain may, at any time, and from time to time deliver, or cause to be delivered to the seller or the keeper of any open shop for the retailing, dispensing, or compounding of medical prescriptions or poisons, or at any shop purporting to be the shop of a pharmaceutical chemist, or pharmaceutist, or chemist and druggist, or chemist, or druggist, or whereat there shall be assumed, used, or exhibited any name, title, or sign implying that it is the shop of a person registered under the Pharmacy Act, 1852, or the Pharmacy Act, 1868, a notice signed by him requiring delivery to him within seven days thereof of a statement in writing of the name and address of such seller, or the keeper of such shop, and of his qualification so to sell or to keep such shop, and thereupon such seller or the keeper of such shop shall, within such seven days, cause to be delivered to the said Registrar a statement accordingly, and in default thereof, every such seller or keeper of such shop shall be liable to a penalty of £5 for each day so long as such default shall continue, and every person afterwards, during continuance of the default, found selling poison at, or compounding medical prescriptions at, or acting in the management of the business at such shop shall be liable to a penalty of £5 for each such offence, and the said penalties may be sued for, recovered and applied in the manner provided in section 11.

11. *Penalties and Recovery and Application of Certain Penalties.*—Every seller or keeper of an open shop for retailing, dispensing, or compounding medical prescriptions or poisons, acting in contravention of either of the three preceding sections numbered 8, 9 and 10 shall, for each contravention, be liable to pay a penalty of £5, and the said penalties of £5 may be sued for and recovered in the manner provided by the Pharmacy Act, 1852, for the recovery of penalties under that Act, and all and every sum and sums of money which shall arise from any penalties so recovered for offences incurred

under sections 8, 9, and 10 of this Act, or under the said Pharmacy Act, 1852, or under section 15 of the Pharmacy Act, 1868, shall be paid to the Treasurer of the Pharmaceutical Society of Great Britain, and shall by him be applied to the purposes of the said Acts, and this Act or either of them. And in any action or proceeding for the recovery of any penalty directed to be sued for by the Registrar of the Society in the name and by the authority of the Council of the said Society, the name of the said Society alone may be used, and it shall not be necessary to give evidence of the appointment of the said Registrar, or of the authority of the said Council and the full amount of the penalty incurred shall be recovered.

12. *Regulations may be made by Bye-law to Sub-divide Examinations, etc.*—It shall be lawful for the Pharmaceutical Society of Great Britain from time to time by any bye-law to make, alter, or amend regulations respecting examinations so as to divide or sub-divide the same, and to require and regulate periods of time and of practical experience, or any course of study between examinations, or any divisions of the same, and to regulate the notices to be given and the fees to be paid by candidates on the giving of notices for, or the passing of examinations or the several divisions of the same and on registration.

13. *Certificates of having passed Preliminary Examination Requisite to Apprenticeship.*—On any division or sub-division of examinations there shall be provided a division to be called the Preliminary examination and a Register of the persons who have passed the same, and thenceforth any pharmaceutical chemist or chemist and druggist who shall take as apprentice any person who has not previously obtained from the Registrar of the Pharmaceutical Society a certificate to the effect that he is registered as having passed the Preliminary examination shall be liable to a penalty of £5, to be sued for and recovered in the manner provided in clause 5.

14. *Certificates may be accepted in lieu of Preliminary Examination.*—It shall be lawful for the Society from time to time by any bye-law to accept evidence of degrees, qualifications, or certificates granted by other examining bodies in lieu of the said Preliminary examination and thereupon to authorize the Registrar to register the person entitled to the same as having passed the Preliminary examination.

15. *Certificates of Death and Expense of same.*—Notwithstanding the provisions of section 11 of the Pharmacy Act, 1868, every registrar of deaths in Great Britain shall, on transmitting to the Registrar under the Pharmacy Act, 1852, of every certificate of the death of any pharmaceutical chemist, or chemist and druggist, charge the cost of such certificate and transmission as an expense of his office.

16. *Certain Persons to be Registered as Pharmaceutical Chemists and Eligible for Membership.*—Every person who, after December 31st, 1886, shall obtain a certificate of competent skill and knowledge and qualification under section 6 of the Pharmacy Act, 1868, shall be entitled to be placed on the Register of Pharmaceutical Chemists and shall be eligible for election to membership of the Pharmaceutical Society of Great Britain according to the bye-laws thereof.

17. *Certain Persons to be Eligible for Membership.*—Every person who, on or before December 31st, 1886, shall have been registered as a Chemist and Druggist by reason of having obtained a certificate of qualification from the Board of Examiners, shall be eligible to be elected a Member of the Pharmaceutical Society of Great Britain, according to the bye-laws thereof, but no person shall, in right of membership acquired pursuant to this clause, be placed on the Register of Pharmaceutical Chemists.

18. *Certain Claims for Registration not valid unless made before 1st January, 1885.*—No claim for registration as a Chemist and Druggist made by notice accompanied by certificates of having carried on business before the passing of the Pharmacy Act, 1868, shall be valid or effectual unless notice in accordance with section 5 of the said Act be duly given prior to the 1st January, in the year 1885.

19. *Repeal of Section XI. of Pharmacy Act, 1852, and Section XX. of Pharmacy Act, 1868.*—Section XI. of the Pharmacy Act, 1852, and Section XX. of the Pharmacy Act, 1868, are hereby repealed.

20. *Penalties under Act not to Exempt from other Penalties.*—No penalty under this Act shall exempt any person from being liable to any other penalty, damages, or punishment to which he would have been subject if the Pharmacy Act, 1868, or this Act had not been passed.

21. *Penalty for Wilful Falsification of Register, or for obtaining Registration by False Representation.*—Any Registrar who shall wilfully make, or cause to be made, any falsification in any matter relating to the said Registers, and any person who shall wilfully procure, or attempt to procure himself to be registered under the Pharmacy Act, 1852, the Pharmacy Act, 1868, or this Act, by making, or producing, or causing to be made or produced any false or fraudulent representation or declaration, either verbally or in writing, and any person aiding or assisting him therein, shall be deemed guilty of a misdemeanour in England and in Scotland of a crime or offence punishable by fine or imprisonment, and shall on conviction thereof, be sentenced to be imprisoned for any term not exceeding twelve months.

22. *Extent of Act.*—This Act shall not extend to Ireland.

23. *Commencement of Act.*—This Act shall come into operation on the first day of January, one thousand eight hundred and eighty-four, and may be cited for all purposes as "The Pharmacy Act Amendment Act 1883."

Schedule of Poisonous Articles.

Sulphuric acid, commonly called oil of vitriol.

Hydrochloric acid, commonly called spirits of salts.

Nitric acid, commonly called aqua fortis.

Solution of chloride of antimony, commonly called butter of antimony.

Carbolic acid.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 10, 1883.

THE PHARMACY ACTS AMENDMENT BILL.

It is now no less than six years ago when Mr. Hampson brought forward at a Council meeting a motion that in anticipation of an opportunity for amending the Pharmacy Act of 1868, which might arise during the then ensuing session of Parliament, it was desirable the subject should be considered by a small Committee, and a report submitted to the Law and Parliamentary Committee suggestive of the amendments requisite. To those who have watched the course of events since that occasion it will be unnecessary to point out that the action thus commenced has been steadily followed up so far as circumstances would permit, and to those who have not done so, we may point to the lapse of time that has occurred without the introduction of a Pharmacy Act Amendment Bill as evidence of the difficulty of the task then entered upon by the Council of the Pharmaceutical Society. At length, however, we are enabled to place before our readers the draft of a Bill which has been adopted by the Council at its late meeting, and having been so adopted on the motion of Mr. Hampson, is to be regarded as the legitimate outcome of the work initiated by him six years ago.

At the commencement of the period we refer to experience had shown that notwithstanding the generally beneficial effect of the Pharmacy Act of 1868, it had proved in some important respects so far a failure that the Council had hesitated to test its strength from the fear that it might prove too feeble to bear the tension of a trial at law. Since that time the view then entertained by the Council has been conclusively proved to have been well founded and the necessity of an amendment of the Act has been demonstrated beyond dispute. Passing over the failure of an attempt to introduce a Bill in 1881, owing to the state of public business in Parliament at that time, we may remind our readers of what took place at a later period when a recommendation to make certain additions to the schedule of poisons was submitted to the Privy Council by the Council of the Pharmaceutical Society, inasmuch as the opportunity now offered for the introduction of a Pharmacy Act Amendment Bill has arisen out of the communications which then took place between the Council and that department of the Government. In November last the Lord President of the Council intimated that he would be glad to have the views of the Society in regard to the sale of poisons submitted for the consideration of the Privy Council in the form of a draft Bill amending the existing law. This has now been done, and the text of the draft Bill submitted will be found in our present number.

The discussion of the various subjects requiring consideration in the preparation of this Bill having been carried on in committee, we are, of course, unable to enter into any critical review of its several clauses, or of the reasons which led to their adoption, and can only refer to the remarks made by the individual members of Council as furnishing assurance of the care and pains that have been bestowed upon the elaboration of the Bill. It will suffice if we offer a brief *résumé* of the leading features of the Bill in language somewhat less technical than that employed in the document itself.

From the mere title and preamble of the Bill it will be seen that, in conformity with public demands, attention has been directed in the first place to the indiscriminate and unguarded sale of poisonous articles which has for some time past given rise to much just complaint from various points of view. In order to carry out the regulation of such sales, which is deemed to be expedient, the second clause provides that the retail sale of the articles named in the schedule shall be unlawful, unless they be distinctly labelled with their names and the word "poisonous," as well as the name and address of the seller. Power is also given to the Council of the Pharmaceutical Society, subject to approval by the Privy Council, to add to this schedule any articles the sale of which it considers ought to be thus regulated. In like manner Clause 3 provides that wholesale dealings in the articles included in the first part of the poison schedule of the Pharmacy Act, 1868, shall be so far regulated that the seller shall make a record in writing of each transaction and preserve it for twelve calendar months. The fourth clause also provides that it shall be unlawful to sell any patent medicine containing a poison within the meaning of the Pharmacy Act, 1868, unless labelled with the word "poison," and the name and address of the first seller of such article. This provision applies to wholesale as well as retail sales, and it is calculated to furnish some protection against the too frequent fatal cases of poisoning referrible to the undisclosed presence of narcotics or other potent drugs in various popular preparations, to the ignorant or careless use of which medical men have lately drawn attention as constituting a serious evil. In reference to the provisions of each of these three clauses, a penalty of from five to ten pounds for their infringement is defined by the fifth clause as that to which an offender is to be liable upon summary conviction. The sixth clause, however, provides a remedy in certain cases where the duly qualified seller of a patent medicine is exposed to penalties by reason of the infringement of the provision above mentioned and gives him a right to indemnification by the owner of the patent medicine or any intermediate seller of it, provided he furnishes proof of having purchased the patent medicine in question not knowing it to be otherwise than properly labelled and of having sold it in the same state as he purchased it. The adoption of precautionary measures in regard to popular preparations containing dangerously potent drugs would be thus in some degree ensured, and the responsibility of complying with the demands of medical men and others, in this respect, would rest upon the proprietors or original vendors of such articles.

To ensure the possession of the competent skilled knowledge held to be expedient in keepers of open shops for retailing, dispensing, or compounding medical prescriptions and poisons, clause nine provides that every such person shall be legally qualified under the Pharmacy Act, 1868, or entitled to and acting within the existing exemptions concerning medical practitioners, executors, administrators and trustees, and veterinary surgeons; but that the provisions of this clause shall not extend to, or interfere with, the business of wholesale dealers in patent medicines or poisons in the ordinary course of wholesale dealing.

Among the clauses which provide for the further regulation of sales of poisons by qualified persons which the preamble of the Bill sets forth as being expedient for the safety of the public the most important are first, clause seven, providing that the person on whose behalf any sale is made by an assistant, apprentice or servant, shall be subject to all the provisions of the Act in that respect; and secondly, clause eight, providing that the proprietor of any branch shop for retailing poisons, etc., dispensing medical prescriptions, shall employ there an equally qualified person occupied *boná fide* in the conduct of the business, the only exception to this requirement being that each partner in a duly qualified partnership may keep a separate open shop for retailing, dispensing, or compounding medical prescriptions, or poisons. By the provisions of these clauses due cognizance is therefore taken of the necessary possession of competent skill and knowledge by those engaged in dispensing medicines and retailing poisons as well as the personal reponsibility of proprietors of open shops. For the further attainment of these objects in conformity with the fundamental principles of the Pharmaceutical Society, while the first clause of the Bill provides that words importing the singular number only shall also include the plural number, clause ten provides that the keeper of any open shop for retailing, dispensing or compounding medical prescriptions or poisons, apparently implying that it is the shop of a person registered under the Pharmacy Acts, may be called upon by the Registrar of the Pharmaceutical Society to furnish a statement in writing of his name and address and qualification to sell or keep open shop, subject to a penalty of five pounds for each day that he fails to do so, and every person found selling poison or compounding medical prescriptions or acting in the management of such shop is likewise to be subject for each offence to a penalty of five pounds.

In a Bill to amend the Pharmacy Acts it is only natural and consistent with the progress which has been made during past years that provisions should be introduced in regard to the system of education by which competent skilled knowledge is to be acquired by pharmacists. As bearing upon this very important point in connection with pharmaceutical advance, clause twelve of the Bill empowers the Pharmaceutical Society to make, alter or amend regulations respecting examinations as may be from time to time found desirable, and as a further important step in the same direction clause thirteen provides that after a specified time the passing of the Preliminary examination shall be a condition indispensable for the reception of an apprentice by a pharmacist.

Clauses sixteen and seventeen contain provisions to facilitate admission to the Register of Pharmaceutical Chemists and to membership of the Society. These it is believed would materially assist in raising the public appreciation of the general body, and contribute largely towards the attainment of those objects which some of our correspondents have from time to time pointed out as necessary and for which they have suggested the establishment of a Fellowship of the Society.

The Evening Meeting held last Wednesday was a very interesting one; the attendance was better than usual, and no less than six papers were brought under notice. The first of these, on "Gelsemine," by Mr. Gerrard, will be found in another part of this number; but the publication of the others, together with the discussion, is deferred, through want of space, until next week.

* * *

At the Evening Meeting of the North British Branch of the Pharmaceutical Society, on Thursday evening next, the 15th inst., a paper will be read on "The Methods for the Separation of Alkaloids," by Dr. Matthew Hay.

* * *

From the report on another page it will be seen that the Committee of the Chemists' Ball have been able once more to send a subscription of twenty guineas to the Benevolent Fund. It appears probable also that the Committee of the Junior Pharmacy Ball will be in a position to contribute a similar sum. Mr. W. H. Kerr and his colleagues may well be congratulated upon the success which this result indicates as having attended their efforts to cater for the enjoyment of the younger members of the calling.

* * *

At the meeting of the School of Pharmacy Students' Association, to be held on Thursday, February 15, at 8 p.m., a paper will be read on "Linnæus," by Mr. W. E. Crow, and Mr. C. Thompson will make a communication on the "Separation of Cadmium from Copper."

* * *

The Annual Dinner of the Chemists' Assistants' Association will take place on Wednesday next, the 14th inst., at the Holborn Restaurant. The chair will be taken by Mr. Michael Carteighe.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, February 7, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, W. Hills, Radley, Richardson, Robbins, Savage, Schacht, P. W. Squire, Symes, Williams, Woolley and Young.

The minutes of the previous meeting were read and confirmed.

Members of the Council who Retire.

The lot being taken in the usual manner for the seven members of the Council who should retire in May next, the following names were drawn:—

Andrews.	Butt.	Robbins.
Atkins.	Radley.	Savage.
Borland.		

The following, who remained in by lot last year, now retire by rotation:—

Bottle.	Hills.	Symes.
Carteighe.	Richardson.	Woolley.
Hampson.		

The following remain in office for another year:—

Churchill.	Schacht.	Williams.
Gostling.	Squire.	Young.
Greenish.		

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Foggitt, John Blackett.
Gilbert, William John.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Foden, Edwin ....Manchester.
Fowler, George..............Birmingham.
MacDermott, Robert John ......London.
Nichol, Anthony ....Carlisle.

Chemists and Druggists.

The following registered chemists and druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Gater, James..............London.
Herring, Thomas ....Thorner.
Turner, Robert John ....Brighton.
Watts, John Newton ....London.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Allen, Samuel ....London.
Bridge, George Edward ....Southsea.
Christmas, William ....Croydon.
Clayton, Christopher ....Oxford.
Cluckie, Andrew ....Stranraer.
Dickinson, David ....Derby.
Fox, Charles James ....Croydon.
Francis, George Bult ....London.
Gelsthorpe, James ....Long Eaton.
Harris, Stephen..............Droitwich.
Jeans, Thomas Robert..............Pendleton.
Joy, Francis John Jessopp ......Cardiff.
Macaulay, William Henry .. ...Huddersfield.
Machin, William George.........Winchfield.
Mackaness, Charles ....Chesham.
Mackay, David..............Dundee.
Moore, Jonathan Reuben ......Kettering.
Norton, Thomas ....Broseley.
Patman, Frederick Thomas......Whitehaven.
Raine, Ralph William ....Middleton-in-Teesdale.
Ranken, John ....Forfar.
Thomas, John Henry ....Hampton.
Whitrod, Henry Frederic ......Diss.
Wilding, George James ....Cressington.

Modified.

Abernethy, John ....Hoyland.
Martin, James ....Motherwell.
Morrell, Frederick Kent ... .London.
Thrower, Edward Arthur ......Diss.

ASSOCIATES.

The following, having passed the Minor examination and tendered their subscriptions for the current year, were elected "Associates" of the Society:—

Adamson, William Stewart ...Edinburgh.
Adler, Martin Woldemar ......London.
Bain, John ....Edinburgh.
Bing, Charles ....Canterbury.
Brisley, George..............Margate.
Cobden, Alfred George ....London.
Dunn, George Stewart ....Landport.
Fraser, James ....Edinburgh.
Gulliver, Walter Frederick ...London.
Holloway, Edwin Arthur ....Leominster.
Hopkinson, Harry ....Grantham.
Ivatt, Albert..............Cottenham.
Kerr, William ....Edinburgh.
Marsh, Edward..............Luton.
Pirie, William ....Arbroath.
Pope, Albert Harry..............Southport.
Ricketts, James ....Plymouth.
Rigden, George..............Folkestone.
Rowand, Robert ....Glasgow.
Shackleton, Thomas..............Accrington.
Smalley, Arthur William ......Stamford.
Sutherland, John William ......Edinburgh.
Watson, Robert William ......Maryport.
Worts, Harry Augustine.........Harwich.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Adamson, Joseph William ......Epworth.
Alderton, James, jun. ....Leamington.
Almack, Edward Ambrose......Bedale.
Archer, Luke ....Bolton-le-Moors.
Atkins, Alfred Edward ....Newport.
Austin, William Hoskin... .....Devonport.
Badcock, Henry John Francis Sheerness.
Bayley, Edward George ....Rye.
Beauchamp, Frederic Crawley...Hemel Hempstead.
Bellamy, Arthur ....Louth.
Bishop, George Henry.......... Southampton.
Blain, William Rushton ....Bolton.
Blankley, George William ......Arnold.
Bostock, John ....Wilderspool.
Broomfield, Walter Henwood...Monmouth.
Burgess, Thomas ....Liverpool.
Burgess, William ....Runcorn.
Chantry, John Henry ....Horncastle.
Chapman, John ....Bedford.

Clarke, Richard ....Ruthin.
Clough, Thomas ....Liverpool.
Cooper, John James ....Castletown.
Crosthwaite, Daniel................Blackpool.
Dick, David Laing ....Falkirk.
Dobson, George Edwin ....Bridlington.
Elliot, William Marshall..........Kelso.
Ellithorn, Arthur Henry..........London.
Evans, Frederic Ernest ....Lymm.
Fardell, Ernest Matthew ....Leicester.
Felton, William ....Maidstone.
Fraser, James Leslie ....Inverness.
Fraser, John Sutherland..........Forres.
Fryer, Charles John ....Warwick.
Gale, William Gillam..............Worksop.
George, Isaac ....Great Yarmouth.
Glanville, Henry Charles..........London.
Gradidge, James Henry ....Truro.
Gray, William Edwin ....Pickering.
Green, Herbert........................Hucknall Torkard.
Gregson, Joseph ....Manchester.
Greig, John ....Montrose.
Grime, James ....Darwen.
Haigh, Walter ....Halifax.
Hamer, Edward Sidebottom ...Pendleton.
Harradine, Holben Montfort ...London.
Harvey, James ....Flintham.
Harwood, John L. ....Redhill.
Hays, Frederick Arthur ....Birmingham.
Henderson, Henry Alfred ....Wibsey.
Hewitt, Joseph Frederick ....York.
Holt, Herbert Collins ....Bowdon.
Hordley, Henry Clement..........Stoke-on-Trent.
Humphreys, Thos. Henry P.S...Denmark Park.
Hutchinson, Edgar ....Newark.
Irving, Frederick William ....Donnington.
Jeans, Alfred ....Mansfield.
Johnson, Harry Haden ....Sedgley.
Kay, James Spencer ....Rochdale.
Keen, Walter H. ....Red Hill.
Lewis, Rees Martin..................Cheltenham.
Lloyd, Thomas Edward ....Pontypridd.
Lobbett, James Godfrey ....Hingham.
Lockwood, Joe ....Hyde.
Lovely, Charles Newton ....Ipswich.
Lowe, Albert John ....Guernsey.
Mallett, Henry Philip..............Norwich.
March, Thomas Frederick ....New Brompton.
Minchin, William.. ....Bedford.
Mitchell, Thomas Maxwell.......Leeds.
Moor, George ....Grantham.
Muddell, Claude ....Southend-on-Sea.
Murfet, Edward ....King's Lynn.
Oswald, Landle Rose ....Glasgow.
Otty, William Hare ....West Bromwich.
Painter, Frederick Hubert ...... London.
Palmer, William Mortlock ....Meldreth.
Parton, John Henry ....London.
Pepperdine, Lemuel Simpson...Lincoln.
Perrett, Samuel ....Bridgwater.
Peterkin, James ....Elgin.
Pick, Alfred ....Chester-le-Street.
Pierce, Robert Wynne C. ....Bangor.
Prosser, Evan Charles ....Colchester.
Reid, Neil ....London.
Renshaw, Frank ....Rochdale.
Rhoden, Samuel Thornton ....Sheffield.
Rogers, Francis Alfred ....Stamford.
Saul, John Edward ....Rock Ferry.
Sayers, William Charles..........London.
Sharp, John ....Galashiels.
Shenston, Robert ....Kenton.
Silk, Edward ....Macclesfield.
Sinclair, Matilda Anne ....Llandudno.
Smith, Burgess ....London.
Swan, William ....Dundee.
Taylor, Ernest Sanderson ....Grantham.
Taylor, Joseph Edward ....Wrexham.
Thomas, Joseph ....Garstang.
Thompson, Evelyn ....Ilkley.
Turner, John Edward ....Woodbridge.
Walker, George John ....Revesby.
Wheatcroft, Hoyland ....Rotherham.
White, Thomas Arthur ....Basingstoke.
Williams, William .... Abergavenny.
Wilson, Robert John ....Chesterfield.
Wilson, William Potter ....Haddington.
Wood, John William ....Darlington.
Young, Edward ....Sudbury.

Restorations to the Register.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

Joseph Hughes Merrett, 57, Hyde Park Road, Southsea.
George Oakes, 7, Market Street, Chorley.
Edmund Wood, 14, Cleveland Terrace, North Cross Road, East Dulwich, Surrey.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Additions to the Register.

The Registrar reported that:—

John Herring Dingle, Bideford, Devon,
Septimus Frederic Leete, Thrapston,

having made statutory declarations that they were in business before the passing of the Pharmacy Act, 1868, and this declaration having been supported by duly qualified medical practitioners, their names had been placed on the Register.

Registrar's Report.

This Report, which is printed on pp. 652 and 653, as to the numerical strength of the Society, etc., was presented by the Registrar.

Reports of Committees.

Law and Parliamentary.

The Draft Pharmacy Bill.

The Council went into committee, while the President explained the alterations which had been made in the draft Pharmacy Bill since it was last before the Council, and the result of his interview with the officials of the Privy Council.

The Council then resumed, and the report of the Committee recommending for adoption the draft Bill, printed on p. 644, was read.

Mr. Hampson said he was very glad to find that the Pharmacy Acts Amendment Committee had been able to produce a draft Bill to the Council for its acceptance, though it had taken a long time to elaborate this Bill. He remembered the early stages of this question being raised by his friend Mr. Betty and himself, when it was found there were certain amendments required in the law, and it was thought desirable to have a committee to go thoroughly into the whole question. In accepting the position of moving the adoption of the report and the acceptance of this draft Bill he felt that it was a privileged position to occupy, inasmuch as, notwithstanding there were certain points which might be objected to, and others with which he might not feel in perfect sympathy, still looking all round the question, and looking at the condition of pharmacy in this country, and the agitation in respect of the sale of poisons, he felt that it would be scarcely possible to have a better Bill at present. It met all that was required at the present time; it might not go far enough in certain directions—it might go too far in others, but he believed it thoroughly met the exigencies of the occasion, and therefore, he had much pleasure in proposing its acceptance. He did not think it was necessary now to go into the details of the Bill, but he would just refer to the Education Clause, for after all that ought to be the keynote which should be struck when asking for any fresh powers in connection with pharmacy. Pharmacists asked for these powers because they were educated men practising pharmacy, and it was necessary that certain legislation should take place. He was extremely happy to find that a young man when entering the business would be protected; that he would enter pharmacy under quite different auspices for the future; that it would be necessary for him to pass a Preliminary examination before he was apprenticed to a chemist, for that was really an important point. Then he should like also to refer to a portion of the Bill which would possibly raise opposition on the part of some pharmaceutical chemists. It was thought desirable at some of the earlier meetings of the first Committee that there should be an additional title adopted, that of "Fellow of the Pharmaceutical Society;" but it appeared to him that rather than make things more complex the true method was to make them more simple, and he maintained that by instituting, as was proposed by this Bill, one title only, which would be understood by all sections of the public, they were taking a very important step indeed. It would not only be a step in the simplification of the title, but would establish a means by which the Society would be strengthened. It had been found by experience that the number of pharmaceutical chemists joining the Society was so small that this class had already become weak, and if some steps were not taken it would become exhausted. This change was one which would tend to strengthen and consolidate the Society, and he was quite sure that although some pharmaceutical chemists might view it with suspicion and dislike, if they took a broad and loyal view of the position they would ultimately give it their cordial support. He would ask them to do this in the interests of the Society and of pharmacy, because it appeared to be a necessary amendment of the law. He would not occupy time further, but he hoped that when this Bill was seen by the pharmacists and chemists of the country they would, before forming a hasty opinion upon it, try to take an all round view, and that they would consider, as the Committee had considered, what was absolutely necessary and what was possible. There would be many disappointments, no doubt, that the Bill did not ask for further powers; for instance, that it did not provide that the compounds of the Pharmacopœia and drugs should only be sold by chemists, with other matters in the same direction; but the Committee had found such proposals utterly Utopian, and he was quite sure if the matter was thoroughly considered they would come to the conclusion that this Bill fully and consistently met the requirements of the times. He, therefore, begged to move—

> "That the report and recommendations of the Law and Parliamentary Committee of January 10th and February 6th be received and adopted, and that the Pharmacy Bill in its present form be sent to the Lord President of the Council."

Mr. Savage, in seconding the motion, said he must endorse all that Mr. Hampson had said, and he believed the country generally would accept the Bill now submitted, and express its very grateful thanks for the time and trouble which the Committee, and especially the President, had taken in connection with it. A great deal of credit was due to those who had framed the Bill, for many difficulties had presented themselves. Those who read the Journal from week to week were aware that every now and then some proposition came forward from a country member under the supposition that the Society could do everything and without taking into account for one moment the necessity of considering public requirements in this matter. He thought, so far as they could possibly be carried out, the propositions submitted in this Bill were such as would meet with the general approval of the trade.

Mr. Schacht said probably it would be as well if he now rose to say a few words which he thought it his duty to address to the Council. Although they might sound as a repetition in the ears of several gentlemen who might hear them, he should make no apology for doing so, because this was the first time the subject had been discussed with open doors. He was sure the President and the gentlemen sitting round the table would agree that they were not the only persons interested in the matter, and that not only their fellow members practising pharmacy, but the great body of the public were very materially interested in the provisions of this proposed Act. With regard to the Bill itself he should like to say at once that there was a very large portion of it with which he entirely sympathized, but there was no occasion for him to specially indicate which those portions were further than to say he referred to those portions which were continued on the lines of the existing traditions of the Society—those which aimed at protecting the best interests of the public by more or less limiting its powers of getting dangerous articles promiscuously. As far as all that went he was in entire sympathy with the Bill; but in those two portions in which new departures were made, and he emphatically asserted they were new departures, notwithstanding his radicalness of character he found himself too conservative to agree with the suggestions now made, and to these points he would briefly draw attention. In the preamble to the Pharmacy Act were these words, "Whereas, it is expedient for the safety of the public, that persons keeping open shop for the retailing," etc., "of poisons, should possess a competent knowledge of their business," and so on, and in order to insure this, should pass certain examinations, and so forth, "be it enacted." All the rest of the Act included a recognition of the broad principle that in the best interests of the public it was not safe that everybody should have the possession or keeping and manipulating of dangerous drugs; but that a trained body should be recognized, into whose hands should be committed the charge of these dangerous materials, and that they should be responsible to the State for the individual members of the State using those articles for their advantage, and not their disadvantage. That was the principle which he believed had been acted upon by the Society from the beginning, and it was one he was exceedingly sorry to see in the least degree interfered with. In the provisions of this new Bill that principle was utterly torn asunder, and it was declared that though technically six or seven articles might be called poisons, and were still to be regarded as such, dangerous articles in the broad sense were to be manipulated exactly as the public liked, with the single exception that they were to be called "poisonous articles." That was the only limit to be put upon the traffic in them. The principle was to be admitted that it was not to the disadvantage of the public that all persons should be permitted to do what they liked with dangerous articles in the shape of drugs and chemicals. That was a principle he should be sorry to admit. If he were a member of Parliament he should oppose it to the utmost, and though the Government officials of to-day might recognize this principle, he believed the Government officials of to-morrow would not do so. The first occasion on which a disaster occurred they would all have to turn round and regret the action which to-day they were beginning to take. He exceedingly regretted that they should not have adhered to that policy which lay at the basis of all their previous efforts for improvement, one which he might say had the sanction and the whole prestige which attached to the action of the Society from its beginning. He had said this before, and would only say it this once more in public, be-

REGISTRAR'S REPORT.

MEMBERS, ASSOCIATES, AND APPRENTICES OF THE SOCIETY FOR THE YEAR 1882.

	Life Members.		Subscribing Members.		Associates in Business.	Associates not in Business.	Apprentices.
	Pharmaceutical Chemists.	Chemists & Druggists.	Pharmaceutical Chemists.	Chemists & Druggists.			
Number in 1881	238	2	1695	786	1069	...	..
„ restored, 1882 ...	...	...	8	3	4	...	...
„ elected, 1882 ...	1	...	35	15	115	..	...
	239	2	1738	804	1188	...	...
Deaths, Secessions, etc. ...	3	...	92	27	81	...	...
Total Strength of the Society	236	2	1646*	777	1107*	824	1037
Summary:—							
1881	238	2	1695	786	1069	817	1046
1882	236	2	1646	777	1107	824	1037
Increase	...	...	...	...	38	7	...
Decrease	2	...	49	9	...	...	9

COMPARATIVE STATEMENT OF THE NUMERICAL STRENGTH OF THE SOCIETY FOR 5 YEARS: 1878-82.

MEMBERS.—PHARMACEUTICAL CHEMISTS.

	1878	1879	1880	1881	1882
Restored to Membership ...	5	7	4	5	8
Elected „ ...	45	67	65	62	35
(Total additions) ...	50	74	69	67	43
Deaths, Secessions, etc. ...	79	91	82	101	92
Decrease ...	29	17	13	34	49
Total Number of Subscribing Members	1759	1742	1729	1695	1646*

MEMBERS.—CHEMISTS AND DRUGGISTS.

	1878	1879	1880	1881	1882
Restored to Membership ...	4	1	2	3	3
Elected „ ...	25	19	24	18	15
(Total additions) ...	29	20	26	21	18
Deaths, Secessions, etc. ..	31	33	35	38	27
Increase ...	...	...	...	...	...
Decrease ...	2	13	9	17	9
Total Number of Subscribing Members	825	812	803	786	777

ASSOCIATES IN BUSINESS.

	1878	1879	1880	1881	1882
Restored	1	3	5	2	4
Elected	153	133†	137	131	115
(Total additions) ...	154	136	142	133	119
Deaths, Secessions, etc. ...	69	70	82	89	81
Increase ...	85	66	60	44	38
Total Number of Associates in Business...	899	965	1025	1069	1107*

ASSOCIATES NOT IN BUSINESS.

	1878	1879	1880	1881	1882
Increase ...	...	19	13	...	7
Decrease ...	24	...	...	23	...
Total Number of Associates not in Business	808	827	840	817	824

APPRENTICES OR STUDENTS.

	1878	1879	1880	1881	1882
Increase ...	...	31	3	...	...
Decrease ...	14	...	...	28	9
Total Number of Apprentices or Students	1040	1071	1074	1046	1037

LIFE MEMBERS.

	1878.	1879.	1880.	1881.	1882.
Pharmaceutical Chemists	243	241	237	238	236
Increase	...	...	...	1	...
Decrease	4	2	4	...	2
Chemists and Druggists	2	2	2	2	2
Decrease	..	...	...	...	...

* 1 who paid as an Associate in Business, afterwards passed the Major, and was elected a Member.
† 134 were elected, but 1 afterwards passed the Major, and was elected a Member.

ANALYSIS OF EXAMINATIONS FOR THE YEAR 1882.

FIRST OR PRELIMINARY EXAMINATION

Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Examination.	Average Number of Rejections at each Examination.	Percentage of Rejections.
1269	629	640	4	317·25	160·00	50·43

MAJOR, MINOR, AND MODIFIED EXAMINATIONS.

ENGLAND AND WALES.

Number of days on which the Board met for conducting the Major, Minor, and Modified Examinations... 26
Average attendance of the Members of the Board of Examiners at each Meeting ... ... 15·25

Examinations.	Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of Rejections at each Meeting.	Percentage of Rejections.
Major	94	36	58	6	15·66	9·66	61·7
Minor	572	242	330	6	95·33	55·00	57·7
Modified	7	4	3	3	2·33	1·00	42·8

SCOTLAND.

Number of days on which the Board met for conducting the Major, Minor, and Modified Examinations... 7
Average attendance of the Members of the Board of Examiners at each Meeting 8

Examinations.	Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of Rejections at each Meeting.	Percentage of Rejections.
Major	9	4	5	4	2·25	1·25	55·5
Minor	78	44	34	4	19·50	8·50	43·6
Modified	1	1	0	1	1·00	0·00	00·0

THE REGISTERS OF PHARMACEUTICAL CHEMISTS AND CHEMISTS AND DRUGGISTS, 1882.

Additions during the year:—

Number of persons who have passed the—

Modified Examination		5
Minor ,, ...		286
Major ,, ...	40*	
Number of persons registered on payment of the Registration Fee, having been in business before August 1, 1868......		7
Number of persons restored to the Register on payment of a fine		15
Placed on the Register by virtue of restoration to membership—Pharmaceutical Chemists .		3
Decrease of numbers on the Register . .		208
		524

* These having already been included in the number who passed the Minor, do not increase the numbers on the Register.

Erasures during the year:—

Deaths:—

Notices from Registrars	135
Other sources	124
Erased at the request of registered persons themselves......	12
Erased by the Registrar in pursuance of the provision set forth in section 10 of the Pharmacy Act, 1868, after sending two registered letters to which no answer has been given .	253
	524

Number of Pharmaceutical Chemists on the Register, December 31st, 1882	2,275	
,, ,, Chemists and Druggists	11,172	
		13,447

cause he knew from the experience of the Committee meetings that he was in a hopeless minority; still he thought it his duty to call public attention to the fact and to express his opinion plainly and clearly. There was also another departure in clause 8 which he regretted, because it seemed to contravene the principle which he believed the Society had allowed itself to be mainly influenced by in all its efforts to promote high pharmacy, namely, to endeavour as much as lay in its power to provide that the individual pharmacist should be qualified to the highest degree; that he should be trained to exercise his powers with a due sense of responsibility, and that everything conducted in his name should have his own personal supervision. That it was not absolutely and legally possible to prevent supervision passing into other hands might be true, but to boldly sanction the handing over of responsibility to an assistant, to any extent, which this clause did, would be so far a departure from principle, which he exceedingly regretted. It seemed to him, once more, if it was to be considered right and proper that the pharmacist should have—as he would be hereby allowed by the authority of the Council to have—any number of shops in any number of places, so long as he carried them on under registered assistants, he could not see why anybody should not do so, because it was absolutely clear that practically a man could not supervise ten shops, and if power were given him to carry on ten shops by the aid of ten qualified assistants he could not supervise those ten shops any more certainly than a corporation calling itself a limited liability company could do. Therefore, he believed this was a great departure from the principle on which the Society had hitherto largely rested, and was giving up the position it had hitherto maintained, namely, holding the individual owner personally responsible for what went on in his establishment. Those were the two portions he had at other times protested against and still felt it his duty to object to. He was quite content to take the defeat which he knew was inevitable, but in the meantime he felt bound to make one public protest, and would, therefore, conclude by moving an amendment, namely—

"That the report of the Law and Parliamentary Committee be approved, with the exception of clauses No. 2 and No. 8 of the Bill."

Mr. Woolley said, in order that the amendment might come properly before the Council, he had much pleasure in seconding it. He held the same views as Mr. Schacht had just expressed, but he did not think it was necessary to take up time by going any further into them. He should, however, just like to say how much he appreciated the time and trouble which the President had given to this work. They were all under a deep debt of gratitude to him for the work he had done, and whether they agreed with the outcome altogether or did not, still the debt remained, and should be acknowledged. He took exception merely to the two points which Mr. Schacht had indicated, namely: the introduction of the term "poisonous" in the new schedule, and clause No. 8. The Bill in other respects contained much which would be beneficial to the trade, but the eighth clause seemed to him to acknowledge a mischievous principle, and might very well be omitted without any loss to the Bill.

Mr. Gostling felt some considerable sympathy with Mr. Schacht in the convictions which he held with reference to adding a list of poisonous substances which were to be sold by any person, and also with reference to keeping branch shops. No doubt if they were in a perfect state of society Mr. Schacht's views might be practicable; but he felt he must support the motion very cordially, because he thought the efforts of the Committee had resulted in suggesting the only practical means of meeting the position of pharmaceutical chemists, and of insuring to the public the amount of security it was possible to give. He felt that the provision with reference to patent medicines was one of the most important in the Bill, inasmuch as undoubtedly, especially in the case of narcotics, which were doing so much harm, the word "poison" being put upon them would have a great effect in limiting the use of those dangerous substances. He felt also with regard to branch shops that they could not be altogether dispensed with and that the provision here made was a very proper one. No doubt, in some cases, where branch shops existed under competent management, they were of great service to the public. With regard to this new schedule of "poisonous substances," he felt that that was the only practical way out of the difficulty. They all knew, and the public knew, that the Council had attempted to get certain things added to the schedule of poisons, but the Government had declined to accede, considering that it would be impracticable that chemists and druggists only should have the sale of the articles mentioned. With regard to the title of "Pharmaceutical Chemist," that was going in a liberal direction which he trusted would be accepted. Some pharmacists might feel aggrieved by it, but on a broad view he thought it might be accepted that the Committee had done the right thing.

Mr. Radley said his sympathies had gone a little beyond this Bill in certain matters, for considering the expense of the education which was likely to be required by those entering the trade, he thought they wanted some further protection, and his thoughts had gone in that direction, at any rate, in so far as regarded the compounds of the Pharmacopœia. But he had arrived at the conclusion that by pushing this point the whole Bill might be endangered, and as there were so many points which were desirable in this Bill he could not press those views at the present time. In reference to both the points named by Mr. Schacht, a decided advance was being made on anything that had been done before in protecting the public and with reference to themselves. With regard to branch shops there was something to be said as to the responsibility of the proprietor, which was a matter of very considerable importance. It was not simply having a branch shop with an assistant, but there were matters connected with the purchase of drugs, and the general supervision which the principal would have to attend to.

Mr. Bottle supported in its entirety the Bill now brought forward. He did not say it was all that he would aim at if he could see his way to its accomplishment, but he looked at legislation altogether as a series of compromises. Certain things were pressed upon the Council last year by the Lincolnshire Farmers' Association which the Government would not entertain, and Mr. Schacht had certain views of his own with regard to education, and he looked upon the Bill as a compromise. When it was printed and went the round of the trade, and of those interested in pharmaceutical matters, he believed there was no part which would be more objected to than the part which Mr. Schacht most energetically supported himself. So far as regarded the observation that the Council was making two new departures he differed from Mr. Schacht altogether. It was only recognizing that which already existed, and putting under surveillance that which had been winked at for the last ten years. He would not detain the Council longer except to personally thank the President for the zeal, energy, and ability which he had thrown into the business.

Mr. Young said it was not necessary to make any lengthened remarks on this occasion, and he might simply say he acquiesced entirely with the motion. He was satisfied from what he knew of the feeling of druggists in the North that this Bill would be received with acclamation. He was quite satisfied it was one of the best Bills which had yet been passed by the Council. It seemed to him to deal practically with all those matters which were the peculiarly crying evils of the present time, and none appeared to him so important as those which Mr. Schacht had referred to, No. 2 and No. 8. No. 2 was just one of those things of which every one sought a solution, but no one seemed to be able to find the real one. Members of the Council knew that the public were supplied on all hands with these commodities. They felt that they could not hope to have them restricted to pharmacists without being actuated by a monopolizing spirit, which would have spoilt their case with any Government, because Governments now-a-days would act for the benefit of the general public. Pharmacists could not ask that the sale of all these things which had been sold by drysalters for so long a period should be given into their hands entirely. Three or four hundred years ago the sale of *aqua vitæ* in Scotland was restricted to the College of Physicians and Surgeons in Edinburgh. Then came some kind of reason by which for some composition they parted with it to the barbers, they being then qualified as surgeons. Nobody would ever think of restricting the sale of *aqua vitæ* now, and yet many people looked upon it as a very glaring poison. Clause 2 seemed to him to be the only practical means of getting over the difficulty. Then, as regards branch shops, if the clause passed it would place matters on a much better footing than they were now. It must be remembered that there were great changes in towns during the last twenty years. In Edinburgh and Glasgow there were old businesses which would have fallen to a very low ebb unless the proprietors had had it in their power to open branch shops. There were districts in those cities formerly inhabited which were now left entirely empty or converted into warehouses, and those who occupied them went into the suburbs. You must follow your customers if you wish to retain your business. He had often noticed the advertisements of Mr. Schacht, in which he described various articles which were manufactured by himself personally, but he did not see how he could be both in the laboratory and in the shop at the same time.

Mr. SCHACHT said he had a partner.

Mr. YOUNG said a qualified assistant was much the same as a partner. If this clause were carried out it would be a very great safeguard which did not exist at the present time, for there were many shops throughout the country which had not qualified persons to manage them. But the Council could go to the Government and say this was for the welfare of the community, and, therefore, demanded legislation. All were greatly indebted to the Committee which had charge of this matter so long, and especially to the President for the manner in which he had been able to negotiate it.

Mr. SYMES said, considering the position of pharmacy in the country and its relation to the public generally, he was prepared to accept the labours of the Committee, and the gigantic labours of the President, without any qualifying conditions whatever. The discussion would, he trusted, help members of the trade to understand at least some of the surrounding circumstances and difficulties under which the Committee brought forward the Bill. He should scarcely have felt it necessary to speak on the question, because most of the clauses were very clear, but as there had been some opposition to one or two of them he would say, in a few words, why he supported the Bill. The Pharmacy Act of 1868 had been quoted as containing the lines on which pharmaceutical progress should proceed, and from which it was a sort of sin to depart. If so, why was the Council going in for a new Bill at all? When that Bill was first drafted it was with the view to get as much as could be got at the time, seeing the opposition that had to be contended with, but it had not existed very long before chemists and druggists generally found reason to complain of it. This had gone on for a number of years, and it had been recently decided that it was a very imperfect Act. No doubt that had become the case by the growth of time, circumstances now not being the same as they were when the Act was framed. He simply asked the members of the trade that they should progress with the times and also be prepared to accept conditions to-day which they were not prepared to accept when the Act was first introduced. Exception had been taken to two clauses, and it was said the Council was initiating new departures. He thought that had been sufficiently answered already, inasmuch as provision was simply being made for restrictions on the sale of certain poisonous substances, which now could be sold without those restrictions, since the Council had failed to get any power to control the sale in any other way. The Council was not called upon to be the guardian of the public in all things, and he failed altogether to follow Mr. Schacht's argument that it was a very serious thing that the public should be allowed to have to do with dangerous things which did not go through the pharmacist's hands. If that principle were enlarged upon it would prevent the public having pistols, razors, and all that sort of thing, which had not come through their hands. It could not be recognized as a principle that the public should not have dangerous articles unless they were sold by a pharmacist.

Mr. SCHACHT said he referred to drugs and chemicals.

Mr. SYMES said, leaving that point the Council was providing for the good of the public. He must dissent from one word which had been used by Mr. Radley, when he said he had hoped for some further protection in the Bill. He would not use that word in a sentimental way, because he was no politician; but in considering this matter it must be considered apart from any idea of protection; if it were considered as the best means of protecting chemists and druggists it was an entirely erroneous idea. Those things were placed in their hands because they were more or less technically acquainted with them, and they had to administer them for the advantage of the public, not for their own benefit, though they should hope, as a matter of course, that in benefiting the public they would also benefit themselves. With regard to the question of branch shops, Mr. Schacht failed entirely to see how a branch shop carried on by a qualified pharmacist with a qualified assistant differed at all from a shop carried on by an unqualified person with a qualified assistant. Now that was thoroughly opposed to everything Mr. Schacht had said, year after year, hundreds of times almost, at the Council, and he was perfectly astonished to hear such a statement from him. He had told them all along that there was all the difference, and at any rate that the qualification of the master should cover everything. He had been seeking to have the individual pharmacist doing all the work himself. Now he (Mr. Symes) did scarcely any of the detail work in his own shop, though probably many of the public might think he made up all their medicines himself; but the commercial aspect of the question must be remembered as well as this ideal of professional character. If pharmacy were purely a profession, as it was more nearly on the Continent, that state might be arrived at. He was not intimately acquainted with continental pharmacy, but he knew something of it, and he should be sorry to see the pharmacists of this country drift into the condition of those in Paris; notwithstanding their professional character they seemed so utterly divested of vitality, of energy, and progress, of anything that would take them beyond the narrow limits of their immediate duties. He did not say there was not much scientific work done there occasionally, but he could not support that which would tend to narrow down pharmacy in this country, and to interfere with its progress. In the United States pharmacy was practised more freely probably than in any other country in the world, and they had been told by the President at that table that the pharmacists of the United States were the best in the world. He did not object to sentiment anywhere except in business, but if this matter were to be dealt with in a business way, the facts must be dealt with. There really was much greater protection where a business was owned by a qualified man and conducted by a qualified assistant than where it was owned by an unqualified person, and, therefore, he trusted what Mr. Schacht had said would not influence the Council in dealing with the Bill now put before it.

Mr. ROBBINS thought the Committee might be congratulated on bringing forward a Bill which was approved by nine-tenths of the Council. This was not the first Pharmacy Bill which had come before it, and when the former one came forward there was a good deal of opposition all round, and at the last it was passed by a majority. There was nothing like the unanimity which existed to-day, and from that circumstance he hoped it might be taken that the present Bill would be received by chemists and druggists throughout the country in the same spirit. He had always noticed that where the Council had been much divided members outside had been divided in the same proportion, but where there had been anything like unanimity in the Council its resolutions had received general approval by the trade at large. Of course in a Bill of this kind there were many points on which individually they would like to make alterations, but they would never get a Bill which met the views of every one.

Mr. WILLIAMS said taking the Bill as a whole he supported it thoroughly. He had taken exception to one or two clauses in committee, but being defeated by a large majority it was not his intention to again raise a discussion on the matter; he bowed to the decision of the Committee, which was a large and influential one, and he was quite sure it represented the Council. He, therefore, accepted the Bill as a whole, and was satisfied that the more unanimous they were—and it would be better if they could be entirely unanimous—the better chance there would be of carrying it.

Mr. ANDREWS said the patience of the Council must be getting exhausted, but he should like to say a very few words. He could not commence without paying a tribute to Mr. Schacht and Mr. Woolley, for the very consistent way in which they had always acted as regarded this Bill on questions which they considered questions of principle, and if they had not spoken as they had done, he thought they would have acted wrongly. He sympathized with them to a considerable extent, but he thought they were mistaken, and he could not vote for the amendment, seeing the importance of the Bill and the necessity of the Council being agreed. He did not see that there was such a question of principle as they imagined, particularly with reference to clause 2. Chemists had never claimed a monopoly in the sale of dangerous things, nor could they get it if they tried. If the Bill were a new departure, if it were lessening in any way the power the Society previously possessed, Mr. Schacht would be right; but as it only regulated the sale of dangerous things by certain persons who already sold them, he could not see that there was any question of principle involved. With respect to clause 8 he was more in accord with him, but still he could not support the amendment, and looking at the necessity for a Bill in the interest of public security he was obliged to waive any objection he might have to that clause and support the Bill in its entirety. He should like to say, however, that he did not agree with the defenders of clause 8. Mr. Young had defended it because old houses of business, when their neighbourhoods altered, had to start branches in new neighbourhoods. That might be a good argument for such houses, but not for the public or for the necessity of the case. Taking the Bill as a whole, and recognizing the fact of its being in the interests of the trade generally, he must support it.

Mr. RICHARDSON wished simply to add his feeble thanks to the President and the Committee which had taken so much trouble in framing this measure, which he hoped would soon be presented to Parliament and become law. The President must have had considerable trouble in framing a Bill of this description, which would, as far as possible, meet the wishes of the trade and yet be acceptable to the Government, and he feared the constituents of the members of Council were hardly aware of the great difficulties the Council had had to encounter. Still he could not but think that, taking it all round, this Bill would prove acceptable to the great bulk of pharmacists. As to attempting to please everyone, it was evident from the letters which were written to the Journal, time after time, how impracticable some people's ideas were. He had considerable sympathy with Mr. Schacht, who was one of the leaders of pharmacy, and regretted that he took this stand on the present occasion, because it was a great misfortune that a gentleman holding such a position should not go heartily with the rest of the Council in this business. With regard to the schedule of "poisonous articles" it simply placed illiterate vendors of those articles under restrictions, which would to a certain extent assist pharmacists; it would tend to drive the trade in those articles more to the legitimate chemist, because there could be no doubt that a great many people, especially the smaller shopkeepers, when they found there were these restrictions placed upon them, would give up the sale in disgust. One thing he did not see in the Bill, but no doubt it had been discussed, and that was a clause exempting all chemists from jury service.

The PRESIDENT said it would have been impossible to claim that exemption for all existing chemists and druggists, and any attempt to do so would simply have led to an abolition of the existing exemption. But the provisions embodied in the Bill would exempt all chemists who qualified hereafter.

Mr. RICHARDSON said that was quite satisfactory. He had some knowledge of pharmacists abroad, and had never before heard them spoken of in the depreciating tone which Mr. Symes had used. He had always looked upon them as the great pioneers of scientific chemistry. He had much pleasure in supporting the Bill as a whole, and thought it would be acceptable to the great majority of wise-thinking chemists and druggists throughout the country.

Mr. GREENISH said that all he had to say on this Bill had been better said by those who had preceded him, but as a member of the Committee it might be thought if he did not say one word, he was lukewarm on the matter and that the Bill had not his entire sympathy. Such, however, was not the case; he believed if it could be accepted and passed the year 1883 would be a memorable epoch in pharmacy. He should have been quite prepared to accept another schedule of poisons. It seemed to him necessary that the public should be protected by having these articles labelled "poison," and chemists were not all in a condition to supply the public as they were now supplied with them; therefore a compromise must be come to, and he thought it was a most important alteration introducing the distinction between "poison" and "poisonous articles." Several other clauses also, such as Nos. 15 and 16, were very important.

Mr. HILLS said he should vote very cordially for the Bill in its entirety, but he considered it a compromise between conflicting interests, and in the main for the advantage of the public. The Council might not approve of certain evils or doubtful advantages which existed, but thought it better to regulate them than to leave matters as they were. The amendment had sole reference to two clauses. But there was another clause (No. 4) on which there might be difference of opinion. To his mind the sale of patent medicines, especially those containing poison, for internal use, was a matter of very doubtful advantage to the public; still the existence of those patent medicines had been already recognized, and it was better in the public interest that the word "poison" should be affixed to those which contained poisons than that the sale should be continued unrestricted. He objected to the principle of branch shops, but the practice existed, and therefore it was better to make some regulation for the protection of the public than to leave the matter open.

Mr. Borland said he gave the Bill his warmest support. At first he had no great liking for clause 2, as he thought the Society would be really legislating for a body outside of pharmacy, and that it would be virtually placing drysalters and others who were the sellers of the poisons mentioned in that schedule in what might be called a legalized position. But when he viewed the question from the point of public safety and considered that the schedule contained so very few poisonous articles he came to the conclusion to support the clause. The danger to the public under this proposed Bill would be really less than at present and that was one of the primary considerations which should be kept in view. With regard to keeping more shops than one, he might say that many medical men in Scotland, who visited in a large area, had assistants whom they placed in villages to meet the wants of the people; and where a privilege of that kind was accorded to medical men, he did not see why the Society should lay an embargo on some of its best members and prevent them carrying on a good business in the same way. The whole centre of Glasgow had been virtually converted into commercial offices and the inhabitants had gone west; so that those having shops in Glasgow must have shut them up if they had not the opportunity to carry shops westward after their customers. From conversations he had with many pharmacists in the North, he believed the Bill would meet with general acceptance.

Mr. Butt was very pleased to be able to give his support to the Bill in its present form. For many years past he had seen the great difficulty arising from the want of a schedule of "poisonous articles," and it seemed to him that the Bill met that difficulty in the best possible way. Another clause embodied a principle he had supported for some years—that of making it compulsory for young men to pass a Preliminary examination before entering on their apprenticeship. A great hardship was often inflicted on young men who entered the business without knowing what they would have to go through, and as soon as this clause came into operation he felt certain it would have the effect of reducing the number of failures, by weeding out the greater proportion of those who were totally unfit for the business.

Mr. Squire said that, being a member of the Committee, and having heard the discussions on these clauses, he was quite satisfied the Bill was the best which could have been framed at the present time. All the subjects connected with pharmacy had been brought under discussion while the Bill was before the Committee, and he believed the best result had been arrived at. Branch shops had existed and would continue to exist, for it could not be expected that any Act of Parliament could be brought in which should shut them up, and as they could not be shut up it was better to legislate for them. There was a vast difference between a branch shop owned by a qualified man and conducted by a qualified assistant and one owned by a person who knew nothing whatever about medicine, trusting entirely to an assistant who would have but a small monetary interest in the concern. As regards the schedule of "poisonous articles," he thought it would be a great protection to the public.

The Vice-President did not know that there was anything he could say which had not been said already, but he must thank the President for his exertions, and he hoped that his term of office would be marked by the passing of this Bill as an Act of Parliament. He must also express his admiration of Mr. Schacht's independence, for it required no small courage with the consciousness of standing almost alone to express his convictions as he had done, and he honoured that courage. However, he differed from Mr. Schacht and Mr. Woolley in the view they took, especially in regard to the first clause they had objected to, because chemists had never had a monopoly of the sale of poisonous articles, and never could ask for it, and if they did Parliament would never give it. Hence it was not a new departure when the Council was simply called upon to recognize that which already existed, but to recognize it only by imposing considerable restrictions which were all to the advantage of the public. He quite agreed with Mr. Bottle that all legislation in this country was, and must be, a matter of compromise, and for the chemists to go to Parliament to advocate their own interests alone would be simply to invite and secure defeat. That the Government department should have honoured the Society by asking it to be the co-ordinate power in imposing fresh legislation was a distinction which should be highly valued; things of infinite importance, upon which all were agreed, could be secured by conceding matter of infinitely less importance, and, therefore, he had no hesitation in giving the Bill his hearty support. He was not in favour of branch shops, but he was in favour of recognizing what could not be prevented by Act of Parliament, and legislating in favour of public security. If controversy arose on this Bill, as no doubt it would, it would probably be with regard to those points in which Mr. Schacht was most warmly interested. He was not sure that every existing pharmaceutical chemist would be willing to concede the right to this title conceded by this Bill, but he thought he might be asked to do so, as the concession would secure for the trade and for the country generally a much greater boon.

Mr. Hampson said, in reply to Mr. Schacht's objection to the schedule of "poisonous articles," he would specially state this broad fact; if the Committee had not undertaken to introduce a clause regulating the sale of those articles, Government would probably do it. Was it not better that the Council should have the control of this matter to a considerable extent rather than that the Government should introduce a Bill independently? He thought Mr. Schacht's opposition was altogether due to his having an exaggerated notion of what the true position was. If his position was sound, the trade ought to go to the Government and ask for a monoply for the sale of tobacco and cigars, because tobacco was included in the Pharmacopœia. The position of a branch shop was very different when the owner was an examined person, and when he was not; a qualified man being the owner of a shop could examine his assistant, could look generally to the conduct of the business, could hear complaints, and from his experience could assess the value of those complaints, whilst an unqualified man could not. He regretted that Mr. Schacht felt incapable of accepting this Bill on account of these two points, which seemed to him to be of secondary importance.

Mr. Schacht asked if he, as mover of the amendment, was not entitled to reply.

The President said that strictly he had not the right to a reply, but no doubt the Council would willingly listen to anything he wished to say.

Mr. Schacht said his position had been to some extent misunderstood. He never for a single moment argued that this Bill or any other Bill should contain a clause prohibiting the keeping of a second shop. There was no such prohibition now existing. But it was one thing to endure what you did not approve of, and another thing to endorse it by making regulations with regard to it; that was the aspect of the matter against which he wished to protest. Some of the gentlemen who had spoken considered that in adopting clause 2 there was no fresh departure from the course the Society had hitherto taken, but that was just where he differed from his colleagues. He had been told by one gentleman on the previous night that the position he took up was the most illogical he had ever heard of in his life; but it appeared to him that that gentleman was entirely wrong. The new departure consisted in this, that the Bill positively recognized that the interests of the public were sufficiently served in the matter of certain poisons by placing on the packet containing the "poisonous article" the word "poisonous." That never had been recognized by the Society hitherto. It had always been understood that the principal advantage given to the public was that—the public being ignorant of the nature of poisonous articles, whilst pharmacists were educated to a full knowledge of them—the sole keeping and manipulation of poisonous articles had been placed in the hands and care of trained persons, and that it was those trained people alone who had the control of such materials; so that merely putting the word "poison" on should not be sufficient, but that the persons dealing with these things should know the nature and character of them and be responsible for them. The new departure was this, that the Bill would sanction the idea that sufficient care was taken of the public if the articles were simply labelled "poisonous." He believed that to be mischievous, and therefore opposed it in the best interests of the public as a distinctly new departure. There was already a poison schedule, and the Council went to the Government to get it enlarged. But the department said "No; you shall not do that, but on the contrary you shall recognize,"—at least, he supposed that was the purport of the communication—"that other people may deal in these things." It was mere nonsense to say that oil of vitriol was not as poisonous as oxalic acid or strychnine; he would rather swallow an ounce of strychnine than an ounce of sulphuric acid. What was the use of selling a groom chloride of antimony labelled "poisonous"? It would not prevent his buying it. It was now proposed to allow anybody to sell a groom chloride of antimony, and the groom did not care a straw for the label. He got the thing he wanted to give to the horse surreptitiously. On the other hand, if he had to go to the Vice-President's establishment to get it he would be very likely told he had better not have it, and if he insisted it might be refused. He objected to anyone being allowed to go to a blacksmith's shop and buy chloride of antimony under the idea that placing the word "poisonous" upon it was a sufficient precaution. It appeared to him that this was a distinct departure from the principle hitherto acted upon.

The Vice-President appealed to Mr. Schacht to withdraw the amendment, so that the Council might go to the department with a united front.

Mr. Schacht said he was in the hands of the President. Of course it would be hopeless to press the amendment, and if it were desired he should not object to withdraw it.

The President said if he were appealed to he must say that in his opinion it would be most fitting for Mr. Schacht to withdraw the amendment.

The motion was then put and carried *nem. con.*

FINANCE.

The report of this Committee was received and adopted and sundry accounts were ordered to be paid. Amongst the subscriptions towards the Benevolent Fund was a sum of twenty guineas from the Committee of the Chemists' Ball, and the President stated that he had reason to believe that a similar sum would be handed over by the Committee of the Junior Pharmacy Ball.

Mr. Schacht drew attention to an item of £18 12*s*. 6*d*. for cleaning two pictures in the Museum.

The Council went into committee to discuss this item, and also the question of the investment of part of the Society's funds at a higher rate of interest. It was arranged that this subject should be brought before the Committee at its next meeting, at which Mr. Butt was requested to be present.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£20 to a pharmaceutical chemist member from 1842 to last year, aged 82.

£20 to a pharmaceutical chemist member for many years, aged 62.

£10 to the widow of a former member.

£5 to a former associate of the Society, aged 58, who is out of employment.

£10 to the widow of a registered chemist and druggist.

£20 to the widow of a chemist and druggist to aid in getting a child into an orphan asylum. 2 previous grants of £15 each.

£5 to a registered chemist and druggist aged 60.

£5 to a registered chemist and druggist aged 59.

£5 to a registered chemist and druggist who has had eight previous grants.

£10 to a registered chemist and druggist, to assist him to emigrate.

£10 to the widow of a registered chemist and druggist, aged 32.

£10 to the widow of a registered chemist and druggist, aged 59.

£10 to the widow of a registered chemist and druggist, aged 62.

£10 to the Secretary's Casual Fund.

A letter was read from Mr. Houghton, who has charge of two of the Isherwood orphans, stating that he hoped to get the eldest boy into a wholesale house in the city before long.

Several other cases had been submitted to the Committee which had not been entertained.

This report was read in committee; on resuming the report and recommendations were unanimously adopted.

Vote of Thanks to the Local Secretaries.

It was moved by the Treasurer and carried unanimously:—

"That the best thanks of this Council be given to the Society's Local Secretaries for their efforts last year on behalf of the Benevolent Fund in making a personal canvass, accompanied by one or more members of the trade, and that they be earnestly requested to renew their efforts in the same direction this year."

LIBRARY, MUSEUM, LABORATORY, AND HOUSE.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
December	Day	414	30	1	17
	Evening	124	18	2	8
Year 1882.	Day	4260	33	0	15
	Evening	1513	19	1	7

Circulation of books.	Town.	Country.	Total.
	No. of Entries.		
December	144	113	257
Year 1882	1806	1444	3350

Carriage paid.

December	£1 10*s*. 5*d*.
Year 1882	£23 9*s*. 10*d*.

The following Donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Accum (F.), Chemical Amusement, 4th ed., 1819.
From Mr. Joseph Stapleton.

British Pharmaceutical Conference, Year-Book of pharmacy, 1882. 2 *copies*. From the Conference.

Gorkom (K. W. van), Handbook of Cinchona Culture, translated by B. D. Jackson, 1883.
From Messrs. Trübner and Co., the Publishers.

Hooker (J. D.), Flora of British India, part 9.
From H.M. Secretary of State for India.

Méhu (C.), Sur l'extraction des matières colorantes des urines bleues (indigotine et indirubine), 1882.
From the Author.

Meyer (A.), Über Chlorophyllkörner, Stärkebildner und Farbkörper, 1882. From the Author.

New York State Pharmaceutical Association, Proceedings, 1880, 1882. From the Association.

Pennsylvania Pharmaceutical Association, Proceedings, 1880. From the ASSOCIATION.
Stocken (J.), Elements of Dental Materia Medica, 3rd ed., 1882. From the AUTHOR.

Curator's Report.

The Curator had reported the attendance in the Museum during December to have been:—

	Total.	Highest.	Lowest.	Average.
Morning	240	25	1	12
Evening	36	5	0	2

The following Donations to the Museum had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimens of Crystallized Xanthate of Potassium. From Mr. F. H. ALCOCK.

Specimens of the Leaves of *Eucalyptus globulus*, from which the oil previously presented was prepared. From Messrs. WARRICK BROTHERS.

Specimens of the Fruit of *Pterocarpus guianensis*, used in skin diseases. From Dr. H. E. CAUTY, Liverpool.

Specimens of the Root of *Tephrosia macropoda*, *Sium Thunbergii*, and of a native root called *Umundi*, of a bark called *Isibaha* and three bottles of Aloe Juice. From Mr. J. M. WOOD, Curator of the Botanical Gardens, Natal.

Specimens of Crystallized Naphthalene and of Naphthol. From Messrs. DOMEIER and Co.

Herbarium specimens of two varieties of the Damiana plant. From Messrs. PARKE DAVIS and Co.

A specimen of Ispahan opium had been purchased for the Museum.

The Professors had attended the Committee and reported satisfactorily of their respective classes.

Sundry applications had been received for loans of specimens, which had been acceded to.

Mr. HAMPSON asked if anything had been done lately respecting wood pavement in Great Russell Street.

The PRESIDENT said he had every reason to hope that this much-needed improvement would soon be carried out.

Mr. GREENISH drew attention to the gratifying fact that the attendance in the Library and Museum had lately been gradually increasing.

The report and recommendations of the Committee were received and adopted.

GENERAL PURPOSES.

This report, which, as usual, was read in Committee, included the monthly letter from the Solicitor as to cases which had been placed in his hands for prosecution. He reported that—

Sinton Michael Honan, 90, King Street, Hammersmith, had paid the penalty and costs.

George Theodore Imeson, 172, Caledonian Road, had paid the penalty and costs into court.

Also that execution had been issued in the case of—

James Kelsall, of 33, Sandy Lane, Stockport,

for the recovery of penalty and costs, but that "the officer of the court had reported that Kelsall had sold up and left the place."*

Several cases of alleged infringement of the Pharmacy Act were recommended for prosecution, and in the case of a member of the Society, who was reported to be practising medicine in the treatment of venereal diseases, etc., it was recommended that in accordance with the bye-laws, section xvii., the Secretary should be instructed to write to him for an explanation.

The report and recommendations of the Committee were received and adopted.

* This was the case reported in the *Pharmaceutical Journal* for November 18 last, p. 410.

REPORT OF EXAMINATIONS.

January, 1883.

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major (24th)	4	2	2
Minor (24th)	8	4	4
„ (25th)	11	6	5
„ (26th)	10	4	6
	—29	—14	—15
	33	16	17

Preliminary Examination.

Candidates. Examined.	Passed.	Failed.
331	194	137

Seven certificates were received in lieu of the Society's examination:—

4 College of Preceptors.
2 University of Cambridge.
1 „ Oxford.

The PRESIDENT said it might be interesting to read a letter which had been written by a former Bell Scholar, having reference to the examinations. It was always pleasant to find that the good intentions of those who had given money for educational purposes had not been mis-spent.

The letter spoke in the highest terms of the advantages which the writer had derived from the educational training he had received in the School at Bloomsbury Square.

THE ANNUAL MEETING.

The VICE-PRESIDENT, who had given notice of motion for holding the Annual Meeting and Conversazione, said he found that the usual day would fall at Whitsuntide, which would be inconvenient to many country members, and tend to prevent so large an attendance as usual. He therefore moved—

"That the Annual General Meeting of the Society be held on Wednesday, May 23, at 12 o'clock precisely, to receive the report of the Council; and to elect the Council and Auditors for the ensuing year."

"That a Conversazione be held on Wednesday, May 23 next. That the President, Vice-President, Treasurer, Messrs. Butt, Greenish and Squire, be appointed a Committee to carry out the necessary arrangements; and that the Secretary be instructed to apply to the Lords of the Privy Council for permission to hold the Conversazione in the Museum as usual."

The resolutions were carried unaminously.

PRELIMINARY EXAMINATION.

The PRESIDENT said he had received a communication from the Sub-Warden of Durham University, enclosing a scheme of examination which it was proposed to establish as a preliminary examination for any professional career, and asking if it would be accepted in lieu of the Preliminary Examination of the Pharmaceutical Society. He had examined the syllabus, which seemed excellent in every way, and suggested that he be authorized to state that the examination would be accepted.

This was unanimously agreed to.

A letter was also read from Mr. J. Clower, enclosing a list of subscriptions to the Benevolent Fund amounting to £1 17*s*. 6*d*., which he had collected from Chemists' Assistants in Leamington.

Parliamentary and Law Proceedings.

Substitution of Sulphate of Cinchonidine for Sulphate of Quinine.

At the Bradford West Riding Police Court, on December 28, Joseph Walker, chemist and druggist, of Chapeltown, Pudsey, was summoned for selling a prescription different to what had been prescribed.

Superintendent Symonds said that from complaints received he sent a man to the defendant's shop with a prescription, and after receiving it he sent it to Mr. Allen, the analyst, Sheffield, who had sent back the following certificate:—The sample had not been dispensed in accordance with the prescription. It contained little, if any, real sulphate of quinine, the most important remedy prescribed. It contained, apparently as a substitute, sulphate of cinchonidine, to the amount of nearly half a drachm, or 30 grains in the 8 fluid ounces, or in the same proportion as sulphate of quinine was ordered. Cinchonidine was a body presenting many resemblances to quinine, but of much lower commercial value, as it was commonly considered to have inferior medicinal properties.

The defendant said that he was getting old and could scarcely see. On the 3rd inst., when the man came to his house, and asked for the prescription to be made up, he had had a very restless night, and was aroused out of bed by his wife; it was by a mistake that the wrong quinine was sold.

The Chairman said he had made his case worse by stating that he could scarcely see, as he had shown that he was not a fit man to be in a place to mix medicines for the public.

Defendant said that it was very seldom that a prescription came in the country.

The Chairman: And very lucky too.

The defendant said he hoped the bench would deal leniently with him.

The Chairman said that the defendant had made himself liable to a penalty of £20, but taking all into consideration, the case would be met with a fine of £5 and costs.—*Bradford Daily Chronicle.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Permanganate of Potash Pills.

Sir,—From an old story, whose date is coeval with the early days of chemistry, we learn that it was the boast of some devotees of this science, that by the use of a given quantity of sulphur, nitre and charcoal fire might be brought down from Heaven; but the significant postulate was added, "If you only know the way." Little did I think, when I forwarded you my mite of information, that 2 grains of permanganate of potash could be successfully mixed with the same quantity of powdered sugar in order to form an excipient, that I would thereby bring down the ire of Mr. Hart (no disciple obviously of Dalton), the sarcasm of Mr. Corder, and ironical compliments from Chester. The nature of the combined remarks might justly call for a reply to each, after its kind, but I forbear. I would rather commend to all your correspondents Mr. Corder's own recommendation, "Try again," in the hope that they may meet with more success, and in particular, that Mr. Hart may, thereafter, breathe with his wonted freedom. I confidently state that the pills were prepared as formerly described without any sign of combustion. They were also readily soluble in cold water, and, after subsiding, gave a distinct permanganate of potash colour and taste. Since then the process has been repeated several times with the same results. But in order to discern some of the wonderful results given by two of your correspondents, another sample of sugar was tried, and with care, pills were also prepared, which exhibited no signs of combustion. At the same time, when roughly handled and removed from the mortar with an iron or horn knife, a mild form of combustion was produced. In my former letter, I merely stated the result of my observations, and how the pills could be prepared. This I repeat. I decline, however, to enter upon any other question, while I do not consider myself called upon to account for the failures of others.

Edinburgh. James Mackenzie.

*** We insert the foregoing letter simply for the satisfaction of Mr. Mackenzie, though we do not think it would be conducive to that of our readers if they were so unwise as to follow the lead of his senior apprentice.—Ed. Ph. J.

Sir,—It being necessary that permanganate of potash be taken in a tasteless form, I would suggest that it be powdered and enclosed in ordinary gelatine capsules. Three grains of the salt can, with a little trouble, be compressed into a capsule no larger than an ordinary 5 grain pill, and in this form would undergo no decomposition.

London, W. W. H. Thomas.

Pungent Liniment of Iodine.

Sir,—Mr. MacEwan's note on the above is well worth the attention of any pharmacist who may be in the habit of preparing B.P. liniments with methyl alcohol.

Some years ago, when using liniment of iodine for articular rheumatism, I was very much annoyed with the pungent odour which it emitted, and which, to the eyes, was very irritating. The liniment I used was made with methyl alcohol, which Mr. MacEwan has proved to be an objectionable (and consequently unjustifiable) modification of the official formula.

Query—Is a chemist justified in using methylated alcohol in the preparation of any of the B.P. liniments?

John.

*** The use of methylated spirit in the preparation of medicines is restricted by law to those which are not capable of being administered internally; but even such preparations should not be made with it except with the cognizance of the persons ordering them.—Ed. Ph. J.

F. W. Doubleday.—Your letter has been handed to the Secretary, to whom all complaints as to non-delivery of Journal should be addressed.

Inquirer.—It does not appear probable that if such a contract were entered into by a Minor it could be enforced. But the question is one that should be submitted to a solicitor.

Frank C.—Your letter has been handed to the Secretary, who will forward to you the required information.

Nemo.—We do not think there is any pharmacy law in force in the State mentioned.

G. K.—Decoct. Aloes Co.

Veritas.—The mixture when recently prepared is not clear, the opacity being due to separation of the resinous matter of the tinctures, which subsides as a flocculent precipitate. There is no apparent decomposition in the mixture of liq. bismuthi and solution of sodæ bicarb. The liquor bismuthi used should be the B.P. preparation.

F. S. S.—A flocculent separation of colouring matter takes place and crystals of a salt of quinine appear to be formed; but the whole mixture should not become a solid mass.

W. F. Garry.—An answer to your question appeared in the number for Dec. 23. See before, in the present volume, pp. 90, 156 and 510.

Communications, Letters, etc., have been received from Messrs. Llewellyn, Johnson, Davis, Rees, Pollard, Sampson, Martin, Bradley, Warden, Vincent, Thomas, Powell, Kermath, Hetherington, Dodd, Paris, Inquirer, Alpha, Assistant, Local Assistant, H. M. H., W. G. W.

AROMATIC SPIRIT OF AMMONIA.*

BY DR. THRESH,
Pharmaceutical Chemist.

History.—An aromatic spirit of ammonia appears for the first time in the Pharmacopœia Londinensis in the issue of 1721. Under "Medicamenta Chymica" is a "spiritus salis volatilis oleosus," prepared by distilling a mixture of cinnamon, mace, cloves, citron, sal ammoniac, salts of tartar and spirit of wine. In the 1746 edition the name is changed to "spiritus volatilis aromaticus," and the method of preparation is very different, for a "spiritus salis ammoniaci dulcis" is first made by distilling fixed alkali with sal ammoniac and proof spirit, and to this is added the essential oils of lemon, nutmegs and cloves, and the whole is again distilled. These are placed amongst the "Sales et Salina." In 1788 the name and mode of preparation are again altered. A "spiritus ammoniæ" is made by distillation and in this the oils of lemon and nutmeg are simply dissolved, forming "spiritus ammoniæ compositus." This is placed in the "Misturæ." In 1809 the name becomes "spiritus ammoniæ aromaticus," but the mode of preparation remains the same. In 1824 the compound bearing this name was ordered to be made in the same way as the "spiritus salis volatilis oleosus" of 1721, the mace being omitted and lemon substituted for citron. The alteration in the P.L. of 1836 was less than in any previous edition, the name remaining the same, the mixture to be distilled varying from that of the 1821 edition only in the strength of the spirit. Finally, in 1851, the proportions of nearly all the ingredients are altered, but no change is made in the method of preparation.

In the Edinburgh Pharmacopœia of 1722 occurs "spiritus salinus aromaticus" made by distilling a tincture of angelica, galangal, marjoram, anthos flowers, cinnamon, cloves, mace, nutmegs, orange and citron with salts of tartar and sal ammoniac. In 1792 the name becomes "sp. amon. ar. vulgo sp. salinus aromaticus," and the preparation is made by dissolving the oils of lemon and rosemary in a distilled spirit containing ammonium bicarbonate. In 1803 the same preparation occurs, but under the name of "alcohol ammoniatum aromaticum," which is changed in 1817 to "tinctura aromatica ammoniata." In 1839 the name again becomes "spiritus ammoniæ aromaticus" and the character of the article is somewhat altered, since the spiritus ammoniæ from which the compound spirit is made by addition of the essential oils of rosemary and lemon, contained *free* ammonia only.

The Dublin Pharmacopœia in 1807 contained a "spiritus ammoniæ aromaticus," and although in every subsequent issue the mode of preparation was altered the name was retained unchanged. In 1807 it was ordered to be made by distilling a dilute spirit with muriate of ammonia and wood ashes, adding bruised nutmegs and oil of lemon, and again distilling. In 1827 carbonate of ammonia (3½ ounces) was ordered to be dissolved in rectified spirit (3 pints); then after maceration with cinnamon and nutmeg and addition of lemon oil the mixture was distilled. This method was discarded in 1850, and distillation entirely dispensed with, a strong solution of ammonia being simply mixed with rectified spirit in which the oils of lemon, nutmeg and cinnamon had been dissolved.

Official Processes.—It will be observed that at the time when the British Pharmacopœia was compiled, there were in the British Isles three official aromatic spirits of ammonia, differing in flavour, strength, and in mode of preparation, and that in all the Pharmacopœias the processes given for the production of this medicament had varied with nearly every issue. At the present time compounds corresponding to our "spiritus ammoniæ aromaticus," B.P., are to be found in the U.S.P., the French Codex, and the Ph. Belg., all made by dissimilar processes. As the principal object of this communication is to point out a method of making this important galenical preferable to any yet adopted, it may be of interest to give somewhat more in detail the various processes and formulæ which the compilers of the above Pharmacopœias believed to be the best, after duly considering the experience of the two previous centuries.

The formula of the B.P. is too familiar to need quoting.

The sp. ammon. ar. of the new United States Pharmacopœia, which differs only very slightly from that of the previous edition, is ordered to be made as follows:—

"Take of

Carbonate of ammonia .	40	parts by weight
Water of ammonia . .	100	"
Oil of lemon	12	"
Oil of lavender	1	"
Oil of pimento	1	"
Alcohol recently distilled and which has been kept in a glass vessel . . .	700	"
Water	146	"

"To the water of ammonia contained in a flask, add 140 parts of distilled water, and afterwards the carbonate of ammonia reduced to moderately fine powder. Close the flask and agitate the contents until the carbonate is dissolved.

"Weigh the alcohol in a tared flask of suitable capacity, add the oils, then gradually the solution of carbonate of ammonia, and afterwards sufficient distilled water to make the product weigh 1000 parts. Lastly filter the liquid, through paper, in a well covered funnel.

"Keep the product in glass stoppered bottles in a cool place.

"A nearly colourless liquid when freshly prepared, gradually acquiring a slightly darker tint, of an aromatic, pungent, ammoniacal odour, and having a sp. gr. of about ·885."

In the French Codex we have—

"*Alcoholat aromatique ammoniacal.*

Ecorces fraîches d'orange . .	100	grammes
Ecorces fraîches de citron . .	100	"
Vanille	30	"
Cannelle de Ceylan	15	"
Girofles	10	"
Chlorhydrate d'ammonique .	500	"
Carbonate de potasse	500	"
Eau distillée de cannelle . . .	500	"
Alcool à 80° (·864)	500	"

"Incisez les écorces d'orange et de citron ainsi que la vanille; concassez la cannelle et les girofles, et introduisez le tout dans une cornue de verre, avec le sel ammoniac, l'eau de cannelle et l'alcool. Laissez macérer pendant trois ou quatre jours, en agitant de temps en temps. Ajoutez le carbonate de potasse; mélangez exactement, et, apres quelques heures distillez au bain-marie pour retirer 500 grammes d'alcoolat aromatique.

* Read at an Evening Meeting of the Pharmaceutical Society, February 7, 1883.

"Cet alcoolat se colore assez promptement à la lumière. Il faut le conserver dans des flacons de petite capacité, bouchés à l'émeri."

The Belgian spirit is called—

Alcoholetum aromaticum ammoniacale.

and is prepared as follows:—

"Alcoholat aromatique	920
Ammoniaque liquide	50
Carbonate d'ammoniaque pulvérisé	20
Huile essentielle de girofles	2
Huile essentielle de macis	2
Huile essentielle de marjolaine	2
Huile essentielle de citron	4

"Mêlez le tout dans un flacon bouché à l'émeri et secouez pour obtenir un solution homogène."

The "alcoholat aromatique" is obtained by distilling a tincture of marjoram, cinnamon, nutmeg, cloves and coriander.

Comparison of Typical Processes.—The method official in the Codex is one of the oldest and most defective. The product is very variable and contains much free ammonia produced by dissociation of the carbonate. It rapidly becomes coloured by the action of light, and contains less than 70 per cent. of absolute alcohol. As the process is unscientific, yields a defective product, and has consequently been discarded by all other Pharmacopœias, it does not require further notice.

The process official in the United States has the great advantage of dispensing entirely with distillation, and should yield a product of perfectly definite strength. Unfortunately in the new Pharmacopœia the "alcohol" is ordered of sp. gr. ·820, and therefore containing about 91 per cent. of absolute alcohol by weight, whereas in the last Pharmacopœia the "alcohol" was of same strength as our rectified spirit. With spirit of 84 per cent. all the carbonate of ammonia remained dissolved when the solution was added, whatever might be the temperature at the time; but with this stronger spirit I find that at 50° F. a considerable amount of ammonium carbonate is deposited when the two fluids are mixed. If put in a warm place (temperature 70° F.) for a short time, however, the carbonate is dissolved, but upon cooling a portion is redeposited. When made with the alcohol, sp. gr. ·834, of the last Pharmacopœia, the whole of the salt remains in solution at 32° F. Even with the stronger alcohol, if the solution of ammonium carbonate be heated to 150° for a few minutes, and then when cold added to the spirit, no precipitate is formed.

When all the salt is in solution this aromatic spirit contains 4·88 per cent. of normal ammonium carbonate, and ·42 per cent. of free ammonia, together with 63·4 per cent. of absolute alcohol. The spirit of the last edition contained only 59·5 per cent. of alcohol.

The only real objection to this process is that by keeping the spirit becomes discoloured. In my opinion also the aroma of a sal volatile made in this way is not so fragrant as it is when prepared by distilling the spirit and essential oils together.

The Belgian process resembles somewhat that of the United States, differing only in the fact that a distilled aromatic spirit is employed as the menstruum instead of plain spirit. Inasmuch as essential oils are afterwards added to the spirit, together with the ammonia salt the same objections apply to this process as to the previous one. It contains 2·4 per cent. of ammonium carbonate, ·6 per cent. of free ammonia and 62·1 per cent. absolute alcohol.

The B.P. spiritus ammoniæ aromaticus differs from all the above in being prepared entirely by distillation. It would appear as if the compilers of the Pharmacopœia had intended the finished product to contain 8 per cent. of normal ammonium carbonate and no free ammonia; but, inasmuch as it contains 67·7 per cent. of absolute alcohol, 4 per cent. of ammonium carbonate is the maximum amount it can hold in solution, and to obtain it of this strength it is necessary to operate on small quantities, and observe a number of precautions during the distillation; the remainder of the ammonia is then found dissolved in the free state, the carbonic acid corresponding thereto having escaped. A very considerable experience in the manufacture of this article in quantities of from 1 to 4 gallons has led me to form the following conclusion:—

1st. That the product varies considerably in strength and in relative proportions of ammonia and ammonium carbonate, this variation depending upon the quantity of material operated upon, the rapidity with which the distillation is conducted, and probably upon other factors.

2nd. That the larger the quantity of spirit distilled the poorer is the product in carbonic acid.

3rd. That working with the B.P. quantities *in warm weather*, and employing every precaution to prevent loss of ammonia, and to transfer all the carbonate deposited in the condenser into the distillate, the product will contain 4 per cent. Am_2CO_3, and 1·42 per cent. NH_3.

4th. That in cold weather the solution thus made deposits crystals of the ammonium carbonate. If made in winter, the whole of the salt condensed in the worm does not dissolve when shaken with the distillate, unless the latter is heated. Of course, upon cooling, the excess again separates.

5th. That in the B.P. process from 1·4 to 1·6 per cent. of the spirit remains behind in the still. To obtain all the alcohol at least 7½ pints must be distilled.

These conclusions are fully substantiated by the results obtained upon the analysis of samples from the first pharmacies, and from manufacturers of the highest repute, which results were communicated to the Pharmaceutical Conference in 1880. With regard to appearance, aroma, and keeping qualities, our spiritus ammoniæ aromaticus leaves nothing to be desired, but in the more important matter of constancy in strength, it is anything but satisfactory.

As the numerous proposals which have been made to remedy this serious defect in the official process have all either been obviously inapplicable, or have not been submitted to the test of actual experiment, a series of experiments was planned and carried out in my laboratory. As a consequence, I most unhesitatingly condemn every process necessitating the distillation of the ammonium carbonate with the spirit. A number of samples of spirit of ammonia was prepared, in which the quantity of free ammonia and official carbonate used corresponded to from 0 to 1·5 per cent. of NH_3, and from 2 to 4 per cent. of $(NH_4)_2CO_3$ in the finished product. Invariably during the distillation CO_2 was lost, and the spirit was deficient in carbonate. This was the case, however the proportion of water and alcohol in the retort was varied, and whatever was the alcohol strength of the distillate. The suggestion to make the B.P. spirit without distillation has been offered by several pharmacists, but none of them have shown that this can be done. True, a sal volatile is ordered in both the Belgian and United States Pharmacopœias to be made without distillation, but both contain considerably less alcohol than our preparation. Taking the official quantities, the ammoniæ carbonas refuses to dissolve in the requisite amount of water and solution of ammonia without the aid of heat, and of that which does so dissolve *nearly the whole* is thrown out of solution on addition of the spirit. When, however, the solution has been effected by the aid of heat in a securely closed vessel, the addition of the alcohol causes, at ordinary temperatures, the precipitation of only about half the ammonia as normal carbonate, the other half remaining in solution also as normal carbonate. When the proportions of ammonia and ammonium carbonate employed are such as to yield a product containing 4 per cent. of normal carbonate, the aqueous solution prepared without heat precipitates copiously on the addition of the spirit; but when the salt and dilute ammonia have been heated in a tightly corked bottle to about 150°, and then when cold mixed with the spirit, only a small quantity of the normal carbonate, depending upon the temperature, is thrown down. Evidently, therefore, when the official carbonate is dissolved in cold dilute ammonia it does not combine with the free NH_3 to form the normal carbonate until heat is applied. The further application of heat then, in either alcoholic or aqueous solution, causes at least partial dissociation and evolution of CO_2. As yet the temperature limits at which the combination of the ammonia and acid carbonate takes place and the rapidity of the combination at any given temperature have not been observed.

Using a more dilute spirit an alcoholic solution can be prepared without the aid of heat, which will contain at 0°, 4 per cent. of normal carbonate or its equivalent of acid carbonate. This was done in the last U.S.P. by adding so much spirit to the aqueous solution that the product contains 59 per cent. of alcohol, or 9 per cent. *less* than is contained in our sal volatile. The process of the Belgian Pharmacopœia also yields a product of reliable strength, but neither this nor the spirit official in the United States is equal to our own in appearance, aroma, and keeping qualities. It would serve no useful purpose to recount all the experiments made to produce a sal volatile having the advantages with regard to aroma, etc., of the one, and the definite composition of the others, by a process which should also entail no loss of alcohol in the distillation. The formula which appears to me to be the most likely to supersede the present one is as follows:—

Take of

Oil of lemons	℥viss.
Oil of nutmeg	ʒivss.
Rectified spirit	6 pints.
Water	3 pints.

Distil 7 pints, set this apart; then continue the distillation until 9 ounces more have been collected.

Take of

Ammonium carbonate	4 ozs.
Stronger solution of ammonia	8 „
The last portion of above distillate . .	9 „

Place in a bottle holding a little more than 1 pint, cork securely, and place the bottle in a water-bath at about 140° F.,* shaking from time to time until all the salt has dissolved. When cold, filter if necessary through a little wool, and pour into it gradually the seven pints of distilled spirit.

The product will measure 1 gallon; its specific gravity is ·886, and it contains 3·45 per cent. of normal ammonium carbonate and 1·23 per cent. of free ammonia. Whilst not quite so strong as it is possible to make a spirit of ammonia by the official process, it is considerably above the average strengh of the sal volatiles of commerce. From the more dilute character of the spirit none of the carbonate is thrown out of solution even at 0° C., and by the continuing the distillation a little beyond the point now ordered (in the B.P.), the whole of alcohol is contained in the finished product instead of a portion being wasted as heretofore.

One fluid ounce requires for neutralization 558 gr. measures of the volumetric solution of oxalic acid, and the same quantity after the addition of 330 grain measures of solution of barium cloride (1 in 10) should yield when filtered a further precipitate when more of the reagent is added.

Doubtless this formula may be varied in many ways, but so far as my experience goes, it is the one which is most likely to give general satisfaction. Probably many would prefer to be able to purchase the spiritus aromaticus, and add thereto the solution of ammonium carbonate. Should it be deemed advisable to encourage this, 7 parts only need be distilled, and water used for dissolving the salts. To form the sp. am. ar. it would then only be necessary to add 7 parts of the spirit to 1 of the alkaline solution, and this product would not appreciably differ from that made by the beforementioned process. The loss of alcohol (on an average 1½ ounce) would be the same as in the process at present official.

For comparison, the results obtained by analysis of a sample of sp. am. co., made by the method here recommended, are given, together with the mean of the results obtained from nineteen B.P. samples examined in 1880.

	Free NH_3 per cent.	Am_2CO_3 per cent.	Total, NH_3 per cent.
New process . .	1·25	3·53	2·49
B.P. process (means of nineteen samples)	1·33	1·88	1·99

[*The discussion on this paper is printed at p.* 674.]

AN APPARATUS FOR CONTINUOUS EXTRACTION.†

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During an investigation which necessitated speedy and thorough exhaustion, trial was made of the principal forms of apparatus proposed for this purpose, and which admitted of construction out of the materials ordinarily found in a chemical laboratory. Among these was the second apparatus proposed by B. Tollens (*Zeits. f. anal. Chem.*, xvii., 320). It consisted of two tubes, the larger one of which was

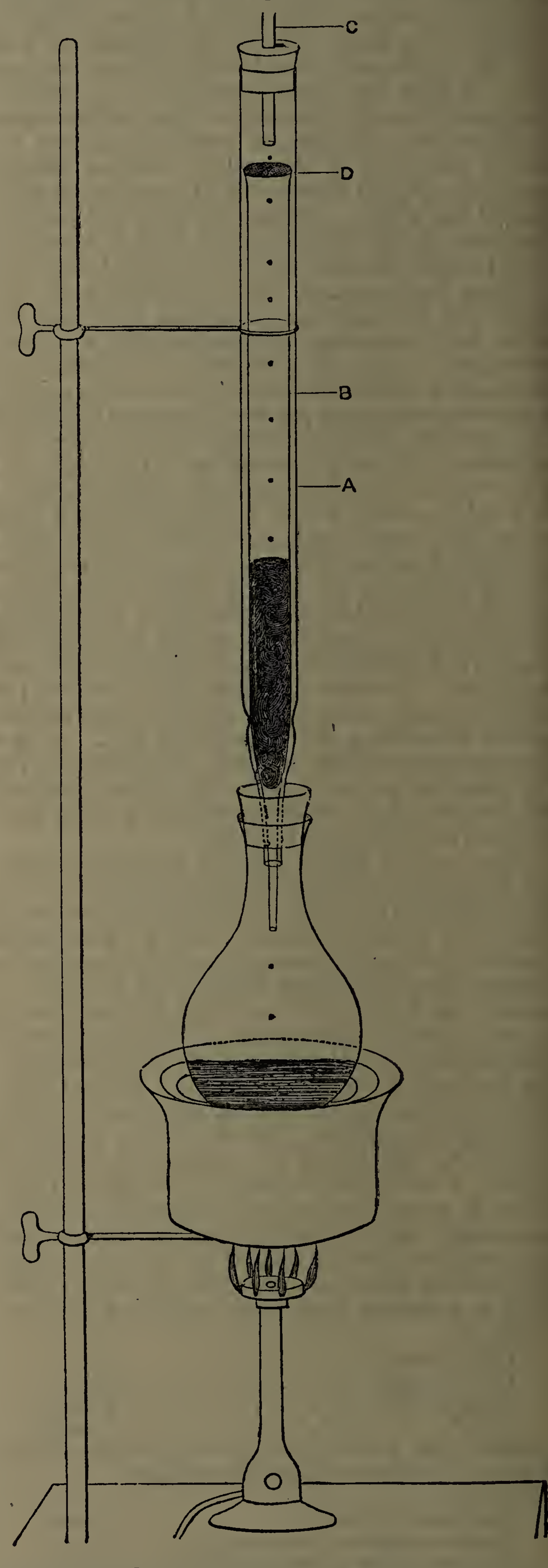
* Solution may be effected without the aid of heat, but not nearly so readily.

† Read at an Evening Meeting of the Pharmaceutical Society, February 7, 1883.

drawn out to pass through a cork in the ordinary way; the smaller tube was of a size which allowed it to fit with much margin into the larger tube, and was cut off straight at both ends, one end being tied over with a piece of filter paper. This tube was packed with the material and placed in the larger tube, so that the closed end rested upon a piece of curved glass rod placed across the contracted portion of the larger tube. This tube was then connected with a condenser. In the use of this apparatus many difficulties were experienced, which suggested the form of apparatus which we now describe. The principle is the same as that involved in the apparatus of Tollens, and, indeed, in many other forms of apparatus which have been used for a similar purpose. It differs in construction and in the fact that it can be used either for digestion, for repercolation, or for both at the same time, the whole operation being conducted at the boiling point of the solvent.

It consists of two tubes, A and B, the larger one being drawn out at one end to such a diameter as will admit of the smaller tube, which is also drawn out, passing through it. The outer tube is indented on each side, by which means two ledges are formed within the tube, which serve as supports for the smaller tube. This is easily accomplished by gently pressing each side of the tube when red hot by means of crucible tongs.*

The substance to be exhausted is placed in the inner tube, the narrow end of which has previously been plugged with a piece of cotton wool. A wire gauze cap, D, fits upon the other end of this tube and prevents possible ejection of the substance from the tube; the use of this cap, however, may usually be dispensed with. The outer tube containing the smaller tube is now connected with a flask by means of a cork though which the contracted portion of the tube passes, the other and open end being fitted with a cork and long upright tube C which acts as a condenser, its length depending upon the nature of the solvent operated with. The extent to which the inner tube is drawn out depends upon the purpose for which the apparatus is required. If drawn out to a fine point and allowed to pass someway beyond the rim of the outer tube the apparatus can be used for digestion. The vapour of the solvent will pass up the outer tube, and after condensation by the upright tube will drop into the inner tube, forming a column of liquid above the marc which will slowly permeate the substance, but while the liquid in the flask is boiling but little will return to the flask. In this way the substance is digested with the solvent at a temperature close upon the boiling point of the liquid. When the source of heat is removed the column of liquid will percolate through the marc into the flask, and the digestion can again be effected with a fresh portion of the solvent. If the inner tube be drawn out so that it extends only a short distance beyond the rim of the outer tube, as shown in the diagram, and its diameter is but little smaller, digestion and repercolation will go on together. The most advantageous way of using the apparatus is as follows:—The substance having been loosely packed in the inner tube and some of the solvent poured over it and the rest placed in the flask, heat is applied; the liquid in the state of vapour will pass up the outer tube and be condensed by the upright tube, the drops of liquid falling upon the substance and rapidly percolating through it into the flask. If the boiling be now continued fairly rapidly, the amount of liquid condensed in a given time will exceed that



which percolates through, with the result that a column of liquid will gradually form over the marc

* The tube A should not be too long or the vapour will be condensed to a greater or less extent in this tube before reaching the condenser C.

in the inner tube. When this has occurred it will be found that the vapour has made its way through the marc and is bubbling through the column of liquid, thus keeping the marc in an agitated condition, yet, be it observed, liquid is still dropping into the flask, which thus never becomes dry. This process of digestion and repercolation will now go on continuously, but the extraction is hastened if after a column of liquid has filled the inner tube, the apparatus be momentarily removed from the source of heat, when the liquid will quickly pass through the solid into the flask, after which heat can be again applied and the operation repeated. The apparatus may be made of any dimensions; an apparatus four times the size of the diagram has been found convenient for general laboratory use. Having made upwards of two hundred extractions with this apparatus, using different solvents, we have no hesitation in recommending it as an efficient apparatus for accomplishing complete exhaustion in a short space of time.

[*The discussion on this paper is printed at p.* 676.]

THE ASSAY OF NUX VOMICA.*

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It will be immediately obvious that the accurate estimation of the total alkaloids in nux vomica seeds is a matter of great importance, for upon the amount of alkaloid contained in the seeds depends the physiological activity of the tinctures and other pharmaceutical preparations made from them. Considering the fact that nux vomica contains one and probably two alkaloids of potent activity, it is somewhat surprising that so little work has been done in this direction. The present paper is the outcome of an investigation made with the view of perfecting a method which should be at once accurate in result and simple in procedure. Professor Dragendorff† has proposed extraction of the seeds in a finely powdered state by boiling with dilute sulphuric acid. This solution is treated with magnesia until nearly all the acid has been neutralized and evaporated. The mixture, which should be decidedly acid, is extracted with alcohol. The alcohol is distilled off and the aqueous residue shaken with benzene, after which the solution is rendered alkaline and the alkaloids extracted with chloroform or benzene. According to results quoted by the author, from experiments upon known quantities of strychnine and brucine, the process yields very satisfactory results. It seemed to us that a process might be devised which should be less long and intricate than this, by taking advantage of the extreme solubility of strychnine and brucine in chloroform. We first attempted directly to extract the alkaloids liberated by an alkali from the seeds by means of this solvent. In the light of the researches of Gal and Etard,‡ Shenstone§ and others, we avoided prolonged heating of the alkaloids in contact with strong acids and alkalies. Fifty grams of nux vomica were made into a paste with a solution of sodium carbonate containing 50 grams of crystallized sodium carbonate, the mixture being dried over a water-bath. It was then powdered and packed in a percolator and percolated with chloroform, which passed through nearly colourless. This was shaken with dilute sulphuric acid and the chloroform separated; when evaporated it left a large quantity of oil which was not at all bitter, thus indicating that the alkaloid had been completely extracted. The acid solution on standing deposited perfectly white crystals of the acid sulphates of strychnine and brucine. By this means we have obtained large quantities of these salts. It now remained to examine the extent to which extraction had been effected. Already about 200 c.c. of chloroform had slowly passed through the mixture yet the marc was intensely bitter. 200 c.c. more of chloroform were then added, but even after this had percolated the marc was intensely bitter. A smaller quantity of the nux vomica was next operated upon in a similar manner with no better result, 10 grams after percolation with 200 c.c. of chloroform being still intensely bitter. The quantity of sodium carbonate added was now doubled, 10 grams being mixed with 5 grams of nux vomica, chloroform was boiled with the mixture and poured off, the residue being treated successively with more chloroform. In this way six successive 25 c.c. of chloroform were employed and failed to render the marc free from bitterness. Experiments were now made in which calcium oxide and hydrate and barium oxide and hydrate were respectively used in place of the sodium carbonate but with no better result. Finally, the experiments with these different alkalies, including sodium carbonate, were repeated, using the extraction apparatus which we have described in a previous paper. After six hours' extraction the marcs were appreciably bitter. The marc containing sodium carbonate was extracted with dilute sulphuric acid until free from bitterness, the solution rendered alkaline with ammonia and the alkaloid extracted with chloroform; 0·10 per cent. was obtained. When calcium hydrate was used, in one experiment 0·108 per cent. of alkaloid was found remaining in the marc, in another 0·1 per cent. The chloroform which had been used in the experiment with sodium carbonate deposited a soap on cooling; with calcium hydrate this was not noticed. Thus it was clear that another solvent was required in order to completely extract the alkaloid from the seeds.

Five grams of nux vomica prepared with sodium carbonate were extracted with the aid of the extraction apparatus by a mixture of equal parts of chloroform and alcohol. The marc was absolutely free from bitterness; the operation occupying about one hour. The mixture of chloroform and alcohol was shaken with dilute sulphuric acid, two separate ounces of a ten per cent. solution of sulphuric acid being used. The chloroform solution after evaporation left a residue which was distinctly bitter, hence the quantity of acid had been insufficient to extract the whole of the alkaloid from the mixture of chloroform and alcohol. Thus while the difficulty of completely extracting the seeds had been overcome, another difficulty had made its appearance. Experiments were next made where

* Read at an Evening Meeting of the Pharmaceutical Society, February 7, 1883.
† *Die Chemische Werthbestimmung einiger Starkwirkender Droguen.* St. Petersburg, 1874.
‡ *Bull. Soc. Chim.*, [2], 31, 98.
§ *Journ. Chem. Soc.*, xxxix., 453.

extraction was effected, and completely effected, by chloroform containing respectively 40, 30 and 25 per cent. of alcohol. In the first two cases the extraction of the chloroform by dilute acid was effected, but with some difficulty; with the mixture containing 25 per cent. of alcohol it was at once accomplished. After some further experiments upon points of manipulation we adopted the following process. Five grams of the finely powdered nux vomica is made into a paste with a solution containing five grams of crystallized sodium carbonate; the mixture is spread on a plate, and dried over a water-bath. It is then powdered, placed in the extraction apparatus, and exhausted with 40 c.c. of chloroform containing 25 per cent. by volume of alcohol. This operation usually takes between one and two hours. The chloroform is then shaken with 25 c.c. of dilute sulphuric acid (5 per cent.) in a separating funnel, the chloroform is separated, and again shaken with half-an-ounce of the dilute acid. The mixed acid solutions are now filtered, if necessary, rendered alkaline with ammonia, and shaken with chloroform in a separating funnel, the chloroform is then evaporated to dryness over a water-bath, and the residue weighed when constant. If the chloroform is at all turbid it should be filtered before evaporation. In this way the alkaloids are obtained in a fused condition having a pale yellow colour. The residue totally dissolves in dilute sulphuric acid, from which the acid sulphates are deposited in perfectly white crystals. A genuine sample of nux vomica seeds, estimated in this way, yielded 2·67 per cent. of total alkaloid. Dragendorff* found in various specimens from 1·65 to 2·88 per cent. Shenstone† isolated approximately rather more than 2·25 per cent. This process then was, in result, satisfactory; the treatment, however, with sodium carbonate was somewhat tedious, and we therefore commenced a new series of experiments with various solvents to endeavour to extract the alkaloidal salts direct from the seeds.

Five grams of nux vomica were treated in the extraction apparatus with 65 c.c. of alcohol, the operation being allowed to proceed for two hours. The marc was still decidedly bitter, and the alcoholic liquid much coloured. The alcohol was partially distilled off and the residue mixed with chloroform; this solution was now shaken with dilute sulphuric acid and the acid liquid, after the addition of ammonia, again treated with chloroform. The solutions were all much coloured and impure; so, also, was the final residue. Thus alcohol alone is an inefficient solvent, both on account of the length of time required for complete extraction and of the amount of matter other than alkaloid which is dissolved by it. Five grams of nux vomica were extracted with 65 c.c. of chloroform for three hours. The marc was slightly bitter, but it was evident that nearly the whole of the alkaloidal salt had been extracted. The chloroformic solution was treated with dilute sulphuric acid, the mixture being well shaken. The chloroform after evaporation left a large quantity of oil which was not at all bitter, indicating that the sulphuric acid had completely converted the alkaloidal salts into sulphates. The acid solution after the addition of ammonia and agitation with chloroform yielded the alkaloids in a pale yellow fused condition. This experiment had shown that chloroform alone was not a good solvent, and having experienced the difficulty before, an experiment was made in which a mixture of alcohol and chloroform was used. Five grams of nux vomica were exhausted in the extraction apparatus with 40 c.c. of chloroform containing 25 per cent. of alcohol. In less than two hours the seeds were entirely exhausted, the marc being absolutely free from bitterness. The solution was treated with dilute sulphuric acid and afterwards with ammonia and chloroform in the usual way. A nearly white residue of alkaloids was obtained, which totally dissolved in dilute sulphuric acid. It now remained to quantitatively determine whether this residue, which weighed 0·161 gram, consisted wholly of alkaloid. After solution in a small quantity of dilute sulphuric acid, tannic acid was added until a precipitate ceased to fall. The precipitate, after washing, was dissolved in ammonia and shaken with chloroform, when 0·1566 of alkaloid was obtained. This process with tannic acid is not altogether a satisfactory one. It is extremely difficult to completely precipitate the alkaloids by its means from acid solutions, and from the solution of the tannates in ammonia the chloroform separates with much difficulty. These experimental difficulties are sufficient to account for the small loss that occurred in the preceding experiment.

Hence this direct method for the estimation of the alkaloids in nux vomica proved satisfactory. In detail the method is as follows:—5 grams of the finely powdered nux vomica seeds are packed in the inner tube of the extraction apparatus and exhausted by 40 c.c. of chloroform containing 25 per cent. of alcohol. This is usually accomplished in one or two hours. The solution thus obtained is well agitated with 25 c.c. of a 10 per cent. solution of sulphuric acid. The separation of the chloroform is much aided by gently warming the mixture on a water-bath. After repeated agitation the chloroform is separated by means of a funnel and again shaken with 15 c.c. of dilute sulphuric acid. The mixed acid solutions, from which all the chloroform has separated, should, if necessary, be filtered,* then made alkaline with ammonia and shaken with 25 c.c. of chloroform in a separating funnel. After the chloroform has completely separated it is slowly run into a dish, evaporated and weighed after exposure for one hour on the water-bath, by which time it is usually constant in weight. It is sometimes necessary to filter the chloroform after separation from the alkaline liquid. In this way we have estimated the amount of alkaloid contained in samples of the powdered nux vomica of commerce, with the following results:—

I. 2·92 per cent.; II. 3·57 per cent.; III. 3·32 per cent.; IV. 3·38 per cent.; V. 2·56 per cent.

In conclusion, we wish to lay especial stress upon the use of a mixture of chloroform and alcohol for the extraction of the alkaloids, and upon the fact that chloroform is an inefficient solvent when used alone. We have already successfully applied the mixture to the extraction of other alkaloids which are soluble in chloroform, but only with difficulty extracted by it. It is doubtless capable of further extension.

* Work cited, p. 65.

† Paper cited.

* It not unfrequently happens that the acid solution is turbid, not from the presence of solid matter, but from suspended chloroform in a finely divided state. This may be removed by agitation with a small quantity of chloroform. It is manifestly important that the acid solution should be free from impure chloroform.

The process which we have described can probably be advantageously used for the extraction of the alkaloids upon the large scale. The acid sulphates can be prepared in a pure condition by merely shaking the chloroform-alcohol mixture with a small quantity of dilute sulphuric acid and gently warming. Upon cooling, the acid liquid deposits perfectly white crystals of the acid sulphate. The results of our examination of the nux vomica of commerce show that the specimens vary considerably in alkaloidal content. It is extremely desirable that a definite alkaloidal standard should be fixed for seeds intended for pharmaceutical use.

[*The discussion on this paper is printed at p.* 676.]

THE CONSTITUTION OF LIQUOR SODÆ CHLORATÆ.*

BY WYNDHAM R. DUNSTAN,

Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society,

AND F. RANSOM.

The liquor sodæ chloratæ of the British Pharmacopœia, which is made by passing chlorine gas into a solution of sodium carbonate, is usually stated to contain sodium hypochlorite and chloride, with sodium bicarbonate. From the observations of Williamson (*Mem. Chem. Soc.*, ii., 234), and also from the results of some experiments of our own upon the action of chlorine upon certain metallic oxides and carbonates, we were led to the conclusion that liquor sodæ chloratæ contained no sodium hypochlorite, but hypochlorous acid in the free state. The experiments which are here described were made with the object of ascertaining the validity of this conclusion and of investigating the chemical changes which occur. At the outset a difficulty was encountered by reason of there being no ready and reliable qualitative test for hypochlorous acid when mixed with other salts, especially with hypochlorites and carbonates. After a great number of experiments with various reagents it was found that hypochlorous acid was readily soluble in ether, and that it could be removed from its aqueous solution by means of this solvent. Hypochlorite of sodium is not soluble in ether. It should be noted that free chlorine is also soluble in ether; for this reason when this substance was present, the solution was freed from it by a current of air.

A solution of liquor sodæ chloratæ of the British Pharmacopœia was prepared according to the official directions, with the additional precaution of passing the chlorine through a wash bottle containing a saturated solution of copper sulphate, by which means the gas was freed from the hydrochloric acid with which it is always associated when prepared by the ordinary means.† The solution of liquor sodæ chloratæ was shaken with ether. The ethereal solution possessed a powerful smell of hypochlorous acid and readily bleached a solution of litmus. As a further test of the presence of hypochlorous acid, the action of sodium hypochlorite upon green nickelous hydrate which results in the formation of black nickelic hydrate was employed,

$$2\,Ni(HO)_2 + NaClO + H_2O = Ni_2(HO)_6 + NaCl.$$

For this purpose the ethereal solution was shaken with a dilute solution of sodium hydrate and a few drops of nickelous chloride added. A green precipitate of nickelous hydrate alone was produced, and no change in this was produced even on boiling. The experiment was repeated many times with the same result. As it had already been proved by other tests that hypochlorous acid was present, and having previously noticed that a concentrated solution of hypochlorous acid in ether quickly decomposes, the ether being powerfully attacked, the action of ether upon nickelic hydrate was examined. To a solution of nickelous hydrate sodium hypochlorite was added; a black precipitate of nickelic hydrate was produced. The mixture was shaken with ether, the nickelic hydrate was speedily reduced to green nickelous hydrate. Cobaltic hydrate is by no means so readily reduced by ether, the reaction requiring a considerable time; in fact, the reaction is sufficiently characteristic to constitute a distinguishing test for the two metals. In view of this fact the ethereal solution was treated with sodium hydrate and this solution decanted from the ether. It gave an abundant precipitate of nickelic hydrate on the addition of a nickel salt. It was then evident that hypochlorous acid was a constituent of the solution. It now remained to examine the solution which had been extracted with ether. This had no odour of hypochlorous acid, did not react with a nickel salt and did not bleach a solution of litmus even after the addition of tartaric acid. Sodium chloride and bicarbonate with a trace of sodium chlorate were present. As this solution had been prepared two or three days it seemed likely that this latter constituent had been developed during this time. A solution was therefore prepared and at once treated with ether and the aqueous solution examined; no sodium chlorate was present. On further keeping the first solution, and especially upon exposing to light, more and increasing quantities of sodium chlorate were developed. This substance is most probably formed by the action of hypochlorous acid upon sodium chloride, thus, $6\,HClO + NaCl = NaClO_3 + 3\,Cl_2 + 3\,H_2O$. Williamson has shown that the decomposition is instantaneous upon the application of heat. We have found that only concentrated solutions of hypochlorous acid will act upon sodium chloride when evaporated together, as in dilute solutions the hypochlorous acid is volatilized with the steam. Hence the reaction is not applicable as a general test. Owing to this decomposition liq. sodæ chloratæ is unstable. The above experiments show that the liq. sodæ chloratæ of the British Pharmacopœia is a solution containing free hypochlorous acid, sodium chloride and sodium bicarbonate. The general reaction attending its production is symbolized by the following equation.

$$Na_2CO_3 + Cl_2 + H_2O = HClO + NaHCO_3 + NaCl.$$

Commercial specimens of liquor sodæ chloratæ were now examined. Samples from four of the

* Read at an Evening Meeting of the Pharmaceutical Society, February 7, 1883.

† Throughout these experiments, the chlorine was generated from hydrochloric acid and manganic oxide. It may be here remarked that when chlorine is required free from hydrochloric acid the process with sulphuric acid, sodium chloride and manganic oxide is next to useless unless special precautions be taken. We have noticed that with more than one sample of manganic oxide, when the proportions recommended by Fresenius and others are employed, more hydrochloric acid than chlorine is at first evolved, probably due to deficiency in the strength of the manganic oxide.

principal wholesale houses in London were obtained. They were all alkaline to test paper. On shaking with ether nothing was dissolved from any of the four samples, hence no free hypochlorous acid was present. On the addition of tartaric acid they gave abundant evidence of the presence of sodium hypochlorite, which was also proved by the nickel reaction. Each contained traces of calcium. It was evident that they had been obtained by the decomposition of a solution of bleaching powder with sodium carbonate, and therefore contained sodium hypochlorite but no free hypochlorous acid.

[*The discussion on this paper is printed at p.* 677.]

THE ACTION OF CHLORINE UPON SOLUTIONS OF SODIUM CARBONATE.*

BY WYNDHAM R. DUNSTAN,
Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society,
AND F. RANSOM.

The general subject of the action of chlorine upon metallic carbonates in presence of water has been studied by Williamson (*Mem. Chem. Soc.*, ii., 234). He concluded that no sodium hypochchlorite was formed, but free hypochlorous acid. In order to chemically explain the results of our former experiments with liquor sodæ chloratæ it was thought desirable to make a complete investigation of the action of chlorine upon solutions of sodium carbonate under different conditions. In all the experiments chlorine which had been purified by means of copper sulphate was employed in the manner described by us in a previous paper. 50 c.c. of a solution containing 25 per cent. of crystallized sodium carbonate, such as is used in the preparation of liquor sodæ chloratæ, were treated with about one hundred bubbles of chlorine gas; the escaping gas was collected and analysed. It consisted mainly of chlorine with a small quantity of carbon dioxide. No effervescence or other visible sign of the evolution of carbon dioxide was observed. The liquid had a characteristic odour quite distinct from that of chlorine in the free state and did not bleach a solution of litmus. The liquid was treated with ether and the ethereal solution after washing with a little water to remove adherent liquid possessed no bleaching properties. We have shown in a previous communication that hypochlorous acid is soluble in ether and sodium hypochlorite insoluble. The extracted aqueous solution was alkaline, and gave the hypochlorite reaction with a nickel salt, but did not bleach until after the addition of tartaric acid. It was then evident that this solution contained sodium hypochlorite but no free hypochlorous acid. We have found that sodium hypochlorite is incapable of bleaching in the presence of much free alkali, whether it be in the form of hydrate or carbonate; after the addition of an acid the usual bleaching effects are observed. Throughout these experiments the acid used for this purpose has been tartaric acid, for this acid does not liberate chlorine or an oxide of chlorine from sodium chlorate, which was frequently present in the solutions.

Fifty c.c. of sodium carbonate solution of the same strength as the preceding were treated with about three hundred bubbles of chlorine. No effervescence occurred. After about one hundred bubbles of gas had passed the small quantity of escaping gas was collected and analysed; it consisted principally of chlorine with some carbon dioxide. The solution was treated with ether in the manner before described. No free hypochlorous acid was found, but sodium hypochlorite in larger quantity than in the first experiment.

Fifty c.c. of the solution of sodium carbonate were treated with about five hundred bubbles of chlorine gas, and as before no effervescence occurred. After three hundred bubbles of gas had passed the escaping gas was collected and analysed; a small quantity of carbon dioxide was obtained. The solution was only faintly alkaline and bleached powerfully. A rapid current of air was passed through the liquid to remove the small quantity of free chlorine contained in it, and the solution shaken with ether. The ethereal solution instantly bleached a solution of litmus. The aqueous solution was freed from hypochlorous acid by repeated treatments with ether; the aqueous liquid bleached litmus solution rapidly, especially after the addition of tartaric acid. In this solution, both sodium hypochlorite and free hypochlorous acid were contained.

Fifty c.c. of the sodium carbonate solution were acted upon by about eight hundred bubbles of chlorine gas; no effervescence occurred, and the escaping gas contained only a small quantity of carbon dioxide. The solution had the physical properties of liquor sodæ chloratæ. It bleached litmus powerfully. After a current of air had been passed through the liquid it was shaken with ether; the ethereal solution bleached, but the extracted aqueous solution did not, even after the addition of tartaric acid. This liquid upon analysis was found to contain sodium bicarbonate and chloride. Thus, the original liquid contained hypochlorous acid, but no sodium hypochlorite.

Fifty c.c. of the sodium carbonate solution were treated with chlorine gas in larger quantity than in the preceding experiment. Effervescence commenced, and at this point the escaping gas was collected and found to consist entirely of carbon dioxide. As more chlorine was passed through the liquid the effervescence increased; the gas evolved was wholly carbon dioxide. Effervescence having ceased, the liquid was examined after the passage of air and found to consist of free hypochlorous acid which was extracted by ether, the remaining aqueous liquid containing sodium chloride with some sodium chlorate.

The experiments above detailed have been repeated many times with the same results. It was always noticed that no effervescence occurred until a large quantity of chlorine had been passed through the liquid.

The action of chlorine upon stronger solutions of sodium carbonate was now studied. A saturated solution of sodium carbonate was treated with a small quantity of chlorine; carbon dioxide was evolved in quantity rather greater than with more dilute solutions. The solution was analysed by means of ether as before described and with the same result, the formation of sodium hypochlorite without any free hypochlorous acid. On passing more chlorine through the liquid a precipitate was observed to form. At this point the reaction was stopped and some of the solution examined after filtration. It still contained only sodium hypo-

* Read at an Evening Meeting of the Pharmaceutical Society, February 7, 1883.

chlorite. The precipitate was examined and found to be sodium bicarbonate. On continuing the passage of the chlorine the precipitation increased, and when this had ceased the chlorine gas was allowed to pass until effervescence was first observed. The solution now, after removal of the free chlorine, contained no sodium hypochlorite, but hypochlorous acid in the free state. The aqueous liquid contained sodium chloride with some chlorate.

When chlorine was again passed through the liquid copious effervescence occurred and the precipitate of sodium bicarbonate rapidly disappeared, the solution finally being found to contain free hypochlorous acid, sodium chloride and chlorate. Experiments were now made at low temperatures and it was found that at 0° C. the reaction which occurred was the same as that at ordinary temperatures. At 100° C. it was found that the product consisted entirely of chloride and chlorate of sodium, carbon dioxide being evolved from the commencement of the reaction.

The first action of chlorine, then, upon a solution of sodium carbonate at ordinary temperatures and at lower temperatures, even to the freezing point of water, results in the production of sodium hypochlorite, chloride and bicarbonate. It may be represented thus:—

$$(1)\ Cl_2 + Na_2CO_3 = NaClO + NaCl + CO_2$$

$$(a)\ CO_2 + H_2O + Na_2CO_3 = NaHCO_3.$$

When more chlorine is passed through this solution the sodium bicarbonate is not appreciably affected, but the sodium hypochlorite is decomposed with the production of hypochlorous acid. We here assume that sodium hypochlorite is at first formed as the simplest hypothesis, but our experiments do not negative the possible existence of intermediate or double salts. The only two agents present which would affect the decomposition of the sodium hypochlorite are carbon dioxide and chlorine. The action of the former would result in the reproduction of sodium carbonate, an improbable result, and for which there is no experimental evidence in the present case. Williamson has shown that chlorine is capable of decomposing a solution of bleaching powder which contains calcium hypochlorite with the formation of hypochlorous acid, thus—$Ca2ClO + 2Cl_2 + 2H_2O = CaCl_2 + 4HClO$. We, therefore, made some experiments to discover whether this reaction obtained with sodium hypochlorite. A solution of sodium hydrate was treated with chlorine gas, and after a current of air had been passed through the liquid the solution was shaken with ether; the ethereal solution did not bleach, but the aqueous solution possessed strong bleaching powers. The solution was now treated with excess of chlorine. It possessed the very powerful and characteristic odour of hypochlorous acid. After passing air through the liquid it was treated with ether; the ethereal solution possessed all the properties of hypochlorous acid. The extracted aqueous solution contained sodium chloride and chlorate, but no sodium hypochlorite. Thus it was conclusively shown that chlorine possessed the power of decomposing sodium hypochlorite, forming hypochlorous acid. It now remained to examine the action of chlorine upon a mixture of sodium hypochorite and bicarbonate. Chlorine was passed through a solution containing about an equal quantity of these two salts No effervescence at first occurred and only a small quantity of carbon dioxide was found in the escaping gas. Just before effervescence occurred the passage of the chlorine was stopped and the solution analysed; it contained much free hypochlorous acid which was extracted by ether, leaving sodium chloride and bicarbonate with a trace of sodium hypochlorite in the aqueous solution. The further action of chlorine upon solutions of sodium carbonate may then be represented thus—

$$(2)\ NaClO + Cl_2 + H_2O = NaCl + 2HClO.$$

The solution at this stage represents the liquor sodæ chloratæ of the British Pharmacopœia, and the above equations explain the genesis of each of its constituents,—hypochlorous acid, sodium chloride and bicarbonate. If more chlorine be now passed into the solution effervescence occurs, owing to the decomposition of the sodium bicarbonate, thus—

$$(3)\ Cl_2 + NaHCO_3 = NaCl + HClO + CO_2.$$

Thus the final constituents of the solution are sodium chloride and hypochlorous acid. The liquid also contains sodium chlorate; this is doubtless produced by the action of hypochlorous acid upon sodium chloride, thus—

$$NaCl + 6\,HClO = NaClO_3 + 3\,Cl_2 + 3\,H_2O.$$

When chlorine is passed into a boiling solution of sodium carbonate, the reaction is as follows:—

$$3\,Na_2CO_3 + 3\,Cl_2 = 5\,NaCl + NaClO_3 + 3\,CO_2.$$

This reaction may be considered to take place in two stages:—

$$(1)\ Na_2CO_3 + 2\,Cl_2 + H_2O = 2\,NaCl + 2\,HClO + CO_2.$$

$$(2)\ NaCl + 6\,HClO = NaClO_3 + 3\,H_2O + 3\,Cl_2.$$

We are at present engaged in studying the action of chlorine upon certain metallic oxides and carbonates, and have already obtained some interesting results.

[*The discussion on this paper is printed at p.* 677.]

NEW PROCESS FOR THE EXTRACTION OF FISH OIL.*

A foreign exchange, speaking of the processes of extracting fish oil, invented by Messrs. Moride and Joulie, says:—The oil in fishes is contained in the network of the tissues, and cannot be liberated until they are destroyed, either by putrefaction or by the application of heat. In both these cases, the oil is subjected to an alternative process of a more or less decided character. It has, however, been noticed that under the influence of certain substances, the albuminoid matters, which form the tissues, contract, become tighter, and cause the oil to exude in a cold state, and in a condition of remarkable purity. The substances which produce this effect are notably lime, perchloride of iron, the sulphates of peroxide of iron, and the chlorides and sulphates of alumina. Of all these reagents, the salts of iron produce the best results, because they cause the disinfection of the substances to which they are applied, and, at the same time, secure them against putrefaction.

In the industrial application of this theory to fish, the inventors sprinkle it with five per cent. of its own weight of a solution of perchloride or persulphate of iron at 45° Baumé; it can then be easily kept three or four days, either entire or in pieces, without undergoing any alteration. It is passed into a machine which crushes it, and reduces it to a thick paste, which is received in bags and taken to the press. A rather large quantity of water is forced out, bringing with it the liquid oil contained in the fish. The cake which is withdrawn from the press dries readily, becomes very friable, and is easily pulverized. It still contains a small quantity of fatty mate-

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* Reprinted from *New Remedies*, February, 1883.

rial, less liquid than oil, which can be extracted by a solvent, such as benzin or carbon disulphide. The greater part of this fatty material can also be obtained by submitting the cake to a second pressure between heated plates of metal.

The cake, freed from oil, dried and pulverized, forms an excellent fertilizer, containing 7 to 10 per cent. of nitrogen and 10 to 15 per cent. of phosphate of lime, according to the substance which has been employed in the anterior processes.

CONDENSED WHEY. A NEW INDUSTRY AND A NEW FOOD PRODUCT.*

BY PROF. ALEXANDER MUELLER.

Whey, which is a bye-product in the manufacture of cheese, contains about an equal quantity of milk-sugar and albumen, as well as a considerable quantity of salts and particles of caseine and butter-fat that have escaped being made into cheese. Only a very small percentage of all the whey produced in Germany is utilized directly for human nutriment, either as drink or as an addition to food and pastry, nor is much used for making milk-sugar. The greatest part of it is used as food for animals—hogs, calves, cows, and even horses—at least among country cheese-makers. Where large cheese factories are situated in cities, a considerable quantity runs off in the gutters and sewers.

The value of whey for feeding cattle and hogs is scarcely higher as an average than one-half cent. per gallon; its value as human food, on the other hand, is at least six times as high. This disproportion between supply and demand has frequently attracted the attention of milk producers and economists generally, without as yet, however, having met with any satisfactory solution.

The chief difficulty lies in the great dilution of nutriment in the whey, and the consequent tendency to sour or putrefy. The first step toward a better utilization of whey must be taken in the direction of concentration. As in the case of most other kinds of food, concentration will improve its keeping qualities.

It is a fact that the small dairymen of Norway have been wont from time immemorial to boil down the greater part of their whey, sweet as well as sour, more or less to a "mesost" or "prim," sometimes alone, sometimes with the addition of buttermilk, or even of cream. The boiling down in open vessels over an open fire of course demands the most painful attention to prevent burning, which would spoil the taste of the whole lot, and make it uneatable, for us at least. Then, too, the consumption of coal is so great as to make the product unreasonably costly. The use of a water or steam bath would overcome the former of these objections, but not the latter. A solution of the problem must be sought in the use of a vacuum apparatus, which, assuming the operations to be conducted on a large scale, guarantees at once the cheapest and best preparation.

After many fruitless attempts, an opportunity was afforded me last autumn, at the Cismar Condensed Milk Factory, in Eastern Holstein, to evaporate whey in a vacuum. But before the experiment had been made there, the firm of Heckmann, in Berlin, kindly placed at my disposal a suitable vacuum apparatus, with an arrangement to prevent foaming over, and all its attachments and service. I first made use of it last January. Part of the whey was evaporated until it just began to crystallize when cold; another part to a stiff dough, which, in a few days, hardened to a solid cake.

In both cases, but especially in the latter case, a very permanent product was obtained, which could be kept for months in pure, dry air without spoiling or moulding. Whey condensed *in vacuo* is better for making milk-sugar than any other preparation. For daily use in the household, it is capable of the greatest variety of uses for food and drink, the most important of which, it seems to me, is in making different kinds of pastry, for which purposes its milk-sugar and milk salts especially fit it, and this is the easiest way to utilize them in nourishing and sustaining large classes of people. C. Becker made experiments on baking with whey concentrated on a water-bath, while Bolle used a portion of the whey extracts obtained by me in Heckmann's factory here. These bakery experiments were so satisfactory that Bolle decided to have a vacuum apparatus set up in his own place, and to offer his whey to the Berlin public in the form of bread or cake.

In the course of the following winter and spring, Bolle put up the necessary apparatus, and having secured regularity in working the process, he began the regular manufacture of whey-rye bread, and of two kinds of wheat bread, one a fine article in rolls, made of the best wheat flour, with the addition of milk, butter, eggs, etc., the other plain bread in round loaves for daily use, without the addition of the more expensive ingredients. The public seems to have a taste for this new form of bread, and the example is worthy of imitation in other places.

By careful treatment of the whey, and if the bakery were properly conducted, I have not the slightest doubt that all large cheese factories which are situated in towns could make a profitable use of their now worthless whey by evaporating and baking it, and at the same time contribute to the sustenance of the people.

Besides this, cooks and housekeepers would soon learn to use extract of whey in the preparation of their daily food, both to improve the flavour and render it more digestible.

The fear that there will soon be too much whey extract made and offered to the public, is met by the idea that the larger cheese factories will in time cease to make use of thin or skimmed milk, but to sell it as condensed skimmed milk, as this would be more profitable than condensing the whey.

* Read before the fifty-fifth meeting of German Naturalists, etc., at Eisenach, 1882. From *Chemiker Zeitung* and *St. Louis Druggist*, Reprinted from *New Remedies*, February, 1883.

TOOTH WASH.*

Tooth washes prepared with soap bark as a base are not injurious to the teeth. Among the published formulæ, we select the following, giving the proportions according to Hager:—

Bennet's Tooth Wash.

Quillaia, in moderately coarse powder	20 parts.
Glycerin	20 „
Diluted alcohol	q.s.
Oil of gaultheria	q.s.
Oil of peppermint	q.s.

Macerate the quillaia with the glycerin and 180 parts of diluted alcohol, and enough of the oils to flavour the mixture, for twenty-four hours, occasionally agitating. Then filter and add enough diluted alcohol to make the product weight 200 parts.

Meyers' Tooth Wash.

Quillaia, in moderately coarse powder	50 parts.
Peppermint water	300 „
Alcohol	300 „

Macerate for a few days, then add

Cochineal, powdered	1 „
Peppermint water	100 „
Glycerin	100 „
Oil of gaultheria	1·5 „

Again macerate during one day, occasionally shaking. Finally add

Peppermint water, enough to make . 1000 parts.

Lastly filter.

* From *New Remedies*, February, 1883.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 17, 1883.

THE REGISTRAR'S REPORT.

The Report on the state of the Registers of Pharmaceutical Chemists and Chemists and Druggists, presented annually by the Registrar under the Pharmacy Act, 1868, to the Council of the Pharmaceutical Society at its meeting in February, offers a convenient opportunity to all interested in the welfare of pharmacy in Great Britain for observing the effect of existing legislation in controlling the number of persons carrying on the business of a chemist and druggist in this country. Especially is this the case with the Report presented next after each of the general expurgations of the Register, such as have hitherto been effected at intervals of two years; because so imperfectly is the provision of the Act as to the communication of information concerning the death of registered persons carried out by registrars of deaths throughout the country, that the Register quickly becomes cumbered with a number of names that ought to be removed. For instance, the recent exercise by the Registrar of the power conferred on him by the Act, led to the removal of 253 names of persons to whose registration address the legal number of registered letters had been addressed and had been returned through the dead letter office.

The Report shows that the total number of persons whose names are included in the new Register of Chemists and Druggists is 13,447; this is 208 less than the number in the Register for last year, and 15 less than in that for 1881. From this it would appear that the number of persons who during the last two years have passed the qualifying examinations has been barely sufficient to counterbalance the removals from the Register occurring during the same time through deaths and other causes. Of course this is explained by the fact that the additions have necessarily been limited mainly to examined persons, whilst the proportion of deaths has naturally been much higher among those who were registered in virtue of having been in business before the passing of the Pharmacy Act, 1868. The result is that of the 13,447 persons whose names are now on the Register, 4798, or 35·68 per cent., have passed at least the Minor examination.

Turning to the smaller Register of Pharmaceutical Chemists, we find that here also there has been a decrease in the gross total, the number in the Register for the present year being 2275, against 2308 in those for 1881 and 1882. This apparently disproportionate decrease in so important a class will naturally attract attention and provoke anxiety, or may even lead, as in former years, to assumptions as to the looming failure of the efforts of the Pharmaceutical Society to establish a class of pharmacists who have voluntarily qualified themselves for carrying on their calling to an extent beyond that which is required by law. Should the Bill which it is intended to introduce into Parliament in the coming session pass into law the whole position will be altered, and it will be hardly worth while to discuss the pros and cons of this question. But, meanwhile, we are inclined to think that an undue importance may be attributed to any absolute decrease in the gross total of pharmaceutical chemists, since, as we have pointed out before, the decrease is considerably affected by the presence on the Register of a large number—still amounting to more than one third of the whole class—of persons who were admitted as pharmaceutical chemists in virtue of having been in business on their own account at least thirty years ago, whilst the class is entirely dependent for recruits upon persons passing the Major examination. We are of opinion that a truer estimate of the probable strength to which the class of pharmaceutical chemists would attain under present conditions may be formed by taking into account in the calculation only the numbers affecting those who have passed the Major examination. More than thirty-six years have now elapsed since the first Major certificates were signed, and this is a sufficiently long period of time to allow of some approximation to an average in gains and losses. Calculating upon these lines we find that the number of Major men steadily increases year by year, being 1511 in the new Register against 1498 in 1882, and 1450 in 1881. Last year 40 persons passed the Major, and the foregoing figures show that these were sufficient to replace the loss in examined Pharmaceutical Chemists and to increase the number by 13. Therefore these figures point to the conclusion that the number who passed the Major examination last year would have been equal to maintaining the equilibrium in a body of 2000 men, and assuming that the examination is usually passed early in life this is not far from what might be expected.

For convenience of comparison we append the figures in a tabular form as in previous years:—

	January 1, 1882.		January 1, 1883.	
	Number.	Per cent.	Number.	Per cent.
Pharmaceutical Chemists:— Examined . . / Non-examined	1498 / 810 } 2308	10·97 / 5·93 } 16·90	1511 / 764 } 2275	16·92
Chemists and Druggists who have passed the Minor only . .	3011	22·05	3287	24·44
Remainder, including those who have passed the Modified . .	8336	61·05	7885	58·64
Total	13,655	100·00	13447	100·00

The simultaneous presentation of statistics as to the numerical strength of the Pharmaceutical Society enables us also, as in former years, to call attention to some points bearing upon the extent to which the Society is representative of the whole body of chemists and druggists. In the first place it appears that the gross number of registered chemists and druggists connected with the Society at the beginning of the present year, either as Members or Associates was 4592, or 34·15 per cent. of the whole number on the Register. This shows a decrease of 15 in the absolute number as compared with the previous year, when it was 4607; but in consequence of the smaller number on the Register the relative proportion, which last year was 33·73 per cent., is higher by 0·42 per cent. The gains and losses are unequally distributed; but they are instructive as indicating that the point has been passed at which recruits from the unexamined class will be sufficient to replace losses of unexamined Members, and that under present conditions the maintenance of the numerical strength of the Society will depend upon a sufficient proportion of the men examined year by year joining it. It will therefore be interesting to see how far this requirement has been satisfied during the last twelve months. The decrease has been entirely confined to the two classes of Members, being 51 in the class of Pharmaceutical Chemists and 9 in that of Chemists and Druggists. The latter may be disregarded altogether in discussing this point, since this decrease must go on in an increasing ratio, and the disappearance of the entire item of 779 is only a question of time. The decrease of 51 in the class of Pharmaceutical Chemist Members is much more serious, especially in the face of the fact that the number elected or restored to membership was 43, and of these 40 would appear to have been examined men, or exactly the total number of persons who passed the Major examination in 1882. It will be seen from the preceding table that the number of non-examined Pharmaceutical Chemists on the Register was during the year 1882 reduced by 46,—from 810 to 764;—and since the roll of members must necessarily have been diminished to this extent, it follows that the accession to the Society of a number of examined men equal even to the total who passed the Major was insufficient by 5 to compensate the losses to the Society through deaths and secessions of examined men during the same time. It is worth mentioning, however, that 74 per cent. of all the holders of Major certificates at the present time are Members of the Pharmaceutical Society. Turning to the two classes of Associates the results are more satisfactory. The important class of Associates in Business, who, if the projected Bill passes in its present form, will become Chemist and Druggist Members, and eligible as members of Council, continues to increase steadily, the number being 1107 against 1069 last year; whilst the Associates not in Business, who also would have the option of becoming Members, have increased from 817 to 824.

The following is a tabular comparison of the numerical strength of the Pharmaceutical Society with the number on the Registers:—

	January 1, 1882.		January 1, 1883.	
	No.	Per cent of whole.	No.	Per cent of whole.
Pharmaceutical Chemists, Members of the Society .	1933	83·75	1882	82·72
Other Registered Chemists and Druggists connected with the Pharmaceutical Society	2674	—	2710	—
Total number of Registered Chemists and Druggists connected with the Pharmaceutical Society. . .	4607	33·73	4592	34·15
Registered Apprentices subscribing to the Society .	1046	—	1037	—

THE CHEMISTS' ASSISTANTS' ASSOCIATION.

It speaks well for the *esprit de corps* prevailing among the junior pharmacists in the metropolis that recently, at least, so keen an appreciation has been shown of the opportunities afforded them for social intercourse. The Dinner on Wednesday evening, in connection with the Chemists' Assistants' Association, proved no exception to the rule, about one hundred and thirty members and friends having been present on that occasion, under the presidency of Mr. M. Carteighe, President of the Pharmaceutical Society.

After the usual loyal toast of the Queen and Royal Family had been duly honoured, the Chairman proposed "The Medical Profession," coupling with it the name Dr. J. Langdon Down, as linking together in his experience medicine and pharmacy. In acknowledging the compliment, Dr. Langdon Down referred to a time when he unsuccessfully sought an engagement in London as a chemist's assistant, and spoke of his training in the School at Bloomsbury Square as awakening in him a love for science that had been very helpful to him in his medical studies. "The Pharmaceutical Society" was proposed in an able speech by Mr. Parkinson, who, quoting the Charter as to the four objects for which the Society was established, expressed an opinion that these had been steadily kept in view. The toast was acknowledged in eloquent terms by Mr. S. R. Atkins, Vice-President of the Pharmaceutical Society. The toast of the evening, "The Chemists' Assistants' Association," was proposed by the Chairman, who in the course of his remarks referred to the proposed Pharmacy Bill as closely affecting the future interests of assistants, and appealed to his hearers to consider it carefully, in a broad and liberal spirit, and then, if they approved of it, to give the Council their hearty support. The toast was coupled with the name of the President of the Association, Mr. W. A. Wrenn, who replied. The other toasts were, "The Pharmaceutical Press," proposed by Mr. Winfrey and acknowledged by Mr. Wootton; "The Visitors," proposed by Mr. H. H. Millhouse and acknowledged by Mr. R. W. Giles; and "The Chairman," proposed by Mr. W. H. Kerr. It is only due to the Dinner Committee to say that all the arrangements were excellent, and that the meeting was successful in every respect.

THE REGISTERS FOR 1883.

It will be seen from the advertisement that has appeared that the Registers of Pharmaceutical Chemists and Chemists and Druggists for 1883 are now ready and that copies may be had from the Registrar. It may be mentioned that the preliminary matter includes the latest addition to the Poison Schedule, and that in accordance with a suggestion made at the last Annual Meeting a summary has been prepared and inserted of all the regulations required by the Pharmacy Act, 1868, to be observed in selling by retail, and in dispensing "poisons."

At a recent meeting of the School of Pharmacy Students' Association, the new Faure-Sellon-Volckmar Accumulator was exhibited to illustrate a paper by Mr. H. Allen, B.Sc. As an example of its power a piece of platinum wire 9 inches long and $\frac{1}{8}$th inch thick, weighing 637·5 grams, was maintained at a bright red heat by one cell. Two cells were sufficient to raise the same platinum wire to a white heat. Each of the cells weighed about 15 pounds and contained nearly 1,000,000 foot pounds of energy.

* * *

There is to be an International Exhibition in Calcutta, under the patronage of the Viceroy, the day fixed for the opening being the 4th of December next. It is to be held in the "India Museum," a magnificent pile of buildings in the centre of the city, the use of which and of the adjoining grounds has been granted by the Indian Government, together with a lac and a half of rupees to defray the expenses of the Indian court. Full information concerning details may be obtained by persons resident in this country on application to the official agent, Mr. W. P. Dilworth, 4, Westminster Chambers, S.W.

* * *

At the quarterly examinations held under the Pharmacy Act of Victoria in December five candidates out of six passed the Major (there is no Minor) and became entitled to registration as Pharmaceutical Chemists. Three other persons acquired the same right by passing a "Modified" examination.

* * *

The Pharmaceutical Society of Victoria held its annual dinner in aid of its Benevolent Fund on the 13th of December. Among the toasts was one to the "Pharmaceutical Society of Great Britain and Kindred Societies." We regret to notice that Mr. Bosisto, who has presided over the Pharmacy Board since the passing of the Victoria Act, announced on that occasion his intention of retiring.

* * *

Vigorous attempts are being made in the United States to deal with the practice—not unknown in this country—of certain retailers making the sale of proprietary preparations at little or no profit a leading feature of their businesses as a "draw." A committee appointed by the Massachusetts Pharmaceutical Association has issued a circular calling upon the manufacturers of such articles to supply them only to such jobbers as will engage to adopt a "rebate" system similar to that which has been found to work well in the wholesale trade. It consists in invoicing the goods at an advance of 50 per cent. on the actual price and deducting a corresponding amount on payment of the bill, only when the retailer guarantees in writing that he has not and will not sell, directly or indirectly, to consumers below the marked price.

* * *

In a report recently presented to the Illinois Pharmaceutical Association by its Committee on Trade Interests attention is called to the prevalence of the practice of "cornering," or securing the control of the supply of a drug, in order to raise the price unduly. It was mentioned, as an instance, that the quotations for cubebs represented at that time three times the actual value of the drug.

* * *

The number of students attending the present sessions of the different colleges of pharmacy in the United States is, according to the *Pharmaceutical Record*, 1454. They are distributed as follows:—Albany, 31; Chicago, 160; Cincinnati, 94; Louisville, 57; Maryland, 80; Massachusetts, 112; National, 33; New York, 300; Philadelphia, 400; Pittsburg, 41; St. Louis, 96; San Francisco, 50. No return had been received as to the number attending Iowa College.

* * *

The editor of the *Chemiker-Zeitung*, Dr. Krause, calls special attention to a suggestion that has been made for the erection of a memorial to the late Dr. Friedrich Wöhler.

* * *

The "adulterated quinine" sensation in Paris has undergone further development. According to the *Times*, some of the French newspapers, in an excess of patriotic zeal, attributed the fraud to "a chemical manufactory at Milan, which some time ago amalgamated with a German one." It turns out, however, that the substitution was effected in Paris, and the foreign "chemical manufactory" so significantly pointed at is having recourse to the law courts to rehabilitate its character.

* * *

The first of a series of six lectures on the Applications of Electricity, for which arrangements have been made by the Council of the Institution of Civil Engineers, was delivered on Thursday evening, by Mr. W. H. Preece, the subject being "The Progress of Telegraphy." The other lectures of the series will be, on March 1, "Telephones," by Sir F. Bramwell; March 15, "The Electrical Transmission and Storage of Power," by Dr. C. W. Siemens; April 15, "Some Points in Electric Lighting," by Dr. J. Hopkinson; April 19, "Electricity Applied to Explosive Purposes," by Professor F. A. Abel; and May 3, "Electrical Units of Measurement," by Sir W. Thomson.

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At the meeting of the Chemists' Assistants' Association to be held on Wednesday evening next, a paper will be read on "Lithiæ Citras," by Mr. C. Thompson.

Transactions of the Pharmaceutical Society.

EVENING MEETING.

Wednesday, February 7, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

An Evening Meeting of the Pharmaceutical Society was held on Wednesday last, February 7. The chair was taken at half-past eight o'clock.

The minutes of the previous meeting having been read and confirmed, the first paper read was entitled—

A Research on the Alkaloid Gelsemine and some of its Crystalline Salts.

BY A. W. GERRARD, F.C.S.

The paper was printed last week (see p. 641), and gave rise to the following discussion:—

The PRESIDENT, in proposing a vote of thanks to Mr. Gerrard, said that it was obvious that the paper would not bear so much discussion as some of the papers which were read. At present Mr. Gerrard had the field all to himself.

Professor ATTFIELD said that the paper was one into which a great deal of labour had been thrown, and he hoped that it would not pass without those present showing that they appreciated it. Perhaps they would especially appreciate the new departure which Mr. Gerrard had made in his experiments. As far as could be judged, it appeared that the probabilities of truth lay with Mr. Gerrard rather than with Professor Sonnenschein. When two men were working at the same drug, and each got an alkaloid, and when one obtained it quite white, while the other got it slightly coloured, and when one obtained it in such a state that it gave no reaction with that great charrer of many organic substances, namely, sulphuric acid, and was not apparently acted upon by nitric acid, while the other got it in such a state that it was affected to some extent by those reagents, the probabilities lay with the investigator who got it in the white state in which it was not so attacked. Certainly Mr. Gerrard's figures, which justified his formula, were much nearer to those required by his formula than to those required by the formula of Professor Sonnenschein. Even if they supposed that Professor Sonnenschein's alkaloid was burnt in such a way that the oxidizer yielded a little water, as such materials commonly did, and that, therefore, his formula should contain less hydrogen than it did, and thus come somewhat nearer to Mr. Gerrard's formula, so that instead, say, of the formula being $C_{11}H_{19}NO_2$ as given by Professor Sonnenschein, it should be $C_{11}H_{12}NO_2$; even then the numbers which Mr. Gerrard got were much nearer to the formula which he suggested than to that suggested by Professor Sonnenschein, or that which might be inferred, assuming that he had got too much hydrogen. Mr. Gerrard's formula required 70·6 per cent. of carbon, and he got 70·3. Professor Sonnenschein's formula required only 67 per cent. of carbon. He (Professor Attfield) took the carbon for the purpose of illustration. Even admitting that there was too much hydrogen, contributed by the process rather than by the alkaloid, the formula $C_{11}H_{12}NO_2$ would require 69 per cent. of carbon, while Mr. Gerrard obtained 70·3 per cent. He hoped that Professor Sonnenschein or Dr. Wormley would go into the question. One matter he would suggest should occupy the attention of investigators, namely, a careful consideration of the set of reactions which pointed to a somewhat close analogy between this alkaloid and strychnine.

Mr. MARTINDALE said that having tried some years ago to repeat Dr. Wormley's experiments he had been struck with the great affinity which gelseminic acid had for gelsemine. He had little doubt that the product which had been in the market, and had been known as Sonnenschein's gelsemine, contained gelseminic acid as an impurity. It would be a great advantage to oculists and others to have the alkaloid free in a crystalline condition and its salts as Mr. Gerrard had produced them.

The PRESIDENT proposed a vote of thanks to Mr. Gerrard, and associated with the proposition the names of Professor Rouch and Dr. Tweedie.

The next paper was on—

Aromatic Spirit of Ammonia.

BY DR. THRESH.

The paper is printed on p. 661, and gave rise to the following discussion.

Mr. MARTINDALE said that he had twice suggested in the *Pharmaceutical Journal* that sal volatile might be made by admixture, without distillation. Referring to the British Pharmacopœia formula Dr. Thresh had stated in his paper that the official quantity of carbonate of ammonia refused to dissolve in the requisite amount of water and solution of ammonia without the aid of heat. He had, however, found that it dissolved perfectly; in fact, he had found that it would dissolve in a third of the quantity of water there ordered. He had 5 drachms of water with ¼ ounce of carbonate of ammonia; he would add to it 1 drachm of liquor ammon. fort., and it would be seen that it dissolved immediately, although he only used one-third the pharmacopœial proportion of water. The process in the British Pharmacopœia theoretically produced only normal carbonate. In Dr. Thresh's process the result would contain about four times as much caustic ammonia as was necessary for this purpose, and very much more than was contained in the United States Pharmacopœia preparation. He arrived at that fact simply by calculation.

The CHAIRMAN asked whether Mr. Martindale was prepared to say that his calculations were right. The basis of the paper was experimental evidence, and Dr. Thresh stated that the result which Mr. Martindale alleged did not occur.

Mr. MARTINDALE said that when the carbonate of ammonia was finely powdered and mixed in the British Pharmacopœia proportions, leaving out the spirit, and adding only a third of the water, it made a perfect solution even in the cold. The United States Pharmacopœia gave a preparation containing normal carbonate of ammonia with very little free ammonia; so that it was much more palatable than the British Pharmacopœia preparation, which contained a large quantity of free ammonia owing to loss of CO_2 during distillation. He had shown this experiment, because it referred to a paper he had published some years ago (*Pharm. Journ.*, 1871, p. 704), giving results obtained in testing some samples of aromatic spirit of ammonia. He at that time suggested three experiments. One was that which he had now performed. Another was performed with double the quantity of water; and in the third there was three times the quantity of water. The quantities of water, carbonate, and liquor ammon. fort. were those of the British Pharmacopœia, less the spirit. It was possible that there might not be an intimate chemical combination between the official carbonate and the liquor ammonia, but the solution was perfect. He knew that normal carbonate of ammonia dissolved very slightly in rectified spirit, and as soon as the solution was added the normal carbonate was precipitated.

Professor ATTFIELD: Is it normal?

Mr. MARTINDALE said that he supposed that it was normal as no CO_2 was given off. The normal carbonate was very soluble in water. In dissolving the arbonate of ammonia he had noticed that if he used only half the quantity of water which was necessary to dissolve it the salt split up in the process of solution, and he got a solution which left behind the acid carbonate. If he put to this, as he had done in his experiment, the small quantity of liquor ammonia which was necessary to dissolve it, the whole would dissolve in less than three volumes. The carbonate of ammonia of the British Pharmacopœia only dissolved in the proportion of one part in six. His idea was that this preparation should not contain so much caustic ammonia as Dr. Thresh suggested, and be less alcoholic. It would, no doubt, be a great advantage to have a preparation which would contain definite quantities of carbonate of ammonia and free ammonia in solution. The preparation which was made by admixture certainly had the advantage; but the carbonate of ammonia of commerce was not so pure as it ought to be, and some of its impurities were kept back by distillation. The fault he found with the paper was that Dr. Thresh made the preparation to contain too much free ammonia gas.

Mr. TANNER said that some years ago he made a great many experiments on this subject, and the results which he obtained pointed to the conclusions to which Dr. Thresh had arrived. The quantities of official carbonate of ammonia and ammonia ordered in the British Pharmacopœia were in the proportions to produce normal carbonate. He found that when they were in the still, and before distillation commenced, a considerable effervescence took place, and there was a consequent loss of carbonic acid. On estimating the amount of carbonic acid in the distillate he found that exactly 50 per cent. of the carbon dioxide was lost. The proportions ordered in the British Pharmacopœia were calculated to produce about 8 per cent. of normal carbonate of ammonia. If the distillation was conducted carefully and in small quantities about 4 per cent. would be found. The other 4 per cent. was dissociated. Its ammonia existed as free ammonia in the distillate, and its carbonic acid had disappeared.

Mr. SCHACHT said he had for some years manufactured a "sal volatile" without distillation for sale as "sal volatile," and a spiritus ammoniæ aromaticus, according to the Pharmacopœia, for dispensing. The constancy of strength in the former article was, he thought, an important advantage; and in respect of one alleged disadvantage, namely, that it gradually became coloured, he did not find that this invariably occurred. Perhaps the development of colour might depend upon the age of the samples of essential oils employed. He felt gratified to Dr. Thresh for having discussed the subject in so practical a manner, and for having offered so useful a suggestion to future Pharmacopœia compilers. Upon one point he did not quite agree with Dr. Thresh, namely, as to the necessity of employing heat in the solution of the ammonia salt. It is quite true that if made cold a precipitate occurs when the spirit is added; but if time be allowed, say two or three days, this precipitate is again dissolved.

Dr. SYMES said that Dr. Thresh was working towards the attainment of a very desirable object, namely, the production of a satisfactory sal volatile without distillation. One difficulty which he seemed to point to was that after admixture the preparation sometimes became coloured, and it would not do for chemists to trust a formula which was liable to give such a result. Dr. Thresh also found that the aroma of distilled sal volatile was more mellow than that of the product formed by simple admixture. He thought that the object sought had scarcely yet been attained in the best possible manner, but perhaps the author's object was to direct the attention of workers to this subject early in the day, that he might get their assistance. The work now required was, perhaps, to ascertain what results were produced by distillation, and whether the colour in the undistilled product was due, as Mr. Schacht suggested, to some oxidized matter in the essential oils, which matter might be separated by distillation. At the same time, he did not think that anybody could deny the value of the results so far as they went.

Mr. INCE thought that distillation could not be given up altogether in the preparation of sal volatile, and that it must be retained at least half way. It would be necessary to investigate whether there were not certain oils which could be used by simple admixture, and whether there were not others which could not be so treated. It was well known to pharmacists that there were certain oils which it would be useless and deleterious to attempt to distil. This was the case with heavy essential oils, by which he meant heavy oils having a very permanent and persistent odour, and it was a sort of law in pharmaceutical work that such an oil should be presented mixed with spirit, and this could always be done in the cold. In the case of such oils it would be best to use a simple admixture. The best way to use oil of peppermint was simply to make a mixture in spirit. It formed a very bad pharmaceutical preparation if distillation was used. The same was the case with oil of rosemary. If oil of lavender, which was a very heavy oil with a persistent odour, were distilled with spirit, the preparation was nearly worthless. He thought that at present there was no better formula before the public than that of the Pharmacopœia. In the case of a very light oil, like the essence of lemon, they would fail altogether if they simply resorted to mixture with spirit. The new preparation recommended itself in many ways, and particularly by the convenience of the process; but convenience must not be made a motive for departing from the instructions of the Pharmacopœia.

Mr. GILES said that the paper had two distinct aspects—one scientific, and the other practical. The characteristic feature of the practical aspect had not been spoken of. It was that it put into the hands of every pharmacist an easy means by which he might himself prepare sal volatile, and that was one of the most important considerations for a pharmacist. Many years ago he (Mr. Giles) attempted to make sal volatile. He thoughtlessly mixed the ingredients, *secundum* the Pharmacopœia, but not *secundum artem*, in a copper still. The meeting might imagine what a beautiful green he got. He corrected his mistake and then blundered into some of the results at which Dr. Thresh had arrived scientifically. He calculated out the results which the Pharmacopœia ingredients ought to produce and he dissolved these calculated products in the due proportion of water, but he found, for some reason which Dr. Thresh had now explained, that they would not remain dissolved when mixed with the spirituous solution of the aromatic oils. This difficulty was, however, removed by moderately heating the solution before mixing. Mr. Schacht seemed to think that heat was not necessary, but at all events it was convenient, and there was no objection to employing it. There was no magic in distillation, but there was a great deal of efficacy in heat. As Mr. Ince had said, there were two distinct processes with a distinct *rationale* for each. The *rationale* of the combination of the ingredients which went to form the ammoniacal constituents could be easily fulfilled by heating them in the aqueous solution to the required temperature. The perfection of the spirituous solution could be best obtained by distillation. But if the spirituous solution was treated separately it could be distilled in a copper vessel without any fear of contamination, and the anxiety arising from the fear of the fracture of a glass vessel could be avoided. If the process described was perfected and accepted there could be no excuse for any pharmacist not making his own spirit of sal volatile. He hoped that this subject would be prosecuted, and the next Pharmacopœia,—in which, of course, he anticipated, pharmacists would be concerned,—would contain a spiritus ammoniæ aromaticus which every one could make at home.

Mr. EKIN said that he believed that the discrepancies in the strength of sal volatile, to which Dr. Thresh had alluded, arose from a very simple cause. They might always get a uniform strength if there was sufficient condensing power. This was necessary whether they operated on a large quantity or a small quantity, and in summer or in winter.

Mr. TANNER, referring to Mr. Schacht's remark that time was necessary for the disappearance of the precipitate, said, as the result of the experimental trial which he had made, that neither three days nor three months would suffice to effect the combination of which Mr. Schacht spoke; but a temperature of 140° Fahrenheit would do it in a few minutes. The combination required was that of the ammonia with the official carbonate so as to be soluble in spirit. He had now in his possession some of the preparation which might have been made six months ago, and as nearly as he could judge the deposit was still the same as it was at first. Elevation of temperature was absolutely necessary to effect combination. If distillation be necessary all risk arising from the use of easily fractured glass veesels might be avoided by the use of a common tin bottle. Both the ammonia and the aromatic ingredients might be put into this vessel, and the distillation would be entirely free from metallic contamination. A one gallon or two gallon tin bottle, purchased at an oil shop and fitted with a cork and tube, would answer the purpose. He thought that it had been settled in that room, long ago, that the distillation of oil of lemons was not an improvement, and that the expressed oil was decidedly superior in flavour to any distilled product. In this respect he differed from Dr. Thresh. He failed to see the necessity for distillation at all, provided that the essential oils were fresh and pure.

Mr. SCHACHT said that it was very likely that Mr. Tanner and he were speaking of different things. Probably a mixture of ammonia in exactly the proportions given in the Pharmacopœia might result as Mr. Tanner had stated. He (Mr. Schacht) was rather directing attention to the results as detailed by Dr. Thresh, and he wished to say once more that if the proportions recommended by Dr. Thresh were adopted, it was certain that in three days a clear solution would be obtained without the aid of heat.

Mr. ANDREWS said that his experience was that oil of lemons was much more fragrant when it was simply dissolved in spirit than when it was distilled.

Professor ATTFIELD, on being asked by the President to reply on behalf of Dr. Thresh, said that it was with great hesitation that he did so. Indeed, he must leave Dr. Thresh to settle with Mr. Martindale the question of the solubility of carbonate of ammonia in ammoniacal water. He thought that it would be clear that the paper contained three leading points. Dr. Thresh recommended what had been happily called semi-distillation, and in this he would be glad to receive the support of such pharmacists as Mr. Ince and Mr. Giles. Secondly, Dr. Thresh recommended the use of warmth in combining the bicarbonate in "carbonate" of ammonia with ammonia; and here he was supported by the practical experience of Mr. Tanner and Mr. Giles. Thirdly, the author pointed out the fact that if they did not use warmth a deposition of ammoniacal salt would occur when the alcohol was added. And in this he was supported by two most practical men—Mr. Tanner and Mr. Martindale. He (Professor Attfield) was sure that Dr. Thresh would also thank Mr. Giles for pointing out the extremely practical value of such papers, and how that with light of this kind thrown on their work retail pharmacists could now make preparations like sal volatile far more conveniently than they could make them previously.

The PRESIDENT said it would be convenient to discuss the next two papers together. They were on—

AN APPARATUS FOR CONTINUOUS EXTRACTION,
and
THE ASSAY OF NUX VOMICA,
BY W. R. DUNSTAN AND F. W. SHORT.

The papers are printed on pp. 663 and 665, and gave rise to the following discussion:—

Dr. SYMES asked whether the authors in constructing the apparatus for extraction had tried the method, which he suggested about two years ago, of making the tube from the vessel pass through the centre of the marc rather than outside it. A large amount of condensation took place in the outer tube of the apparatus before them; but when the tube through which the vapour passed was carried through the centre of the marc, that condensation could hardly occur; and a larger proportion of marc also could be contained in the vessel. He had found from experience that a shorter tube might be used if the upper part was packed with silver gauze. This seemed to act mechanically, presenting a large surface and a number of points for condensation.

Professor BENTLEY said that he had long been aware that the nux vomica seeds of commerce varied considerably in strength; and having been in the habit of taking extract of nux vomica as a tonic he had suffered serious personal inconvenience from the variation. He had since taken solution of strychnia in order to get a definite compound. Mr. Hodgkinson had told him many years ago that it was well known to makers that certain commercial specimens of nux vomica yielded more strychnia than others, and he sent him samples of five varieties from Bombay, Madras and Cochin. This matter had been referred to in Bentley and Trimen's 'Medicinal Plants," where it is also stated that the Bombay variety yielded the most strychnia; and he (Professor Bentley) had also called attention to it for some years in his lectures. Perhaps it would be found that the strength of the seed differed according to its degree of maturity.

Mr. GILES asked to what Mr. Dunstan attributed the fact that chloroform mixed with spirit acted better as a solvent than chloroform. Was it due to the mixture penetrating better than the chloroform alone? And could Mr. Dunstan explain why the addition of sulphuric acid did not cause the alcohol to separate from the mixture?

Mr. TANNER said that it appeared to him that when two liquids of different boiling points were used in the same apparatus the marc was subjected to the action first of the one having the lower boiling point, and then to that of the one which had the higher boiling point. He had some time ago used a similar apparatus to that now exhibited, but it was made of tin ware, as described in Dorvault's 'L'Officine,' under the name of "Extracteur à distillation continue." He found that it answered well when a homogeneous liquid was used. With regard to Professor Dragendorff's process, he should like to ask whether sulphuric acid was the best thing with which to extract nux vomica. It appeared to him that the acetate of strychnia being much more soluble than the sulphate, dilute acetic acid would be preferable to dilute sulphuric acid. In the extraction of the chloroform particularly he should suggest the use of acetic rather than of sulphuric acid.

Professor ATTFIELD said that there could be no doubt that a great many apparatus had been suggested which had some resemblance to the present one, but the point of novelty in the apparatus which was now exhibited was that one could carry on either infusion or distillation or percolation with it, and no apparatus had been previously made in which that could be done.

Mr. GERRARD said that the apparatus before them was very ingenious and simple, and in that respect it recommended itself; but there appeared to be an objection to it in the long continued application of heat to the matters exhausted by the solvents. They would never think of estimating the amount of alkaloids in cinchona bark by such a process, for the long continued application of heat would interfere with the result. He should rather use hot percolation and evaporate at a low temperature. Temperature made a great deal of difference, especially in the case of alkaloids. He should like to ask to what extent alcohol was extracted by the water from the mixture of chloroform, alcohol and alkaloid. Probably it was nearly all removed, and, therefore, the aqueous alcoholic solution retained a considerable quantity of the sulphate of strychnine; and it would be necessary to have recourse to distillation or evaporation to obtain the full yield.

Mr. DUNSTAN, in reply, said, with regard to Dr. Symes's remarks as to condensation in the outer tube, that of course condensation occurred at first, but by fairly rapid boiling it was possible to get a temperature sufficient to volatilize the whole of the solvent from this tube. He had used the apparatus which Dr. Symes mentioned, but had not found that it was so efficacious for extraction as the present one. As to the different varieties of nux vomica which existed in commerce, if Professor Bentley would hand the samples he spoke of to Mr. Short and himself, they would be glad to examine them. Mr. Giles had asked why chloroform and alcohol extracted more readily than chloroform alone. The reason probably was that the chloroform alone was incapable of thoroughly penetrating the seeds. Mr. Giles mentioned that when chloroform and alcohol were mixed and shaken with sulphuric acid probably the alcohol would separate. Where chloroform and alcohol were present in equal quantities there would be a considerable separation taking place. It was not easy to see why the alkaloid was not wholly extracted by the dilute acid in that case, but it was a fact that it was not. As to the different boiling points of the two liquids, the result which Mr. Tanner had described might occur when there was a large proportion of solvents of very different boiling points, but it had not occurred with the present mixture. With chloroform containing 25 per cent. of alcohol the whole of the alcohol was carried up by the chloroform. Mr. Gerrard had spoken of the effect of the continuous application of heat upon the alkaloids; but he (Mr. Dunstan), failed to see that the method which Mr. Gerrard proposed avoided this. It was proved that strychnia and brucia were not altered by the temperature of boiling chloroform or of a mixture of chloroform and alcohol; nor were they altered by boiling in dilute sulphuric acid, according to Dragendorff. Of course there might be certain alkaloids which were altered at this temperature, but strychnine and brucine were not.

Two papers were then read—

ON THE CONSTITUTION OF LIQUOR SODÆ CHLORATÆ

and

THE ACTION OF CHLORINE UPON SOLUTIONS OF SODIUM CARBONATE.

BY W. R. DUNSTAN AND F. RANSOM.

The papers are printed on pp. 667 and 668, and gave rise to the following discussion:—

Mr. WILLIAMS said that he wished to congratulate the authors upon the papers which they had produced. He had had a good deal of experience in the subject to which they alluded, and these papers had cleared up some difficulties which had existed in his mind for a long time.

Professor ATTFIELD said that he had carefully followed the work of the authors, and he gave it as his candid opinion that they had clearly established the point which they had set out to establish. They had satisfactorily made out that chlorine acting upon a solution of carbonate of sodium gave a solution not of hypochlorite of sodium, but of hypochlorous acid. It was quite another question whether the solution which medical men prescribed should be one of hypochlorous acid or one of hypochlorite of sodium. It would be for therapeutists to decide that.

The meeting was adjourned to March 7.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, February 7, in the College of Physicians, Kildare Street, Dublin, at three o'clock.

Dr. Charles Tichborne, President, in the chair.

The other members of the Council present were—Dr. Aquilla Smith, Vice-President, Messrs. Allen, Brunker, Dr. Collins, Messrs. Draper, Grindley, Hayes, Minchin, Dr. Montgomery, and Mr. Simpson.

The President stated that Mr. Brunker had written to him suggesting that the Council should seek an interview with the Chief Secretary relative to the amendment of Irish Pharmacy Act, as if an interview were not obtained before the meeting of Parliament there would be no chance of doing anything this year. He (the President) coincided in that opinion and directed Mr. Fennell to write asking for an interview. Mr. Fennell would now read the reply which had been received.

Mr. Fennell read a letter from the Chief Secretary, Mr. Trevelyan, dated January 27, acknowledging the receipt of a copy of the report of the Pharmacy Act Amendment Committee of the Society, and expressing his regret that it was not in his power to receive a deputation from the Council, as he should have to leave town shortly after the beginning of February. He should be glad to consider any further views the Council might wish to state, if they would forward them in writing; and he would take the earliest opportunity he could of receiving a deputation.

On the motion of Dr. Collins, seconded by the Vice-President, the letter was ordered to be entered on the minutes.

A letter was read from Dr. Kaye, Q.C., Clerk of the Privy Council, dated January 22, which stated that a communication having been received from the Lords of the Privy Council of England, stating that the question of the amendment of the Pharmacy Act, of 1868, was now under consideration, and that he was desired to request the Council to give replies to the following questions:—(1) Whether the provisions of the Sale of Poisons (Ireland) Act, 1870, so far as regards the sale of poisons to persons unknown to the seller, are generally observed in Ireland; and, if so, whether any inconvenience has been caused thereby. (2) Whether it is considered desirable that any alteration should be made in the existing law by the amendment of the Sale of Poisons (Ireland) Act, 1870, or the Pharmacy (Ireland) Act, 1875, and if so, in what respect?

The President: Does not our report convey all our views?

Mr. Brunker; I do not think it does. We should get some more information as to the inconvenience arising from the sales of poisons.

Mr. Brunker moved—

"That the letter from the Clerk of the Privy Council of Ireland be referred to the Pharmacy Act Amendment Committee, who shall draw up a reply to same and report it to this Council, and that in the meantime circulars be sent to all licentiates residing in Ireland, requesting them to give any information in their power as to irregular sales of poisons in country districts."

Mr. Grindley seconded the motion, which was unanimously agreed to.

On the motion of Mr. Draper, seconded by Mr. Grindley, Mr. Brunker was appointed Chairman of the Pharmacy Act Amendment Committee.

A letter was read from Dr. Edmund W. Davy, examiner in chemistry, stating that the two other examiners, Dr. Duffey and Mr. Evans, concurred with him in suggesting that one entire day should be allowed to him (Dr. Davy) for written and practical examinations in chemistry, and that the other of the two examination days should be divided between Dr. Duffey and Mr. Evans.

Mr. Draper said the suggestion was a most reasonable one, and moved that it be adopted, and that Dr. Davy's letter be entered on the minutes.

Mr. Hayes seconded the motion, which was agreed to unanimously.

A letter was read from Dr. Moore, Registrar of the College of Physicians, conveying the permission of the College for the use of the Fellows' Room once a quarter for meetings of the Council.

Dr. Collins moved—

"That the thanks of the Council be conveyed to the President of the College of Physicians, and that the letter of Dr. Moore be entered on the minutes."

Mr. Brunker seconded the motion, which was unanimously carried.

A letter was received from Dr. Pollock requesting, on behalf of the Academy of Medicine in Ireland, permission to use the Council room in February and April for the exhibition of sanitary improvements to the members of the Academy. The improvements were to be shown under the direction of Mr. Maguire, of Dawson Street, to a meeting of a sub-section of the Academy on State Medicine.

The President said he took on himself to give the permission asked, because he felt sure that the Council would be glad to assist so important a body as the Academy of Medicine. The appliances had accordingly been put into the room. But he wished to call attention to the fact that the Academy of Medicine had also asked for the use of the room on a second day, namely, the 12th of April. He did not know whether that would clash with the examinations of the Society or not.

The Vice-President: We have no right to give the room without the leave of the College of Physicians.

The President: Dr. Pollock stated that he had applied to the College of Physicians and they referred them to us. Was Dr. Moore consulted in the matter?

Mr. Fennell: Yes, he spoke to us about it.

Dr. Montgomery: The Council ought to assist as much as possible the improvement of sanitary arrangements.

Mr. Brunker moved—

"That the Secretary of the Department of State Medicine of the Academy of Medicine be informed that the department can have our room on the 12th of April next, provided their arrangements do not clash with our examinations which will take place on the 5th and 6th of that month, and also provided the sanction of the College of Physicians is obtained."

Mr. Allen seconded the above, which was adopted unanimously.

A letter was read from Mr. A. Davison, chemist, of Kimberley Diamond Fields, South Africa, presenting two packets of original prescriptions to the Society.

On the motion of Mr. Allen, seconded by Mr. Grindley, a vote of thanks was passed to Mr. Davison.

The President moved—

"That a notice must be forwarded by the Registrar to all members of the Pharmaceutical Society a fortnight before the expiration of their subscription to the effect that the *Pharmaceutical Journal* will not be supplied after the date which closes their subscription. That the Registrar be directed to act strictly in conformity with this resolution, but that on receipt of the lapsed subscription within a reasonable time he may forward the back numbers as supplied."

Last year the Society lost money by the *Pharmaceutical Journal* being supplied to members who neglected to pay their subscriptions. According to the existing regulation they were bound to supply the Journal for six months; and if a man then dropped off they lost his six months' subscription to the Journal, because he never informed them that he was going to drop off. He simply did not pay his money. They did not want members of that kind; they were a great drag on the Society. One object of his motion was to put an end to this state of things. Another was to test whether the supply of the Journal was an inducement to members to subscribe. The practice which he recommended was in existence in connection with all subscription journals in London and elsewhere; immediately the subscription was up the supply of the journal was stopped. One member of the Council had said that he did not like his (the President's) arrangement, and that the very day the notice appeared upon the paper three gentlemen had said they were taken by surprise, and had paid up their subscriptions. That he considered an excellent argument in favour of his motion.

Mr. Draper seconded the motion.

Dr. Montgomery said he thought it was a pity that gentlemen desiring to belong to the Society were also obliged to take the Journal. He thought members should be at liberty to take the Journal or not, as they pleased. Of course, the question was a broad one; but it would be a great matter if the Council could see their way to making the Journal a separate thing. The subscriptions of those who did not take the Journal might be reduced.

Mr. Draper: You should bring that question before a general meeting of the Society.

A Member of the Council pointed out that the supply of the Journal was merely an act of grace, and that the subscription, in any case, could not be reduced.

The latter part of the resolution was modified, so as to declare that the lapsed subscription should be sent in within two months; and with that alteration it was put and carried unanimously.

A report of the Law Committee, which recommended amongst other things that a circular should be issued to members of the Society asking them were they willing to contribute to a prosecution fund, was adopted.

A report of a Committee on the new mode of marking suggested for the examiners, was brought up. It stated that the members who attended the Committee were the President, Messrs. Allen, Brunker and Montgomery, together with Dr. Duffey and Mr. Evans, examiners. They had discussed the proposed rule as to percentage, and recommended that the minimum for Pharmacy should be 45 per cent., and that for Chemistry, Materia Medica, and Botany 40 per cent., and that the candidate should make a total of not less than 55 per cent. It was suggested that the examiner in arts should be requested to make his marking in conformity with this arrangement. The examiners had suggested that the written and the practical examinations should be on separate days, and the Committee recommended that that suggestion be acquiesced in.

The report was adopted.

The Council then adjourned.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The eighth general meeting of the above Association was held at the Royal Institution, on Thursday, February 1, 1883. The President, Mr. Joseph Woodcock, occupied the chair.

The minutes of the last meeting were read and confirmed.

The following donations were announced:—The *Pharmaceutical Journal*, from the Society; the *Canadian Pharmaceutical Journal*, from the Editor.

Mr. A. H. Samuel called attention to the recent discovery that some of the Paris Hospitals had been supplied with a preparation under the name of quinine containing upwards of 40 per cent. of cinchonine.

Mr. Symes mentioned the subject of permanganate of potash pills.

Mr. T. Farmer, F.C.S., F.R.H.S., then read a paper upon the "Development of Theory in Chemistry."

A vote of thanks, proposed by Mr. A. H. Samuel, was passed to Mr. Farmer for his interesting and elaborate paper.

ABERDEEN CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The weekly meeting of this Association, was held on Thursday, February 8. The President occupied the chair and there was a fair attendance.

The subject on the syllabus was a debate on "Should the Proposed Curriculum be adopted." It was opened in the affirmative by Mr. Charles Moir, and the negative was argued by Mr. R. Eden. The discussion was entered into with great spirit, being taken part in by nearly all present.

On the vote being taken at the close it was found that the negative view had commanded the majority of votes.

A vote of thanks to the leaders terminated the proceedings.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The half-yearly meeting of the above Association was held at the rooms, Halford Street, on Thursday, February 1, 1883. The President, Mr. J. J. Edwards, in the chair.

After a few remarks from the President, a report of the past half-year's work was read and adopted, from which the following has been abridged:—

The Committee stated that the materia medica class had been continued, and a chemistry class again started, both attaining a fair amount of success. The number of members had increased; but it had been found absolutely necessary to resort to some practical means for the increase of the funds, and with this object in view, the fees of the members had been raised. This to some degree had had the desired effect, but as there had been shortcomings elsewhere, it had not entirely removed the difficulty. It is earnestly desired that the Association should receive the full support of the members of the trade, lest that which has been the means of untold usefulness in the past, and held a high place amongst associations of its kind, should come to an issue by no means pleasing. The hearty thanks of the Committee were tendered to the honorary members for their subscriptions; the Pharmaceutical Society, for the Journal; the British Pharmaceutical Conference, for the last 'Year-Book of Pharmacy'; and the gentlemen who had delivered lectures during the half-year.

The meeting then proceeded to the election of a Committee for the ensuing session, with the following result:—Mr. J. Garrett, President; Mr. J. J. Edwards, Vice-President; Mr. W. B. Clark, Treasurer; Mr. R. E. Broof, Secretary; Messrs. Kelly, E. Brice and Winter.

The balance sheet showed that the receipts during the half-year had amounted to £13 17*s.* 4*d.*, and that the balance due to the Treasurer had been reduced from £5 13*s.* to 15*s.* 9*d.*

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The seventh meeting of this session was held in the Pharmaceutical Society's Rooms, 119A, George Street, on Wednesday, January 31, Mr. Peter Boa, President, in the chair.

The minutes of the former meeting having been read and confirmed, the Chairman called upon Mr. J. R. Hill, Secretary to the Association, to read a paper on "The Manufacture of Sulphuric Acid."

In the introductory portion of this paper the properties and uses of sulphuric acid were fully treated, it being pointed out that nearly nine-tenths of the product is utilized by the manufacturers in the production of alkali, artificial manures, etc. The history of the acid from the time of Geber up to the present time was then given, the author incidentally noting the different methods of preparation used from time to time and the quantities and market value of acid so produced. He then proceeded to consider the composition, properties and sources of the raw materials employed. Regarding sulphur, it was mentioned that at one time Sicilian sulphur was the only body employed for the production of sulphur acids, but owing to the monopoly granted by the Sicilian Government its use for this purpose had now been almost superseded by pyrites. A full account of the methods employed in manufacturing acid from both materials was given, the description being rendered very interesting by means of a series of diagrams of furnaces, Gay Lussac and Glover towers and other plant employed, as well as by an enlarged plan of a sulphuric acid manufactory. The paper concluded with a summary of the theories advanced regarding the reactions which may take place during the chamber and denitrating stages, the author illustrating his statements by blackboard equations.

A discussion followed the reading of the paper, in which Messrs. Adamson, Boa, Hendry and MacEwan took part.

On the motion of the President, a hearty vote of thanks was accorded to Mr. Hill for his interesting communication.

A series of specimens illustrative of the paper will be shown at the next meeting of the Association.

After some other business had been disposed of, the President announced the next meeting for February 21, when a paper on "The Manufacture of Alcohol" will be read by Mr. James McGlashan.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on February 1. Dr. Gilbert, President, in the chair.

The minutes of the previous meeting were read and confirmed.

The following certificates were read for the first time: G. Board, J. J. Knight, J. O'Sullivan, A. Vasey, T. D. Watson, R. M. Walmsley.

During the evening a ballot was held, and the following were declared by the Scrutators, Messrs. J. Spiller and W. Thorp, to be duly elected, as Foreign Members: F. Beilstein, D. T. Clève, H. Debray, E. Erlenmeyer, R. Fittig, H. Helmholtz, D. Mendelieff, Victor Meyer, Lothar Meyer; as ordinary Fellows, H. C. Bond, G. Chandra Basu, J. Brock, A. M. Chance, J. T. Donald, H. C. Foote, W. Fox, W. R. Flett, J. A. M. Fallon, E. C. Gill, F. Gothard, J. Hunter, H. Jones, R. B. Lee, A. H. Jackson, Joowansinghi, T. Jenner, J. E. Johnson, W. W. J. Nicol, F. W. Richardson, E. S. Spencer, C. A. Serré, T. Turner, J. E. Tuit.

Dr. Hodgkinson then communicated to the Society a paper—

On Derivatives of Fluorene. By W. R. E. Hodgkinson and T. E. Matthews.—Since Berthelot first isolated diphenylenmethane from coal tar oil, this body, termed fluorene from its supposed fluorescent properties, has been studied by several chemists. The object of the present investigation was to obtain a hydroxyl derivative. The fluorene was obtained in a state of approximate purity from Schuchardt and Kahlbaum. It was crystallized five or six times from hot alcohol, those crystals only being reserved which fell out between 25°–30°, and thus a pure product melting constantly at 113° and boiling 298°–305° was obtained. The slight fluorescence of this pure product can be entirely removed by sublimation over a little potassium carbonate. A dibromfluorene $C_{13}H_8Br_2$ and a monobromfluorene $C_{13}H_9Br$ were obtained; both these bodies yield on oxidation a substituted diphenylen ketone. The authors have also prepared fluorene sulphonic acid, $C_{13}H_9SO_3H$, by treating a chloroform solution of fluorene with SO_3HCl; the potassium, barium and cadmium salts were prepared and analysed. On heating the potassium sulphonate with potash to 400° C, acidifying the product and distilling in a current of steam, a white crystalline substance came over consisting of a substance melting at 205°, having the composition $C_{12}H_{10}O_3$, and a second substance much more soluble in water. This extraordinary result, the formation of trihydroxydiphenyl, can only be brought about by the splitting off of the methylen group in fluorene, and its replacement by two hydroxyl groups. By dropping the hydrocarbon into fused potash a dihydroxydiphenyl $C_{12}H_{10}O_2$, melting at 98°, was prepared. The authors shortly discuss the constitution of these bodies. The authors have also prepared dichlorfluorene $C_{13}H_8Cl_2$ by passing chlorine through a cold chloroform solution of fluorene. By using boiling chloroform a substance $C_{13}H_5Cl_7$ is obtained; a completely different action takes place when chlorine is passed into boiling fluorene. Fused potash acts energetically on these chloro-derivatives.

Mr. R. COWPER then read a paper—

On the Action of Chlorine on certain Metals.—As previously noticed by Wanklyn, dry chlorine is quite unable to act upon metallic sodium. The author finds that chlorine which has been perfectly dried by long contact with fused calcium chloride is without action on Dutch metal foil; on introducing a minute quantity of water the ordinary reaction ensues immediately. Similarly zinc foil and magnesium are not attacked. Silver and bismuth are tarnished very slowly. Tin foil, arsenic, and antimony are attacked immediately. The author remarks that these three metals all form chlorides which are liquid at ordinary temperatures. Chlorine, whether dry or moist, attacks mercury. If dried chlorine be passed over a piece of potassium the latter catches fire; this is probably caused by the envelope of hydrate. Potassium was sealed up in a tube containing dry air; the tube was then heated until all the oxygen was absorbed and a bright surface of potassium obtained; the tube was then filled with chlorine. The surface of the metal became slowly covered with a deep purple film, and the potassium finally ignited when heated considerably above its melting point.

Dr. Armstrong suggested that the author should dry the chlorine with phosphoric anhydride, and then try its action upon antimony; it was most important to settle the question whether two bodies could act upon each other without the presence of a third. Thus in most text-books it was stated that zinc dissolved in sulphuric acid; now, zinc is quite insoluble in sulphuric acid, and the presence of water is necessary to effect solution.

Mr. J. Spiller asked if the author had ascertained, in an alloy, whether chlorine attacked one metal leaving the other untouched, as, for instance, an alloy of zinc and tin.

Mr. Groves said that bromine when dry had no action upon zinc, but acted violently upon antimony and tin.

Dr. Hodgkinson mentioned that sulphur dioxide and sulphuretted hydrogen did not act upon each other if perfectly dry.

Professor McLeod said that similarly carbonic oxide and oxygen did not explode if free from moisture.

Mr. Cowper in reply said that he had not tried the action of chlorine upon an alloy of zinc and tin, nor upon phosphorus.

Mr. L. T. WRIGHT then read a paper entitled—

Some Notes on Hydrated Ferric Oxide and its Behaviour with Sulphuretted Hydrogen.—The author endeavoured to prepare hydrated ferric oxide by precipitating the chloride with ammonia, but could not succeed in preparing it free from basic chloride. In order to avoid the inconvenience of handling a bulky gelatinous precipitate the following method was tried:—Ferric chloride solution was added slowly to an excess of ammonia, and the whole evaporated to dryness at 100°. The reddish brown mass on treatment with water fell into an impalpable powder, which, for the most part, passed through many filter papers. The filtrates were turbid and of a bright red colour. In this condition the precipitate is probably similar to the so-called "colloidal ferric hydrate." The ferric hydrate in this condition is not blackened by sulphuretted hydrogen. Recently precipitated ferric hydrate is blackened at once by sulphuretted hydrogen, and the sulphide thus formed is completely soluble in excess of potassic cyanide

$$FeS + 6KCN = K_2S + K_4Fe(CN)_6.$$

Two equations are given in text-books to express the reaction of sulphuretted hydrogen upon hydrated ferric oxide,

$$(1)\ Fe_2O_3H_2O + 3H_2S = Fe_2S_3 + 4H_2O$$
$$(2)\ Fe_2O_3H_2O + 3H_2S = 2FeS + S + 4H_2O.$$

The author has studied the reaction, estimating the sulphur and the water formed.

Mr. Page suggested that it would be interesting to know whether the finely divided precipitate could be filtered off by sucking the fluid by a Sprengel pump through porous porcelain. Milk when thus filtered through the porous cell of a Daniell battery furnishes a perfectly transparent filtrate almost free from albuminous bodies and fats, but containing the sugar and salts.

The Secretary then read a paper—

On Alpha Cyano-naphthalene Sulphonic Acid. By U. K. DUTT.—The author first prepares naphthalene alpha sulphonic acid by treating naphthalene in carbon disulphide solution with sulphuric hydrochloride. The acid was converted into a potassium salt, which was distilled with an equal quantity of potassium ferrocyanide. The product was crystallized from light petroleum, and obtained as yellowish acicular crystals, melting at 36°. This α-cyano-naphthalene was dissolved in carbon disulphide and treated with sulphuric hydrochloride, and thus brilliant, colourless, laminar crystals of α-cyano-sulphonic acid were obtained; the barium salt was also prepared and analysed by the author.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

W. W. Morris.—(1) *Hypnum alopecurum.* (2) *Trichocolea tomentella* (scale moss). (3) *Plagiochila asplenioides* (scale moss). (4) *Hypnum cuspidatum.* (5) *Mnium hornum.* (6) *Hypnum triquetrum.*

M.P.S.—Syrup of white poppies.

An Assistant.—We do not think the subject can be discussed profitably in these columns, by persons unacquainted with all the circumstances of the case. Evidently there is some excuse for irritation.

R. B. Rees.—A recipe for ginger ale will be found in vol. xi., p. 588. As to "soluble essence of ginger," see Mr. Thresh's papers, vol. x., pp. 193 and 260.

Nemo.—A widow of a chemist and druggist, left sole executrix, may carry on the business with the aid of a qualified assistant, only during the time in which she is engaged in carrying out the duty of executrix.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. Symes, Dr. Hesse, Messrs. Benjamin, Long, Martin, Symons, Smith, Forrest, Haydon, Wade, Laurie, Vincent, Evans, Pond, Williams, Hoult, Clagur, Cymro, Tinct. Gent. Co., A Forth Bank Assistant, One who Loves the Work, etc., B. J.

"THE MONTH."

Welcome signs of spring are already meeting the eye. The upper branches of the elm are bristling with flower-buds, the coltsfoot is decking favourite localities with its bright blossoms, and the catkins of the black poplar, the hazel and the willow are beginning to show traces of colour. An Isle of Wight correspondent remarks that compared with last year the flowers are running a neck-and-neck race. *Pulmonaria angustifolia* was observed in flower on February 7, and the Lent lily, true to its name, opened one day before Lent began. In the Royal Gardens, at Kew, the nutmeg is just coming into blossom.

In *Nature* (February 15, p. 365), Fritz Muller calls attention to some interesting facts with regard to plants which have differently coloured anthers or pollen in the same flower, or stamens of different length. Thus in *Heteranthera reniformis* insects visit the short stamens with yellow anthers, while fertilization is effected by the longer stamen with pale blue pollen. He suggests that the green colour of the anthers of the longer stamens of the mid-styled and shorter-styled flowers of *Lythrum Salicaria* may protect them against the attacks of pollen-eating insects. In a species of *Cassia* he has noticed that the humble bees which visit it gather the pollen of the four intermediate stamens, the three upper ones being pollenless, while the three lower ones, which are very long and curved, deposit their pollen on the back of the insects, whence it is taken by the similarly curved and elongated style.

At a meeting of the Linnean Society, January 20, Mr. H. Groves exhibited a specimen of *Ranunculus ophioglossifolius*, collected in the New Forest. In the British Islands this species has hitherto been found only in Jersey, and even there it is now practically extinct. The discovery of this plant and of *Eriophorum gracile*, *Orchis incarnata*, L., and of new localities for *Spiranthes æstivalis* and *Isnardia palustris*, indicate that there are probably parts of the grand old forest which may still repay careful exploration. A new British *Potamogeton* is also reported from North Wales, an account of which will appear in the March number of the *Journal of Botany*.

It is fortunate that fungological forays do not depend for their success on the edible properties of the species met with. One by one our edible species have been recently attacked. M. Dupetit has stated that *Agaricus campestris*, *Boletus edulis*, and three species of *Amanita* contain a poison, and now fresh *Helvella esculenta* is stated by Dr. Bostroem, of Freiburg (*Brit. Med. Journ.*, Jan. 27, p. 172), to also contain under all conditions a very active poison. Boiling and rejection of the water afterwards, prolonged washing, the addition of salt and any pickling process all fail to eliminate it. The fact, however, that this and other fungi have long been eaten with impunity, taken in conjunction with Bostroem's statement that the active principle is very soluble in hot water and is very unstable, and his denial that there is any form of the fungus but the typical one, as well as his affirmation that that one is poisonous, leads to the suspicion that it is probably only in cases of idiosyncrasy, or when the fungus is eaten raw, that there is any danger. *Lycoperdon giganteum* has been known to produce poisonous symptoms when eaten raw, but it is harmless and agreeable to eat when cooked.

The importance of a knowledge of the properties of the microscopic fungi with which we are surrounded is daily shown to be more and more important. A disease occasionally met with in France and occurring (*Lancet*, Jan. 27, p. 160), chiefly among labourers who manipulate the stems of the large reed, *Arundo Donax*, has recently been traced to the fungus *Sporotrichum dermatodes*, developed on the surface of the reeds under the influence of prolonged exposure to moisture. The symptoms produced are a painful irritation of the nose, eyes and throat, followed by erythematous swelling, which extends to others parts of the body. Acuminated pustules subsequently appear; inflammation of the eyes and a slight cough being also produced. Although usually trifling, the malady may sometimes assume a severe form, and has been known to cause death.

The *Brewers' Guardian* (Feb. 13, p. 47), calls attention to the fact that notwithstanding there was probably nearly 300,000 tons of dry yeast produced in the breweries of this country last year, six-sevenths of which was in excess of the requirements of the breweries, the imports of dried yeast from abroad during the same period amounted to nearly 30,000 tons. It is known that the bitterness of brewer's yeast is an obstacle in the way of its utilization by bakers, for whom the specially-prepared yeast is imported from abroad; but it would seem desirable that further investigation should be made as to the possibility of removing the objectionable bitterness and so to make another waste product available for economic purposes.

A few months since it was demonstrated by M. Gessard (*Pharm. Journ.*, [3], xii., 802) that the blue-green coloration sometimes noticed on the dressings of wounds is due to the development of minute organisms capable of separate cultivation. M. Rapin has now found that the analogous phenomenon of a black coloration occasionally occurring in toilet sponges is referable to a similar cause (*Lancet*, Feb. 17, p. 325). The blackness is attributed to the development of a minute fungus belonging to the genus *Torula*, and which he has named *T. spongicola*, in the chitinous fibres of the sponge, where it produces black spores and induces an alteration in the tissue of the sponge itself, which also becomes black. The fungus is communicable from one sponge to another; but it can be combated with the ordinary disinfectants or boiling water.

M. A. Bechamp, in the first number of Brown-Séquard's *Archives de Physiologie* for the present year (*Lancet*, January 27, p. 163), undertakes to show that the power possessed by the saliva of man of converting starch into sugar, which is not exerted by the saliva of the horse, dog or ox, is dependent upon a peculiar and special zymase which is the outcome of the action of microzymes peculiar to the salivary glands, of the microzymes of the anatomical elements which line the buccal cavity and the tongue, and of the microzymes and infusorial animalcules that accumulate in the interstices of the teeth. He found in the course of his experiment that a milligramme of the matter adherent to the free border of the gums of a healthy man, after being frequently washed with a weak solution of creasote, acted powerfully on starch paste. The parotidean saliva of the horse and dog do not saccharify boiled starch naturally, but acquire the power if placed in contact with the buccal organism of man.

Dr. C. Burger, of Bonn, describes in the *Berl.*

Med. Woch., No. 1, 1883 (*Med. Times and Gazette*, Feb. 3, p. 129), the bacterium of whooping cough. They are found most abundantly in the opaque white pellets of the early stage of the disease. With a magnifying power of 600 diameters the bacilli appear as small rods of different sizes, but of an attenuated ellipsoidal shape, the smaller being about twice as long as broad. With the aid of higher magnifying power and an Abbé condensing lens the larger rods are seen to have a constriction in the middle. These are quite distinct from those of *Leptothrix buccalis*, which are longer and thicker, and the spores and long threads of the leptothrix may always be discovered in close contiguity with them. Methyl-violet or fuchsin is used as the staining agent.

M. Vallin has lately (*Lancet*, Jan. 27, p. 161) communicated to the Académie de Médecine the results of a series of experiments on the disinfection of tubercle. He found that it was necessary in order to destroy the activity of tuberculous matter, spread on strips of paper in a chamber 50 cubic centimetres in area, to expose them to the fumes of burning sulphur for twenty-four hours, and that if less than 20 grams of sulphur was burnt animals subsequently inoculated with the matter died of tuberculous disease. He therefore deduces from his experiments the inference that it would be well every year to purify by sulphurous fumigation all prisons, barracks, hospitals and schools.

A paper, by Dr. Leistikow, is reported in the *Berliner Woch.*, No. 32, detailing the results of his researches on the bacterium of gonorrhœa. These are found in the pus cells, the locality distinguishing them from other bacteria, and whether found in the urethra or conjunctiva may be taken as proof of the disease, since they are not found in other secretions. Corrosive sublimate prevents their development, and Dr. Leistikow especially recommends its external use, in an exceedingly weak solution, such as 1 in 2000 or 3000, as the best treatment of gonorrhœa.

A novel dress, intended to protect nurses and others who have to enter the apartments of persons suffering from infectious disease, has recently been exhibited (*Med. Times and Gazette*, Jan. 27, p. 97) at the rooms of the National Health Society, Berners Street. The garment is of mackintosh, glazed inside and out, and made to completely envelop the wearer, with a hood to cover the head, only the hands and face remaining exposed. The garment is enclosed in a tight case when not in use, and can be cleansed by disinfectants as often as deemed necessary. By this means the danger of communicating diseases by garments is minimized. Further protection is given where necessary by a simple form of respirator, made of two folds of thin washing-net, between which is placed a thin layer of medicated cotton wool, which allows no germs to pass, while permitting the wearer to breathe. After use the wool is burnt and the net washed.

An account of the action of very dilute nitro-hydrochloric acid on meat and other animal substances has been recently published by Signor Pavesi, in the *Giorn. Farm. Chim.*, xxxi., 529 (*Nature*, February 8, p. 348). He finds that it is an excellent preserving agent. Meat in pieces of about 1 kilogramme kept in the liquid in wooden vessels remains unaltered and savoury for years. The meat so treated may also be dried at 15° to 20° C. without undergoing change, apart from a diminution of volume and the appearance of a brown colour; when placed for a few hours in water the meat regains its original softness and colour.

Professor Dianin records some observations on the use of trichlorophenol as a disinfectant, in the *St. Petersburg Med. Woch.*, 38, 1882 (*Practitioner*, Feb., p. 146). He considers it twenty-five times more powerful than carbolic acid, and that it deodorizes as well as disinfects. The solid substance is but very slightly, the solution not at all, irritating to the tissues. It is prepared by acting on carbolic acid with chloride of lime and the formula given is $C_6H_2Cl_3OH$. The compound with calcium is cheaper than carbolic acid, and that with sodium is inodorous, the properties of both being similar to those of trichlorophenol.

Dr. Gourges (*Jour. de Med. de Paris*, Sept. 22) recommends an ointment of 4 parts of finely powdered boracic acid, ½ part of benzoic acid and 20 parts of vaselin, in the treatment of boils. It promptly relieves pain, and causes the disappearance of the boil in three or four days.

L'Union Pharmaceutique proposes a method of applying chrysarobin to the skin, by which the staining of the clothes usually caused by it may be prevented. The chrysarobin is mixed with water so as to form a dough, and is applied carefully to the diseased spot, previously freed by warm water from adhering scales. As soon as it is dry, which will be in a few minutes, it is covered with a layer of collodion. After some days the whole may be soaked and washed off with warm water, when the application may be repeated (*New Remedies*, Jan., p. 20).

Iodide of barium has been used in France as an application to enlarged lymphatic glands, and more especially as a local application in chronic eczema. For this purpose it can be mixed with petrolatum. Iodide of barium is actively poisonous (*New Remedies*, Jan., p. 20).

Iodide of lithium is said to be the most useful of the lithium salts in the treatment of gout. It is serviceable in well developed cases and also in varieties of eczema and dyspepsia of gouty origin (*New Remedies*, Jan., p. 20).

Dr. W. H. Broadbent, commenting in the *Lancet* (Jan. 27, p. 166) on the use of manganese in amenorrhœa, points out that the use of the metal for this purpose was known as long ago as 1868, and quotes from the 'Transactions of the Clinical Society' (ii., 122) to show that it is there stated that in using certain metals as accessories to iron, manganese seemed to have a special influence in promoting the return of the catamenia, and nickel a special property in checking leucorrhœa. He attributes, however, the favourable effect of manganese to its effect on the general health and on the blood, since it does good in anæmia, whether associated with amenorrhœa or menorrhagia.

Dr. J. Mortimer Granville, in the *Brit. Med. Journ.*, p. 183, gives a prescription for acute gout, which he believes will give great relief. It is as follows:—"Ammonii chloridi, ʒij.; potassæ chloratis, ʒjss.; tincturæ iodi, ʒj.; glycerini, ʒvj.; aquam destillatam ad ℥vj. Misce fiat mistura cujus sumantur cochlearia duo magna quartâ (vel tertiâ) quaque hora. If there be much thirst it is well to give the dose of this mixture further diluted with water. In the interval of successive attacks of gout while the *malaise* lasts, great benefit is often derived from the use of a single dose freely diluted every morning before breakfast." If this prescription were correct, it would certainly be a heroic remedy, and one impossible to dispense as directed. But there can be no no doubt that ʒvj., as applied to distilled water, is a printer's error, probably for ℥vj.; at all events, chemists who may be called upon to dispense this prescription had better make inquiries on this point.

Dr. Quinlan, of Dublin, who last year read a paper at the British Pharmaceutical Conference, on the hæmostatic properties of the *Plantago lanceolata,* has recently investigated the properties of the common mullein, *Verbascum Thapsus* (*British Medical Journal,* January 27, p. 149). This plant has long been used in Ireland as a domestic remedy for consumptive cough, and Dr. Quinlan has made a series of experiments with a view to determine if it really possesses the valuable properties attributed to it. He finds that when boiled in milk the patient takes the decoction readily and experiences a physiological want when it is omitted. Its power of checking phthisical looseness of the bowels and the relief afforded to coughing were very marked, so that the patients took hardly any other cough mixture. In early stages it appears to have a distinct power of increasing weight, but in advanced cases, Dr. Quinlan remarks that he is not aware of anything that will do this except koumiss.

Dr. T. P. Kinnicutt has tried the oil of wintergreen, salicylate of methyl, in twelve cases of acute rheumatism, and considers that it possesses the following advantages (*Brit. Med. Journ.*, February 10, p. 243). Its use is unattended with the occasional toxic effects and frequent gastric disturbance produced by the acid or its sodium salt, while its agreeable taste and its comparative cheapness are also recommendations in favour of its employment. In controlling the disease, he considers that it at least ranks with any of the salicyl compounds, and that the best method of administration is in frequently repeated doses, diminished throughout the period of convalescence.

Paraldehyd has recently been introduced into medical practice as a new hypnotic, by Professor Morselli, of Turin (*Brit. Med. Journ.*, Feb. 3, p. 215). This body is a polymeric form of aldehyde and in its physiological action somewhat resembles chloral. Its formula is $C_6H_{12}O_3$. From chloral it differs in strengthening the action of the heart while diminishing its frequency. It also greatly increases the flow of urine, but does not affect the skin, and it does not give rise to digestive disturbance, headache or any other unpleasant symptom. Professor Morselli believes that it will to a large extent take the place of chloral. He has found it a valuable remedy in mania, melancholy and other nervous affections, as well as in the sleeplessness that accompanies acute bronchial catarrh, lobar pneumonia and heart disease. The action of paraldehyd was first studied by Dr. Cervello, of Palermo.

Dr. W. Soper, in the *Lancet* (Feb. 10, p. 262), recommends the use of a mixture of equal parts of glycerine and castor oil, slightly flavoured with oil of almonds or lemon, as an agreeable substitute for castor oil. He states that of this mixture a teaspoonful is an effective dose, and in cases of chronic constipation, hæmorrhoids and anæmia it has proved most useful. He has found half-teaspoonful doses useful in the early states of bronchitis, in which it seems to promote exudation from the bronchial tubes and is certainly expectorant. Dr. Soper having stated that there was some difficulty in making the two liquids mix, Mr. Brewis, a Portsmouth chemist, in the succeeding number (Feb. 10, p. 303), points out that if the glycerine be first poured into a mortar and the castor oil added very gradually, triturating thoroughly meanwhile, the result will be a perfectly homogeneous jelly-like emulsion, which, even after the lapse of twenty-four hours, shows no signs of separation, and in which the taste of the oil, if the finest Italian kind be used, is quite disguised.

M. Vigier, in the *Gaz. Hebd. de Méd.* (*Med. Press and Circ.*, Feb. 4, p. 149), states that any substance incorporated with glycerine is not absorbed when applied to the skin and does not produce constitutional effects. Hence he recommends the use of glycerine instead of lard in mercurial preparations for scabies, pediculi, etc. He states that even the following glycerite may be used without danger:—Hydrarg. bichlor. ʒiss., glycerine ℥iij.

Thanks to careful observations by scientific observers, the use of medicines is daily becoming less empirical and more dependent on actual knowledge based on experiments on animals. Professor Rossbach, of Wurtzburg, has recently added to our already increasing store, by experiments made as to the action of alkalies and other expectorants (*Brit. Med. Journ.*, Jan. 27, p. 165). It has generally been supposed that alkalies render the mucus of the air passages, etc., more soluble. Dr. Rossbach's observations, however, show that this is not the case, but that they cause a gradually increasing pallor and greenish-white appearance of the mucous membrane and ultimately a complete cessation of the mucous secretion.

As the results of other experiments, Dr. Rossbach strongly recommends oil of turpentine internally and locally in cases of chronic bronchial catarrh, especially where putrid expectoration is present. Apomorphia he considers to be the prototype of all expectorants, it giving in his hands most excellent results. He administers it in the form of hydrochlorate in doses of $\frac{1}{15}$ to $\frac{1}{7}$ of a grain thrice daily with a little dilute hydrochloric acid, the mixture containing no sugar and being kept in a dark bottle. Morphia possesses the advantage over atropine of diminishing secretion and lessening irritability without subsequent inflammation being produced. A mixture of morphia and apomorphia he has found extremely useful in difficult expectoration, while a combination of morphia and atropine has given excellent results in catarrh, emphysema and phthisis.

Two new anæsthetics, diethylacetate and dimethylacetate, have recently been experimented with by Dr. Mering (*New Remedies*, Feb., p. 51). The former has a burning pungent taste and the latter a disagreeable taste and smell. Both rapidly produced narcosis in frogs and rabbits, slowing the action of the heart, weakening the respiratory movements and acting, when inhaled, much like chloroform. The former was tried on criminals; it acted well, causing narcosis without bad after effects.

Dr. M. Czartoryski, writing to the *Lancet* (p. 261, Feb. 10), from California, states that the Chinese place great reliance on the internal use of fresh lime juice, and of the fruit itself, in diphtheria, and that the results are apparently most successful. Following their example, he has found the same advantages to accrue from its use even in the most desperate cases.

MM. Coninck and Pinet (*Comptes Rendus*, Jan. 15, p. 200) give an account of physiological experiments made on the frog, guinea-pig and dog, to determine the action of picoline and lutidine. They find that picoline abolishes the excito-motor power of the nervous system, thus approaching cicutine in its action. β-lutidine obtained from cinchonine has a similar effect, as also β-lutidine derived from brucine, but the latter acts more rapidly and diminishes muscular contractility, the hydrochlorate being still more active.

The recent introduction of a preparation of the seeds of *Abrus precatorius* (jequerity seeds) in the treatment of ophthalmia will lend interest to an investigation of them by Dr. Warden, of Calcutta. In a preliminary physiological experiment, half a seed, rubbed down with a small quantity of water, and injected into the thigh of a full-grown cat, produced fatal effects within twenty-four hours. This is in accordance with what is alleged to be a practice in some parts of India of using small spikes prepared by drying a paste of the powdered seeds for felonious cattle-poisoning, the spikes being fastened on to the end of a stick after the manner of a drover's goad. The only special principle which Dr. Warden has succeeded in isolating is an acid, which he represents by the formula $C_{21}H_{24}N_3O_4$, and has named "abric acid;" but this proved to be non-poisonous. There appears to be no question that a poisonous principle of considerable potency is present in the seeds, and Dr. Warden thinks his failure to isolate it may be due to its susceptibility to the action of reagents or heat, to its volatility, or that having a composition analogous to amygdalin, its poisonous properties require for their development the action of a principle allied to emulsin.

The composition of cacao butter has been engaging the attention of Herr Traub (*Archiv*, xxi., 19), who is, however, unable to confirm the experience of Mr. Kingzett (*Pharm. Journ.* [3], viii., 412), as to the presence in this fat of two new fatty acids, one of them, which he named "theobromic acid," having the formula $C_{64}H_{128}O_2$. The highest member of the $C_nH_{2n}O_2$ series recognized by Herr Traub was arachic acid, $C_{20}H_{40}O_2$, the other acids obtained being oleic, lauric, palmitic and stearic acids. He is of opinion that the solid consistence of cacao butter coincident with a low melting point is dependent upon the peculiar relative proportions in in which these acids are present.

Some experiments have been made by Herr Müller (*Pharm. Central.*, 1882, p. 581), having for their object to ascertain whether the composition of tamarinds is approximately constant. The pulp of nine specimens obtained from various sources, freed from seeds, showed the greatest variation in respect to citric acid, one specimen containing 3·95 per cent., and another only 0·64 per cent., and it may be remarked that Dr. Nessler has reported the presence of 13·5 per cent. in a specimen examined by him. The other constituents found were:—tartaric acid, ranging from 5·29 to 8·80 per cent.; potassium bitartrate, from 4·66 to 6·01 per cent.; water, from 21·92 to 32·58 per cent.; and vegetable fibre from 12·6 to 20·2 per cent. The relative proportion of the seeds varied enormously, one specimen containing 1·5 per cent. and another 38 per cent. It is evident that the proportion of this last constituent has an important bearing upon the value of the drug, and the author is of opinion that 10 per cent. should be the maximum of seeds allowed.

Mr. Martin, referring (*Druggists' Circular*, Feb., p. 17) to the coloration which takes place in a solution of salicylate of sodium, after being kept for a short time, says that it may be obviated by an addition of a small quantity of sodium hyposulphite. He prepares a solution which he finds to keep indefinitely, by rubbing 16 ounces of salicylic acid into a paste with 1 pint of boiling water, adding 1 drachm of sodium hyposulphite, and then gradually pouring upon it a solution of 9 ounces of sodium bicarbonate in $1\frac{1}{2}$ pint of boiling water. After filtration through paper sufficient water is added to make the product measure 4 pints.

According to some experiments recently described before the Société de Biologie, by Dr. Laborde, which were suggested by the recent disclosures as to the adulteration of the quinine supplied to the Paris hospitals, the physiological effects following the subcutaneous injection of quinine and cinchonine differ considerably. Two guinea-pigs were submitted to injections; one of them received twenty centigrams of the quinine adulterated with cinchonine, and the other twenty centigrams of pure quinine. The former was attacked almost immediately with violent convulsions and died in the course of twenty minutes; the other presented the well-known phenomena of quinism, collapse and ataxia, but did not die until after fifty or sixty minutes. Dr. Laborde pointed out, as a clinical fact of importance, that certain diseases, as for instance, typhoid fever, involve a predisposition to symptoms resembling those following the administration of cinchonine. If the observations of Dr. Laborde are confirmed in experience it is manifest that they will have an important bearing upon the use of preparations of red bark, such as the mixed alkaloids and those which have recently been made official in the United States Pharmacopœia.

A few months since Dr. Hesse stated (*Pharm. Journ.*, [3], xii., 517) that in a peculiar thin kind of cuprea bark, of a much paler colour than the ordinary bark of the *Remijia pedunculata*, he had found, in addition to cinchonine and a new alkaloid, a large quantity of aricine and cusconine. This "new alkaloid" he now believes (*Berichte*, xvi., 58) to be identical with the "hydrocinchonine" of Caventou and Willm, and the alkaloids he then regarded as aricine and cusconine, he now finds to consist of several new bodies. At present Dr. Hesse has separated an alkaloid which he calls "concusconine," as standing in the same relation to cusconine as quinidine to quinine; another which he has named "concusconidine," analogous to cusconidine, and a third, somewhat resembling aricine, which he believes may eventually prove to be identical with Arnaud's cinchonamine. Concusconine (m.p. 144°) gives $(\alpha)_D + 36·8$ (whilst cusconine melts at 110°, deflects the ray of polarized light (54·3° to the left), and crystallizes from alcohol with one molecule of water of crystallization. Concusconidine, $C_{23}H_{26}N_2O_4$, (m.p. 124°) is an amorphous yellowish white powder and gives a sulphate which gelatinizes from boiling water, but which soon becomes transformed into a mass of delicate needles. The alkaloid resembling aricine has the composition $C_{19}H_{24}N_2O$ (m.p. 184°), and gives a sulphate, $(C_{19}H_{24}N_2O)_2SO_4H_2$, which crystallizes from alcohol in colourless prisms, readily soluble in water. It is dextro-rotatory, whilst aricine is lævo-rotatory. As Dr. Hesse is extracting the alkaloids from about 100 kilos of this bark there is a possibility of the discovery of other alkaloids and an elucidation of the question as to the identity of cinchonamine. Diconchinine (diquinidine) and a small quantity of cincholine are also separable from the amorphous bases of cuprea bark, and more conviently than when dealing with cinchona bark.

In these days of unbelief it is satisfactory to learn (*Berichte*, xvi., 60) that Dr. Hesse has confirmed the independent statements of three sets of observers as to the existence of a peculiar alkaloid in cuprea bark,—"homoquinine," "ultraquinine" or "cupreine," —by an examination of a portion of the alkaloid obtained by Messrs. Paul and Cownley in their investigation. He states moreover that, although working with quinine and quinidine of absolute purity and prepared from cuprea bark, he has been unable to obtain the compound of quinine and quinidine which Messrs. C. H. Wood and Barrett stated they had prepared.

The observation that the essential oils of chamomile, wormwood, and millefolium, though varying in colour, when examined spectroscopically all give three absorption bands in the red and orange, led Herr Hock to suspect that there is a colouring matter common to them all (*Archiv*, xxi., 17). Upon submitting samples to distillation the first portion was obtained colourless; but on exceeding 150° C. greenish and blue-green portions passed over, and at 260° C. an intensely blue distillate, which showed the three absorption bands most distinctly. An examination of other similar oils led to the conclusion that although differing in chemical composition they all contained the same blue colouring matter (azulen). It would appear that this blue body is sometimes formed in the plant, and sometimes is first produced during distillation in the vapour of water, or at a higher temperature, as in the dry distillation of galbanum. The formation appears to be associated with the age of the oil, a somewhat resinified oil yielding a larger blue fraction than an equal quantity of a perfectly fresh sample.

Dr. H. P. Farnham, in a paper read before the Materia Medica Society of New York (*New Remedies*, February, p. 39), calls attention to the fact that the sulphocarbolates met with in commerce vary much in purity, some specimens that he had met with producing vomiting and prostration when taken internally. These specimens were not of English manufacture, the only satisfactory samples that he could obtain being prepared by one of the leading chemical firms in England. Dr. Farnham gives as a test for the purity and safety of the sulphocarbolates, that they should give off scarcely any odour of carbolic acid, should have a definite crystalline form, and should give no precipitate with chloride of barium. In other words, they should not contain free carbolic or sulphuric acid, and a preparation offered in the form of an amorphous powder should not be used. The pure salt also makes a perfectly clear solution in water, but the impure a muddy one.

Curious mistakes are sometimes made with regard to the names of drugs sent from foreign countries; thus safflower seed has been offered for sale as sunflower seed. Recently a fragrant commodity appeared in the market (*Gardeners' Chronicle*, Feb. 10, p. 184) under the name of safflower, which had not the least claim to the name, inasmuch as it was found to consist not of composite florets but of the finely broken leaves of a labiate plant, *Zataria multiflora*, a native of Persia, Beloochistan and Afghanistan. It was shipped to this country from Bombay, but with what object it is difficult to conceive. The odour of the leaves somewhat resembles that of thyme.

A new variety of aniseed has lately appeared in the market, imported from Chili. Eighty-six bags of this variety were offered at the London drug sales this month, but fetched a low price, being small and not so free from stalks, etc., as European aniseed.

In a paper read before the Institution of Mechanical Engineers "On the Molecular Rigidity of Tempered Steel," by Professor D. E. Hughes, (*Electrician*, Feb. 3), it is shown that there is experimental evidence for believing that tempered steel is a true alloy of carbon and iron. The author's experiments were made with a simple modification of his well-known "induction balance." One of the conclusions arrived at is that iron possesses more coercitive force than steel whenever the inducing force is limited, and within the range of iron. The author has remarked in this and previous researches on molecular magnetism that in all alloys of iron the molecules are far more rigid than in the pure metal; and further that, with steel, tempering adds greatly to this rigidity. He is now engaged upon the effect of different tempers on the same steel, and hopes in a future paper to bring the results before the Institution. Soft steel, when compared with hard drawn iron, shows that the mechanical hardening of iron has not in any great degree diminished its molecular freedom. Even the softest steel shows a high degree of molecular rigidity, as compared with the hardest iron, but far less than that of tempered steel. This would seem to indicate that steel in its softest state is still an alloy, though only feeble quantities of carbon may be held in that condition.

The same eminent experimenter has communicated a preliminary note to the Royal Society "On a Theory of Magnetism based upon New Experimental Researches." The following conclusions have been arrived at:—(1) That each molecule of a piece of iron, steel, or other magnetic metal is a separate and independent magnet, having its two poles and distribution of magnetic polarity exactly the same as its total evident magnetism when noticed upon a steel bar-magnet. (2) That each molecule, or its polarity, can be rotated in either direction upon its axis by torsion, stress, or by physical forces such as magnetism and electricity. (3) That the inherent polarity or magnetism of each molecule is a constant quantity like gravity; that it can be neither augmented nor destroyed. (4) That when there is external neutrality, or no apparent magnetism, the molecules, or their polarities, arrange themselves so as to satisfy their mutual attraction by the shortest path, and thus form a complete closed circuit of attraction. (5) That when magnetism becomes evident, the molecules, or their polarities, have all rotated symetrically in a given direction, producing a north pole if rotated in this direction as regards the piece of steel, or a south pole if rotated in the opposite direction. Also, that in evident magnetism, there is still a symmetrical arrangement, but one whose circles of attraction are not completed except through an external armature jointing both poles. The experimental evidences of the above theory are said by the author to be so extremely numerous and conclusive that he has ventured upon formulating the results in the above manner.

In a paper read before the Royal Society on the 1st inst., "On the Electrical Resistance of Carbon Contacts" (*Electrician*, February 10), Mr. Shelford Bidwell has adduced some reasons for the superiority of carbon over metal in the microphone. He considers that the mere fact that a current causes delicately-adjusted metal contacts to adhere to each other (an observation previously made by Mr. Stroh) seems sufficient to account for the superior efficiency of carbon. In addition to this phenomenon of adhesion, and probably connected with it, are the facts that metallic contacts, unlike those of carbon, do not even approximately recover their original resistance when once it has been reduced by increased pressure or increased current; unless, indeed, complete reparation occurs; and even the initial effect of pressure upon resistance is in general much more marked with carbon than with metals. In the case of carbon, pressure and current act in consonance with each other; pressure diminishes the resistance, and in so doing increases the strength of the current, and the current thus strengthened effects a further diminution in the resistance. In the case of metals, on the other hand (or at least in the case of clean bismuth), pressure and current tend to produce opposite effects. The resistance is diminished by pressure, and the current consequently strengthened; but by reason of the increased strength of current the resistance is *higher* than it would have been if the current had remained unchanged. The effect of this antagonism is not very great, but it seems sufficient to give a material advantage to carbon.

According to a paragraph in the *Electrician* of the same date, Mr. R. Barker has patented a process for extracting gold from its ore, by causing it to be washed by a stream of water over an inclined table, in which are placed at intervals "riffles," or baths of mercury. The mercury is connected with the negative wire of a dynamo-machine, and the positive wire is led to the water. It is found that the mercury readily seizes on and holds the particles of gold, and never "sickens," as has hitherto been the case.

The electrical transmission of power is justly regarded as one of the greatest future possibilities of electricity, hence much interest has been manifested in some public experiments in this direction, made before a large number of scientific men and social and political notabilities, assembled at the Northern Station, Paris, on the 6th inst. According to *Nature* of the 15th inst. the energy was transmitted by an ordinary iron telegraph wire from Paris to Sevran, near Le Bourget, and returning to Paris, thus completing a distance of 20 kilometres. The primary engine was moved by a force of about 5 horse-power, and the force of the secondary was said to be 2½ horse-power. No precise measure was taken. The experiment was in continuation of the much spoken of Munich transmission of energy from Mierbach, according to the Marcel-Deprez system. It is not believed that this new experiment will put an end to the controversy, though many papers have reported enthusiastically on the proceedings, and letters have been written by electricians claiming to have executed more successful trials. It is stated that new experiments on the Marcel-Deprez system of transmission of energy will take place, under the superintendence of M. Tresca, with the same machines as on February 6. The *Lumière Electrique* states that the force transmitted is about 37½ per cent., and that the dynamometer for measuring the motive power of the primary machine was not in order at the time of the first experiment.

In a lecture on the "Progress of Telegraphy," which was the first of a series of six to be delivered before the Institution of Civil Engineers, Mr. W. H. Preece, last Thursday, presented to his hearers some interesting details. Premising that telegraphy is the oldest practical application of electricity, Mr. Preece remarked that electric currents for this purpose are, as a rule, maintained by the combustion of zinc in batteries of innumerable forms. In the British Post Office telegraph system three forms of batteries are used to the following extent—Daniell, 87,221 cells; Leclanché, 56,420 cells; and bichromate, 21,846 cells. Magneto-electricity is applied for some forms of apparatus and dynamo machines are sometimes employed to supplement batteries. Where the electric currents are conveyed from place to place overground the conducting wire used is almost exclusively of iron, but copper is much used in passing through smoky places. Phosphor-bronze wire is under trial, and appears to possess the conductivity of copper with the strength of iron. The quality of iron wire has been greatly improved, and it conducts now 50 per cent. better than it did a few years ago, whilst copper wire has improved in a still greater ratio. In towns the wires are carried underground; copper wire, insulated with gutta percha and encased in iron pipes, being the material used. There are now 12,000 miles of telegraph wire carried underground in the United Kingdom; to adopt the same course with respect to the whole of the Post Office system would involve an expenditure of £20,000,000, as the cost is fourfold, whilst the carrying power is reduced to one-fourth. Gutta percha still remains the best material for insulating purposes. Of submarine telegraphs there are now 80,000 miles of cable at work and a capital of £30,000,000 has been invested in them. A fleet of twenty-nine ships is employed in laying, watching and repairing the cables, and the Atlantic alone is spanned by nine cables in working order. The type of cable has been very little varied from the first laid between Dover and Calais, but the materials are better, the breaking strain of the homogeneous iron wire now reaching ninety tons to the square inch, whilst the machinery for laying has been so improved that a cable across the Atlantic was last year laid in twelve days, without hitch or stoppage. Of telegraph instruments the A B C is the simplest to read, and there are 4398 in use. Its mechanism is, however, complicated and expensive and it is being rapidly supplanted by the telephone. The needle instrument is the simplest in construction, but it requires training to read it; there are 3791 employed by the Post Office and 15,702 by various railway companies. The Morse instrument, of which the Post Office possesses 1330, records its letters in ink, in dots and dashes on paper tape, and also indicates the letters of the alphabet by sound. Sound reading is more rapid and accurate than any system of visual signals or permanent record and it is gaining ground with great rapidity, there being now about two thousand sound readers in England, while in 1869 there were none. Acoustic reading attains great perfection in Bright's bell instrument, where beats of different sound replace the dot and dash of Morse's system. In ordinary working only one message can be sent in one direction at one time; but by a simple and ingenious contrivance, by which the neutrality of opposite currents is utilized to convey signals, duplex telegraphy is rendered possible, so that two messages can be sent on the same wire at the same time; and, by a still further improvement, where currents of different strength are utilized, four messages are sent on one wire—two simultaneously in opposite directions—at the same time. There are in England 319 duplex and 13 quadruplex circuits at work. In the automatic system, manual labour is supplanted by mechanism in transmitting the messages. There are 71 circuits worked by these instruments, and 224 instruments in use, and a speed of working of 200 words per minute is easily maintained upon them. With the hand alone from 30 to 40 words per minute is the maximum rate attained. Since this system can be duplexed, and in many cases is so, 400 words per minute on one wire are easily sent. By the use of high-speed repeaters, the length of circuit for automatic working is scarcely limited; it would be easy to send 100 words per minute to India. The growth of business since the telegraphs have been acquired by the State is enormous: 126,000 messages per week have grown to an average of 603,000. In 1873, the average number of messages per mile of wire was 147, it is now 256. It is in press work that the greatest increase has taken place: 5000 words per day at the time of the Companies have grown to 934,154 words per day now. The growth of business is equally discernible in the great Cable Companies. In 1871, the number of messages dealt with by the Eastern Telegraph Company was 186,000; in 1881, it was 720,000.

NEW REMEDIES.*

BY WILLIAM ELBORNE.

Abrus precatorius. Nat. Ord., Leguminosæ.—This plant was originally a native of India, but is now found in the West Indies, the Mauritius, and most tropical regions. It is remarkable for its small nearly globose seeds, which are of a brilliant scarlet colour, with a black scar indicating the hilum or place of attachment to the pods. These seeds are much used in India in the arts, for necklaces and other ornamental purposes, and are employed as a standard of weight under the name of Rati. The weight of the famous Koh-i-noor diamond was ascertained in this way. From a medicinal point of view the roots are made use of in the same manner as the roots of the liquorice plant (Indian Pharm.). An infusion of the curious scarlet seeds has long been used in the interior of Brazil as a popular remedy in the treatment of ophthalmic disorders. In some experiments made by Dr. de Wecker to test the action of this remedy, he found that a weak cold infusion made from the powdered seeds, when applied as a lotion, rapidly produced a purulent ophthalmia, of intensity corresponding to the number of applications made. The factitious ophthalmia thus produced disappeared in the course of ten days or a fortnight without any therapeutic intervention or danger to the cornea, and Dr. de Wecker is of opinion that this property possessed by the seeds, of provoking a very intense ophthalmia of short duration, could be utilized in ocular therapeutics in the treatment of granulations and conjunctival diphtheria. M. Silva Aranjo having recently submitted to microscopical examination the infusion and maceration of the seed, together with the exudation produced by their use, attributes the cause of the inflammation and the purulent condition which follows the use of the drug, to the great number of gonidia contained in both preparations of the seed developing abundantly on the conjunctiva.

Adonis vernalis. Nat. Ord., Ranunculaceæ.—This plant is a showy perennial herb with large yellow flowers, finely divided leaves, and black fascicled roots. It has been recently introduced into medicine as a remedy in the treatment of certain forms of heart disease. Dr. Cervello, who has recently submitted the plant to a chemical investigation, finds that its active principle is a glucoside which he has named adonidin. It is described as being colourless, odourless, amorphous and very bitter.

Adonidin is prepared by precipitating a tincture of the plant, made with 50 per cent. alcohol, with basic acetate of lead, and decanting and evaporating the clear liquid to a syrup. This syrup is bitter and slightly acid, and after being made slightly alkaline with ammonia it is boiled with a strong solution of tannin, until a precipitate is no longer thrown down. The tannate of adonidin thus formed is difficultly soluble in water. The precipitate, after being washed, is decomposed with zinc oxide in presence of alcohol, the alcoholic solution evaporated to a small bulk, and colouring matter precipitated with ether. The clear solution on evaporation gives the adonidin in a pure state. It is then dried *in vacuo* over sulphuric acid.

The therapeutic effects are described as being identical with those of digitalin, with the exception that they are not accumulative, the administration of the drug during a considerable time being without danger.

Convallaria majalis. Nat. Ord., Liliaceæ.—The lily of the valley is a plant so well known that little need be said by way of description. A slender irregular stalk, a few inches high and slightly curved, bears from eight to twelve small bell-shaped white flowers, arranged one above the other, each on a pedicel of its own, elegantly bending towards the ground, and of a delicate perfume. The lily of the valley is an inhabitant of the woods in many parts of England, and has long been admitted into every garden. Notwithstanding the fragrance of the flowers, they have a narcotic odour when dried, and if reduced to powder excite sneezing.

The medicinal properties of the lily of the valley have been known as far back as the early portion of the seventeenth century, as having a peculiar action upon the heart. But this appears to have been lost sight of until a year or two ago, when the fact of the plant being used by the Russian peasants as a remedy for dropsy, attracted the attention of Messrs. Troitzky and Bojajawlensky. Two glucosides were obtained from this plant by Walzy in 1858, and were named convallarin and convallamarin. In 1865, Stanislas Martin isolated an alkaloid and an acid, which he named respectively maialine and maialic acid, finding at the same time an essential oil and a yellow colouring matter.

Convallarin is soluble in alcohol, but insoluble in water. Convallamarin is very soluble in water, alcohol, and methylated alcohol, but insoluble in ether, chloroform, and amylic alcohol. It has a bitter flavour, followed by a peculiar after-taste. The plant contains only a small quantity of this glucoside, 1000 parts (collected in August) yielding only 2 of convallamarin. It is best prepared as follows:—According to Tanret, a strong tincture of the whole plant is precipitated with subacetate of lead, filtered; the excess of lead removed by dilute sulphuric acid, carefully avoiding excess, neutralized, and the tincture distilled, the last portions being driven off in the open air. The cooled and filtered liquid is then precipitated by tannin, being at the same time kept neutral by very slight additions of dilute solution of sodium carbonate. The precipitated tannate of convallamarin is then washed, dissolved in 60 per cent. alcohol, the solution decolorized with animal charcoal

* The subject of a Report on Materia Medica read before the School of Pharmacy Students' Association, Jan. 18, 1883.

decomposed with oxide of zinc, filtered and evaporated to dryness. Thus prepared it is nearly white, and has the appearance of ordinary digitalin. To free it from salts sometimes carried down by the tannin, it may be advantageous to dissolve it in 60 per cent. alcohol, filter and evaporate.

Drs. Bojajawlensky and Troitzky found that in organic heart disease the effects of the plant taken in infusion were equal to those of digitalis; the urine being increased, serous deposits rapidly absorbed and nervousness diminished; while cumulative action was not observed. The irritability and resulting peevishness were lessened, the effect continuing for some days after the administration of the medicine; no dyspnœa or palpitation being experienced; the patients also were able to take boldly exercise without discomfort.

Lycoperdon giganteum (*The Giant Puff-ball*). —*Lycoperdon giganteum* is a fungus belonging to the Nat. Ord. *Trichogastres*. The peridium or outer coat which breaks up into warts or scales, is intimately connected with the inner coat, and the spores are mostly sessile. All the various species of *Lycoperdon* are produced abundantly in nearly every country, but are so variable both in character and properties that it is very difficult to distinguish them.

Dr. E. Thompson recalls attention in the *Lancet* to the use of this fungus as a local hæmostatic. He states that it forms a very soft and comfortable surgical dressing, and that the powder it contains seems to possess antiseptic and anodyne properties. The mature plant is used. At this period it is about the size of a child's head, and is covered with a thin skin; the latter is removed and the capillitium and spores, which form a dusty mass, are used. Mr. Fagan, a leading surgeon in Belfast, found that it at once restrained bleeding from arteries in the bone, in the neighbourhood of the orbit, after the failure of other means. The researches of Hagen, on the reason of the coagulation of the blood, show that the hæmostatic action of the puff-ball, as well as of all other spongy or powdery substances, depends upon the fact that healthy blood deposits hæmato-blasts or minute corpuscles on any foreign substance introduced into a vein, which become adhesive points for the subsequent attachment of particles of fibrin. This action, however, also takes place when the vessels themselves assume abnormal conditions, as when cut or altered by disease.

Pongamia glabra. Nat. Ord., Leguminosæ.—Pongamia glabra is a tree extensively diffused throughout Southern India, Malacca and the Indian Archipelago, and also found in Southern China and North Australia. It has smooth pinnate leaves, composed of five or seven egg-shaped or broadly elliptical leaflets, arranged in pairs with a terminal odd one; and loose axillary racemes of flowers. In India an oil, called pongamia or kurung oil, is expressed from the seeds, which is described in most works on Hindu Materia Medica as being a favourite remedy amongst the natives for various skin diseases. The oil is of a deep yellow colour, inclining to reddish-brown, and is fluid at temperatures above 60° F., but below that it becomes solid.

Surgeon-Major Dymock, of Bombay, has recently called attention to the use of pongamia oil in pityriasis versicolor. Having observed that the specific character of the diseases in which the oil had been used was not clearly defined in the descriptions given by Ainslie and other writers, he determined to make some experiments with the oil, and selected pityriasis versicolor, as a common and troublesome affection, for the first experiment.

Several cases occurring on the neck, face, and shoulders were cured in less than a fortnight by rubbing in the oil twice a day. He concludes, therefore, that this oil is likely to be of service in other skin diseases which, like pityriasis, are attended by the growth of a fungus. Dr. Dymock considers this oil much more effective than acetic acid; while it has the advantage over iodine and Goa powder of not discolouring the part (often the face) to which it is applied. Dr. Thin has recently stated that sulphur ointment is an admirable remedy for ringworm; but pongamia oil might be used in cases where the disease is of a recurrent character.

Sterculia acuminata.—Cola, Gourou or Ombéivé nuts are the seeds of the above plant, which belongs to the natural order, *Byttneriaceæ*, and are known to us by the accounts of West African travellers, who state that when chewed they possess the power of rendering the flavour of water, even if half putrid, agreeable and they were believed to contain caffeine.

Cola nuts have recently been submitted to a chemical investigation by Messrs. Haeckel and Schlagdenhauffen, who found that they contained more caffeine in an uncombined state than the best samples of coffee that could be procured; also theobromine, three times the quantity of starch that is found in cocoa, a considerable quantity of glucose, a small percentage of fat, a special tannin approaching caffeotannic acid in its composition, and a red colouring matter similar to cacao-red. Professor Attfield in a previous analysis found also a small quantity of volatile oil.

The physiological examination of this remedy has shown that its properties are essentially due to the caffeine and theobromine it contains. The seeds, it appears, have long been in use in Africa for the cure of diseases of the intestine or liver, and especially in cases of atony of the digestive tract, and also as a masticatory and tonic, like areca nuts, which are so much esteemed by the natives of India. Medically they may occupy a prominent place by the side of coca and other anti-metabolic remedies, to which they would probably prove superior in consequence of the tannin they contain.

EAU DE COLOGNE.*

A very pleasant and refreshing eau de Cologne, much resembling that sold with the trade-mark "Springbrunn," may be obtained as follows:—

Dissolve 15 parts of oil of orange-peel, 15 of oil of lemon, and 6 of oil of bergamot in 3000 parts of finest Cologne-spirit. (It is absolutely necessary that only the purest and finest oils and alcohol be used.)

Also dissolve 1 part of oil of neroli (pétale) and 1·5 parts of oil of orange (petits grains) in 1000 parts finest rectified rye-spirit.

After standing for five or ten days, both liquids are mixed. It is best to distil the mixture, since the odours are better blended thereby; but it may also be aged by allowing it to stand for a time.

To the distillate are added 2 parts of the finest oil of rosemary, and the liquid then put up in small well-corked vials, which must be kept in a cool, shady place.

TROPIC FRUIT LAXATIVE.†

Mr. Adam Conrath gives the following approximative formula for the preparation sold under the name of "Tropic Fruit Laxative":—Jalap tubers, powdered; senna leaves; sugar, of each 5 parts; pulp of East India tamarinds (of the consistence of a stiff extract), 30 parts.

Having rolled out the mass with a rolling-pin to a thickness of $\frac{1}{4}$ of an inch, it is to be cut with a tin mould to a size of one inch long by $\frac{7}{10}$ of an inch wide, to weigh 40 to 45 grains. The lozenges should be coated by a confectioner with chocolate and sugar, after which each one may be wrapped in thin tin foil. Mr. Conrath says that the objection to dispensing this form of a confection of senna is the liability of the laxative portion to become worm eaten, in which case, those who do not first remove the chocolate and examine the central mass are apt to swallow worms and all.

* From *New Remedies*, February, 1883.

† From the *Pharmacist*. Reprinted from *New Remedies*, February, 1883.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 24, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed* "*Pharm. Journ.*"

THE BENEVOLENT FUND.

On subsequent pages will be found a list of the subscriptions and donations to the Benevolent Fund received during last year, which has been prepared in accordance with a resolution of the Council of the Pharmaceutical Society at its meeting in November that such a list should be printed in this Journal and a copy sent to every chemist and druggist whose name is on the Register. In thus carrying out the decision of the Council it has appeared to us that if the list were prefaced by a short statement as to the origin and past administration of the Fund it would enable some who receive it better to understand the nature and objects of the appeal which is to be made to them for help.

From the very inception of the Pharmaceutical Society, when in the year 1841 a few energetic spirits were endeavouring to give form to a belief that the permanent interests of chemists and druggists required the establishment of some organization for securing their common welfare, it was recognized that the "foundation of a fund for the relief of the distressed, the widow, and the orphan" would help to establish a substantial and permanent bond of union. Consequently, upon the establishment of the Pharmaceutical Society no time was lost in connecting with it the work of benevolence. In the first year only £37 17*s.* was received in donations; but in the first annual report the Council recommended that a sum of £500 from the funds of the Society should be invested in the names of trustees, as the nucleus of a fund, from which relief should be granted as soon as the annual income from investments should amount to £300. In the following year the Society obtained its Charter, in which the provision of a fund for the relief of distressed members and associates of the Society, and of their widows and orphans, was formally mentioned, and in "commemoration" of this, the Council in its second annual report recommended that another sum of £500 should be set apart for the Benevolent Fund. A similar course was taken in the following year, and again in 1870. In 1848, although the interest on investments had not yet reached the amount originally intended, it was decided to commence the granting of casual relief from the Fund; but it was not until the year 1865 that the first elections of annuitants took place.

Hitherto the Benevolent Fund, which had been formed mainly by successive grants from the General Fund of the Pharmaceutical Society and subscriptions and donations from its members and associates, had been administered solely in the interests of persons who were connected with the Society. But the area was to be now widened, for in the year 1868, when the accumulated investments amounted to nearly £10,000, the Council was empowered by the provisions of the Pharmacy Act to extend the benefits of the Fund in future to all persons "who may be, or have been, duly registered" as Chemists and Druggists. This permission has been fully utilized by the Council, and at the present time as many as eleven annuities, amounting altogether to £370 a year, are being paid from the Fund to registered chemists and druggists who have never been connected with the Society, or to the widows of such persons, whilst last year, besides this, the casual relief given in the same direction amounted to upwards of £160. It was justifiable to hope, therefore, that so catholic a dispensation of relief from the Fund would have been met by help, however small, from nearly every person whose name is on the Register, but, unfortunately, at present scarcely any advance has been made towards the realization of this hope. It is true there was some improvement manifest last year; though even then the total number of subscribers was only just over three thousand, so that there are *still more than ten thousand registered chemists and druggists who do not subscribe to the Benevolent Fund, or more than three-fourths of the whole!* It is impossible to believe that this is a fair indication of the measure of charitable feeling existing among the chemists and druggists of Great Britain, and the explanation is probably rather to be found in the absence of proper machinery for bringing the Fund, at stated intervals, under the notice especially of those who for various reasons have abstained from associating themselves with the Pharmaceutical Society. As an aid towards supplying this deficiency a copy of this number of the Pharmaceutical Journal will be sent to every chemist and druggist on the Register, and it is intended that this shall be supplemented in as many cases as possible by a visit to each recipient from the Local Secretary of the district, who will supply any other information about the Fund that may be desired and afford him an opportunity of satisfying his benevolent instincts with the least amount of trouble possible.

It would appear almost a work of supererogation to argue the necessity for the existence of some such organization. Every chemist and druggist must be cognizant more or less of the distress that exists among the unfortunate members of his craft or in families that have been bereft of the bread-winner, though few perhaps see it in the concentrated form in which month after month it comes under the observation of the Benevolent Fund Committee. It will be more to the purpose to mention a few simple facts to enforce the appeal now made on behalf of the Benevolent Fund which has been administered so successfully during a period of forty years by the Council of the Pharmaceutical Society. Last year twenty-one annuitants received from the Fund £35 each, one £32 10*s*., and fourteen £30 each, amounting altogether to £1187 10*s*.; besides which casual grants were made to the extent of £461, representing a total of £1648 10*s*. It may be desirable to explain that the variation in the amounts paid to different annuitants is in accordance with a resolution arrived at some years since, that annuitants above the age of sixty-five should henceforth receive £35 instead of £30 per annum. Towards meeting this outlay of £1648 10*s*. the dividends on invested capital only amounted to about £560, or less than half the sum required for annuities alone, leaving a sum of nearly £1100 to be made up by subscriptions and donations. Under the conditions which usually obtain in the administration of charitable funds this deficiency would have been largely increased by various expenses; but owing to the manner in which this Fund is administered, under the personal supervision and as part of the business of the Council of the Pharmaceutical Society, this large sum of money was collected and disbursed at a cost to the Fund of a little over ninety-five pounds. It is not likely that the calls upon the Fund during the present year will fall below those of last year; indeed the election of annuitants in December increased the responsibilities to the extent of at least £180 a year, and this did not represent all that might have been done with advantage in the same direction. Moreover, there is a constantly increasing necessity for casual relief, the sum granted this month,—namely, £150,—being larger than on almost any previous occasion. But if, as it is hoped, the present appeal is responded to favourably by even a moiety of the ten thousand registered chemists and druggists who are not at present subscribers, the anxiety of the Council will be removed, and it might become possible to dispense assistance more in accordance with the antecedent circumstances of those receiving it.

It only now remains to say that whilst the casual grants are made directly by the Council, upon the recommendation of its Benevolent Fund Committee, the election of Annuitants lies entirely with the Subscribers and Donors. Half-a-crown subscribed annually entitles the giver to one vote, but the number of votes is increased to five for each half-a-guinea. A contribution of five guineas constitutes a life subscriber, with five votes at each election for life, and an additional vote is accorded for each additional guinea. In the case of firms or corporations contributing five guineas, the right is acquired to a similar number of votes at each election for a period of ten years. We hope that the present special effort to increase the number of subscribers to the Fund, by bringing it under the immediate notice of every member of the body for whose benefit it is exclusively applicable, will be sufficiently successful to warrant the Council in repeating it annually. For it must be evident that, welcome as donations may be, the regular income from annual subscriptions is the only reliable basis upon which the Council can regulate the expenditure.

1843 AND 1883.

It is certainly a noteworthy, though an undesigned, coincidence that the resolution of the Council of the Pharmaceutical Society to send a copy of its Journal to every chemist and druggist on the Register should take effect in a week which marks the completion of a period of forty years since the granting of the Society's Charter of Incorporation on February 18th, 1843. The occasion will, therefore, not be an unsuitable one to take a retrospective glance and note some changes in the condition of the calling of a chemist and druggist which have occurred subsequently to, and we believe have been consequent upon, the establishment of the Pharmaceutical Society of Great Britain, of which this charter was the first official recognition.

It is in the power of only the older members of the body now to have a personal remembrance of the status—or more correctly the want of status—of chemists and druggists in Great Britain before the year 1840. The manor of pharmacy was then truly a "no man's land," and no restrictions were in existence as to qualification. Among those who in those days practised the art of pharmacy, it is true, were men equal in ability to any of their successors in the present day. But, on the other hand, the most ignorant of men was allowed, if he chose, to dub himself "chemist and druggist," and to carry on business as such with those members of the public whom he could induce to pin their faith to the colour of his carboys, the smartness of his shop or any other specious pretence that he might be able to put before them. Neither was there any bond of union between those who were more or less justified in assuming the name of "chemist and druggist." It was in this condition of affairs that a few of the more watchful members of the calling became aware, in the year 1841, that a Bill had been introduced into Parliament by Mr. Hawes, which, while affecting in its title only to amend the law relating to the medical profession, would have placed the whole body of chemists and druggists under the control, in respect to education and examinations, of a Medical Council in which they had no representative. The Bill would also, in Jacob Bell's words, have made a chemist and druggist "liable to a penalty of twenty pounds for recommending ten grains of rhubarb, strapping a cut finger, or explaining to a customer the usual mode of taking any medicine." Fortunately, through the vigorous opposition that was organized, though not without considerable difficulty, the danger was for the time averted. But it became evident to those who conducted the opposition that it was necessary to establish some permanent organization for promoting the interests of chemists and druggists, if their independence was not to be sacrificed and many existing privileges lost through the institution of an extraneous jurisdiction. Action trod upon the heels of conviction, and within six weeks of the first note of alarm, the memorable "pharmaceutical tea party" was held at 338, Oxford Street, which eventuated in the foundation of the Pharmaceutical Society of Great Britain. From that time, it may be fairly said there was little danger that chemists and druggists would be legislated for without knowing the reason why.

It was early recognized by the founders of the Pharmaceutical Society that a too plausible pretext for the harassing proceedings of ambitious medical reformers existed in the absence of any judicious regulations for connecting the welfare of chemists and druggists with the interests of the public. In a preliminary report it was therefore recommended that "education, examination, registration and representation" should form the basis of the new Society, and to these was afterwards added "benevolence." These objects have been steadily kept in view by successive Councils, and notwithstanding much apathy, or occasionally even opposition, the work has been steadily carried forward, so that although the measure of success has not been so full as might have been hoped, the progress that has been made is considerable. Pharmaceutical education, which was first treated with indifference, even when provided at the cost of the Society to its members and associates, is now eagerly sought for at various schools established as independent commercial speculations; examination and registration have, in presence of a rapidly increasing population, for a time rendered stationary the number of persons entitled to carry on business as "chemists and druggists," and have raised the body considerably in the estimation of the medical profession and the public; whilst benevolence has created a Fund from which a very large amount of assistance is distributed continually to distressed members of the calling. Moreover, instead of chemists and druggists being now harassed and worried by unexpected attempts at legislation, such is the confidence which the prudent conduct of the Council of the Pharmaceutical Society has established that it has been entrusted with important executive functions on behalf of the public, and it is now almost uniformly consulted by the various Government departments upon subjects which arise touching the interests of pharmacy.

Under these circumstances we think it is to be regretted that the roll of Members and Associates of the Pharmaceutical Society is not co-extensive with the Register of Chemists and Druggists. That the legislation obtained by the Society in 1868 was not more favourable was no fault of those who then conducted its affairs, but rather lay with those who stood aloof from or even opposed the efforts of the Society when all ought to have been united. Nevertheless, evidence that the legislation of 1868 had its value is to be found in the wide-spread complaints that it did not include a provision to meet a contingency which could not have been foreseen at the time it was passed. An effort is now, however, to be made to supply its shortcomings, and as almost all pharmacists are agreed that Parliament should be approached with an application for fresh legislation, it does seem very desirable that the Council of the Pharmaceutical Society should be actively supported at such a time by at least every chemist and druggist in business. We do not affect to ignore that many persons outside the Society,—and, indeed, some inside,—profess to be dissatisfied with the work done by the Society; but that is not, in our opinion, a sufficient reason for helping to neutralize, by simple abstention, the influence of the most powerful organization which chemists and druggists are likely to have at their disposal during the present century. Such a plea is deprived of any force it might have had by the fact that so fully has the principle of "representation" been carried out by the founders of the Society and their successors that it is in the power of the general body of chemists and druggists to mould its policy as they will; for all persons on the Register, whether examined or not, have the option of connecting themselves with the Society either as Members or Associates, and so to become entitled to take a part in controlling its operations. We may be pardoned, therefore, for expressing a hope that many under whose notice these lines will be brought through the extra issue of this Journal may be persuaded that such a step is in accordance with their true interests.

THE PROPOSED PHARMACY BILL.

It might naturally be expected that the publication of the Draft Pharmacy Bill adopted by the Council would give rise to considerable discussion. We have already evidence of this in the receipt of several instalments of correspondence upon the subject, which in consequence of the somewhat special character of this number of the Journal we think it desirable to defer dealing with until next week. A meeting of chemists and druggists has been held at Manchester, to discuss the subject, and has been adjourned for a month, and another one is being held in Edinburgh at the time of going to press.

SCHOOL OF PHARMACY.

As will be seen by the advertisement in the present number, the courses of lectures on "Chemistry and Pharmacy" and "Materia Medica and Botany," in connection with the Pharmaceutical Society's

School of Pharmacy, 17, Bloomsbury Square, will recommence on Thursday, March 1, at 9 a.m., when Professor Bentley will give his first lecture on Botany. Professor Redwood will commence his course on "Chemistry and Pharmacy" on Monday morning, March 5, at 9 o'clock.

Students will find the ensuing five months a favourable period for studying at the School, for between March 1 and the end of July they will have an opportunity of attending not only Practical Chemistry in the laboratories and the usual courses of lectures on Chemistry and Pharmacy and Materia Medica and Botany, but also the summer course on Practical Botany and the Classification of Plants, at the Royal Botanic Society's Gardens, in the Regent's Park, where every opportunity will be afforded to them of obtaining a practical acquaintance with medicinal plants.

In addition to the above courses of lectures and Practical Chemistry, there is also Mr. Dimmock's class for "Practical Instruction in Dispensing," which will recommence on Friday, March 2, at 5 p.m., and be continued until the end of July.

The preliminary matter of the newly published Medical Register for 1883, includes, in addition to reprints of the existing Medical Acts, some interesting statistics. From these it appears that the total number of registered medical practitioners in Great Britain and Ireland, at the commencement of the year, was 23,081, showing an increase of 525 as compared with the previous year. The number added by registration during the year 1882 was 1171, and the restorations were 199. On the other hand, there were 522 names removed upon ascertained evidence of death, 10 through ceasing to practise, and 311 through failure to respond to two registered letters.

* * *

It is interesting to notice, in the presence of this large influx into the medical profession, that there was a considerable falling off in the number of medical students registered during the year 1882, the number being 1862, against 2171 in 1881. Of these 853 were registered in England, 585 in Scotland, and 424 in Ireland The University of Cambridge had 72 entries, a larger number than any other place of medical study, and St. Bartholomew's Hospital, London, came next, with 69. It is significant of the great change that has taken place in the conditions of medical study in recent years, that out of the 1862 registrations, only 169 were in respect to pupilage with a registered practitioner.

* * *

From a similar table in *The Dentists' Register* for 1883, of which also we have received a copy, we learn that there are now 5252 registered dentists in the United Kingdom, of whom 759 are "licentiates in dental surgery" of various colleges. This shows a decrease of 93 registered dentists as compared with the previous year. Of registered dental students there are 166.

* * *

In reply to a question, Earl Granville stated, on Tuesday evening, that it is the intention of the Government to introduce into the House of Lords a Bill dealing with the subject of the Medical Council.

* * *

A Bill which has been introduced into the House of Commons, by Mr. A. Arnold, for the amendment of the Trade Marks Act, provides that after the expiration of five years from the date of registration of a trade mark, the original registered proprietor, or any subsequently registered proprietor lawfully claiming through him, shall have an absolute and unimpeachable right to the exclusive use of such trade mark.

* * *

A Partnerships Bill has been again introduced into the House of Commons, but it is devoid of the sections referring to the registration of firms and limited partnerships present in the Bill of last year, and to which we then called attention as being likely to affect the working of the Pharmacy Act.

* * *

A decision, given by the tribunal of the Seine, on the 3rd instant, has established that the French law regulating pharmacy does not allow of a pharmacy being carried on by any person who is not at the same time the real proprietor and a qualified pharmacist. The principle was distinctly laid down, that the responsibility of the proprietor of the pharmacy was the best guarantee to the public that the business should be efficiently carried on. The decision was given in connection with a prosecution of M. Bravais, formerly manager of the Company trading under the name of Bravais and Co., and M. Jolly, an unqualified man who was carrying on the business as liquidator of the Company.

* * *

A Pharmacy Bill has been introduced into the Nebraska Legislature which contains two novel definitions of classes of poisons. The first class is to include "any drug, chemical or preparation which according to standard works on medicine or materia medica is liable to be destructive to human life in quantities of 60 grains or less." These are to be labelled "poison," and are not to be delivered until the seller has satisfied himself that they are to be used for a legitimate purpose. The second class is to include "poisons" which are known to be destructive to adult human life in quantities of 5 grains or less, and sales of these are to be registered. Agricultural insecticides are to be excluded from the operation of the clause.

* * *

The Pharmaceutical Society of Victoria has just concluded the purchase from the Colonial Government of some premises now occupied as a County Court in Swanston Street, Melbourne.

* * *

Extra buildings are being erected adjoining the Imperial Museum, Calcutta, for the International Exhibition which is to be opened next December. Invitations have been sent throughout India to all the Rajahs and Princes, inviting them to contribute to the Indian display, which is to be on a very grand scale. It is to be hoped that a good descriptive catalogue of the exhibits will be prepared.

* * *

Many of our readers will have inferred from the frequent occurrence of German looking names at the head of articles quoted from transatlantic journals that the Teutonic element is pretty well represented among pharmacists in the United States. But few probably will learn without surprise that the New York German Pharmaceutical Association numbers 116 members.

* * *

A school of pharmacy has been organized in Louisville, Kentucky, for the education of women only. It is under the patronage of the local Polytechnic Society, and the members of the Board of Directors are all of the sterner sex.

* * *

According to the *Neue Dörptsche Zeitung*, the number of students in the Dorpat University in January, was 1431, of whom 610 were engaged specially in medical studies, and 103 in pharmaceutical studies.

* * *

A correspondent of the *Students' Journal* tells a good story about an accident that happened a few days ago in Kent, by which a carter's leg was broken. The man's companion ran off to the local practitioner for help, telling him that there was an "old cove" pulling his friend about, but, added he, "I can see he ain't up to much." When the local practitioner arrived on the scene he found that the "old cove" not "up to much" was Sir James Paget, who had in the meanwhile improvised some splints and bound up the leg with a copy of the *Times* newspaper.

* * *

We have received a circular announcing the commencement of the "Colchester Students' Association," which is worth referring to for the sake of mentioning a plan that might perhaps be followed with advantage in some other provincial localities. We are informed that the Association was mainly founded by chemists' apprentices, who at first intended to call it the "Colchester Chemists' Assistants and Apprentices' Association." Being doubtful, however, of their ability to stand alone, the title was altered so as to include other young men residing in the town; but the titles of the scientific papers read last year show that the original object of the founders has not been lost sight of.

* * *

According to *Nature*, the sulphuric acid works in connection with the Imperial Japanese Mint, at Osaka, are in active operation, nearly a million pounds of acid having been exported to China last year, besides supplying the home demand. Alkali manufacture also is being developed energetically.

* * *

At the meeting of the Chemical Society on Thursday next there will be a ballot for the election of Fellows, and a paper will be read on "Some Derivatives of the Isomeric $C_{10}H_{14}O$ Phenols," by Drs. Armstrong and Rennie.

* * *

The Chemists' Assistants' Association will meet at their rooms, 53, Conduit Street, on Wednesday evening next, when a paper on "Tobacco of Commerce" will be read by Mr. C. E. Palmer.

* * *

It may interest some of our readers to learn that on Monday next, the 26th instant, Professor Flower will commence, at the Royal College of Surgeons, a course of nine lectures upon the "Anatomy of the Horse and its Allies," which are to be free to all who take an interest in the subject. The lectures are to be delivered on Mondays, Wednesdays and Fridays.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

EVENING MEETING.

The fourth Evening Meeting of this Session was held in the Society's Rooms, 119A, George Street, Edinburgh, on Thursday, February 15, at 9 o'clock.

Mr. Alexander Napier, President of the Branch, in the chair.

The minutes of the former meeting were read and confirmed.

The Secretary to the Branch then announced the following donations.

To the Library:—

'New Commercial Plants and Drugs.' By Thomas Christy, F.L.S. (in six parts). From the AUTHOR.

To the Museum:—

Seeds of *Ptycholis Ajowan.*
From Mr. JOHN R. HILL, Edinburgh.

Resin of Scammony and Resin of Jalap.
From Messrs. T. and H. SMITH and Co., Edinburgh.

Large Crystals of Potash Alum, Bichromate of Potash, Sulphate of Copper and Yellow Prussiate of Potash.
From Mr. ALEXANDER NAPIER, Edinburgh.

Calumba Root Starch.
From Mr. JAMES MCGLASHAN, Edinburgh.

A vote of thanks having been accorded to the donors, the Chairman called upon Dr. Matthew Hay to deliver a lecture on "The Methods for the Separation of Alkaloids." This paper and the discussion thereon will be printed in next week's Journal.

Provincial Transactions.

OLDHAM CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Tuesday, February 12, at the rooms of the Association, the Church Institute, Oldham, the first lecture of the present session was delivered by Mr. A. Martin, the President, on "The way to prepare for the Minor."

The lecturer, who spoke for above an hour, dealt in turn with each of the six subjects of the Minor examination, and pointed out the work that should be done, and that which it would be as well to leave alone. He strongly insisted on the untrustworthiness of "cram," and the urgent necessity for honest systematic study.

The lecture was listened to with marked attention, and at its close a hearty vote of thanks was unanimously given.

Nearly all the members were present.

Proceedings of Scientific Societies.

ROYAL INSTITUTION.

THE PRIMÆVAL ANCESTORS OF EXISTING VEGETATION AND THEIR BEARING ON THE DOCTRINE OF EVOLUTION.

BY PROFESSOR C. W. WILLIAMSON.

The fourth lecture of this course was delivered on Tuesday, February 6. The following is an abstract:—

The alternation of sexual and spore-bearing generations already noticed in the Equisetums probably attains its most conspicuous manifestation, so far as the Cryptogams are concerned, in the Ferns. Yet the prothalloid or sexual condition in Ferns is a varied one. In the Hymenophyllums, or Filmy Ferns, in its development it rises but little above that of the Protonema of the Moss;

but in most other Ferns, or in the Polypodiaceæ, the Prothallus becomes a heart-shaped thalloid structure, even less like that of the mosses than in the diœcious form seen amongst the Equiseta. Another characteristic of the fern prothallus is its uniformly diœcious nature, as well as its commonly obcordate form; two features which cause this organism to be of little value in the distinction of genera and species. The classification of living Ferns mainly rests upon variations in the structure and arrangement of their spore-bearing organs. The spores are enclosed in "sporangia," or little cellular boxes. In most cases each of these sporangia is more or less surrounded by a linear series of large corner cells, which become elastic when ripe, and which are strong enough to tear open the sporangia and liberate the spores. Variations in the form and condition of this annulus characterize the primary groups. It is wanting in the Marattiaceæ; it is limited to a small localized cluster of cells in the Osmundæ, and whilst it is more complete in all the other types, peculiarities of its position distinguish them from one another. In like manner there are variations in the number and position of these sporangia upon the frond. Attached to the under surface of the frond they are more or less isolated in Mohria and various Lygodiæ, but gathered together in clusters called *sori* in various other tribes. The genera are characterized by the form and position of these sori on the frond.

Fossil plants on which these sori are preserved are very rare, hence paleo-botanists have been unable to make use of them when classifying the Fossil Ferns. The method of Brogniart, who trusted to the arrangement of the nervures of the leaves in constructing his genera groups, has from necessity been adopted by more recent observers, but this method proves to be an extremely defective one. The number of known examples retaining their sori has much increased of late, and their discovery has shown that Brogniart's method has brought together plants that differ widely and has separated others that should be more closely united. Hence the classification of Fossil Ferns now is and must for a long time to come be in a very unsatisfactory state. When endeavouring to learn what the Fossil Ferns teach in reference to the theory of evolution, it is important to ascertain which of the numerous living types of Ferns may be regarded as the highest and lowest representatives of the group. In determining this point their *general* organization must be considered rather than that of special organs. Thus viewed, the delicate Hymenophyllaceæ seem to claim the lowest rank, and to come nearest to the Mosses. Like the latter plants, their leaves consists of a single layer of cells which corresponds to the much thicker mesophyl of the other forms, whilst the latter are also furnished with an upper and a lower epidermal layer, which not only is absent from Mosses, but also from the Hymenophyllaceæ. These latter plants also have sporangia of a peculiar form. These project from the margin of the frond, each one being sustained by a prolongation of one of the nervures of the leaf. Then the "prothallus" developed from a spore approached much nearer to the filamentous "protonema" of the Moss than is the case with this organism in other Ferns. Examining the Fossil Ferns as they present themselves to us as we descend through the scale of strata, we discover that, whilst many of the common living genera, such as Polypodium, Asplenium, Pteris, Osmunda, Adiantum, and several others seen in a fossil state, they are confined to the Tertiary rocks. On the other hand, the semi-tropical genus Gleichenia descends through the Cretaceous age, and has two representatives in the Oolites, whilst though the true Osmundas are only seen in Tertiary beds, one of the Osmundaceæ, a Todea, has also been found in the Oolites; but whilst Oolitic Ferns are comparatively abundant, most of them assume generalized forms, incapable of being identified with special living genera. The large fossil genera Pecopteris, Neuropteris, Sphenopteris, are defined by peculiarities in the form of their nervures, but they may well be regarded as mixed and ill-determined groups, out of which many of the more specialized modern types have been developed, an opinion which obtains support from such examples as have already been met with in which traces of the reproductive sori are still preserved.

These remarks apply equally to numerous Fossil Ferns of yet older date. The three genera just named occur in considerable numbers both in the Carboniferous and Devonian strata.

On leaving the Oolitic rocks we find some special examples that demand more minute examination. Both the Permian and the upper and lower Carboniferous rocks furnish examples of true Tree-ferns. In the two former they have been obtained rather abundantly at Autun, in France, and in the latter from the neighbourhood of Oldham, in Lancashire; but since we only know their stems, it is impossible to say to what group of Ferns we ought to refer them. But it is otherwise with the very distinct group of the Marattiaceæ. The peculiar forms of the sporangia in this aberrant type of the Fern tribe are so distinctive, that it is impossible to mistake them. We have three principal modifications of this type living; the Angiopteris, the Marattia, and the Danæa. We find the Angiopterids represented in the Tertiary strata, in the Oolites and in the Keuper. The Marattiæ have only been discovered in the Tertiaries, whilst the Danæa is represented by two Oolitic species, the *Danæopsis marantacea* and *D. Rumphii*. But, besides these, some stems or very large petioles have been found at Autun, in France, and in the lower Carboniferous beds of Eastern Lancashire, which are certainly Marattiaceous, demonstrating the existence of this peculiar Cryptogam at that early date.

The greater number of the Carboniferous Ferns to which the organs of fructification are found attached belong to a peculiar and now extinct group to which the name of *Botryopterids* has been given; in which portions at least of the fertile fronds have been connected into branching masses of sporangia. But perhaps the most interesting feature connected with these Palæozoic Ferns is the discovery both in the Carboniferous and Devonian strata of representatives of the group of Hymenophyllaceæ or Filmy Ferns. The primitive organization of these Ferns has already been referred to; hence their prevalence in the oldest strata in which ferns have been discovered in any considerable quantities is what the doctrine of Evolution would lead us to expect were we to reason after the *à priori* fashion. There is evidently no reason for doubting that the fine *Palæopteris Hibernica* from the Devonian strata, not only occurs at Kiltorcan and some other places in Ireland, but also in Scotland and in North America. It may be observed that whilst both the Equisetaceæ and the Lycopods of the Palæozoic age became gigantic trees, and hence displayed in the interior of their stems a magnificent exogenous development of their vascular structures unknown amongst their living representatives, the Ferns of the same age, arborescent or otherwise, possessed no such growths. The genera and species are distinct from existing ones, but, except in detailed features of secondary importance, this important group has undergone but little change between the Devonian age and the present time. But that age was not the beginning of their existence. We have already obtained some fragments of Silurian Ferns, but they are too scanty and insignificant to throw much light on the true character of these plants in the Silurian age. A complete Silurian land-flora yet remains to be discovered.

CHEMICAL SOCIETY.

A meeting of this Society was held on February 15, Dr. Gilbert, President, in the chair.

It was announced that a ballot for the election of Fellows would be held at the next meeting (March 1).

The following certificate was read for the first time: W. H. Cameron.

The list of officers as proposed by the Council was read from the chair. Professor G. D. Liveing and Dr. A. Voelcker are proposed as Vice-Presidents instead of Professors J. Dewar and A. V. Harcourt, who retire; in the Council, Professor Dittmar, Dr. W. R. E. Hodgkinson, Messrs. D. Howard and R. Meldola replace Dr. T. E. Thorpe and Messrs. F. D. Brown, J. M. Thomson and W. Thorp.

Drs. Thorne and Hodgkinson and Mr. D. Howard were elected auditors.

The Secretary then read the following papers—

On some Derivatives of Diphenyleneketone Oxide. By A. G. Perkin.—While preparing the above substance from salicylic acid and acetic anhydride, the presence of a small quantity of another body was detected in the washings; this substance the author has separated as transparent satiny plates containing 75·2 per cent. C., 3·9 per cent. H; its formula has not yet been settled. By the action of a cold mixture of equal parts of nitric and sulphuric acids, and by the action of fuming nitric acid, a nitro body was formed, $C_{13}H_6(NO_2)O_2$; it is very slightly soluble in boiling alcohol and melts at 262° C. By the action of tin and hydrochloric acid on dinitrodiphenyleneketone oxide, suspended in alcohol, a diamido body is produced, $C_{13}H6(NH_2)_2O_2$; it was obtained in flat orange-coloured needles. This base forms a hydrochloride and a platinum salt, which were analysed. Diphenyleneketone oxide dissolves in cold Nordhausen acid unchanged, but on heating the solution and treating with barium carbonate a salt was obtained having the formula $C_{13}H_6O_2Ba(SO_3)_2$. Bromine, when heated in a sealed tube with diphenyleneketone oxide, forms a dibromobody, $C_{13}H_6Br_2O_2$.

On α-ethyl Valerolacton, α-ethyl-β-methyl Valerolacton, and on a Remarkable Decomposition of β-ethylacetosuccinic Ether. By S. Young.—Fittig and Krafft (*Ann.*, 208–71) prepared a heptolacton of unknown constitution. The author, at the suggestion of Professor Fittig, undertook the preparation of a heptolacton of known constitution. A mixture of 10 grams of sodium, 100 grams of alcohol, 58 grams of aceto-acetic ether and 87 grams of α-bromobutyric ether was heated in a water bath for two days. The author could not obtain a product of constant boiling point; about 12 grams of the portion, boiling at 250°–260°, was boiled with twice its weight of 33 per cent. hydrochloric acid. The resulting product was principally α-ethyl-β-acetopropionic acid, which was extracted with ether and the latter distilled off. The residue partially crystallized at low temperatures. A portion was warmed with sodium amalgam, acidified with sulphuric acid and boiled, made alkaline with potassium carbonate, and extracted with ether; the ether extract on distillation gave a residue which eventually, after fractionation, proved to be the lacton boiling at 219·5°. Analysis indicated the formula $C_7H_{12}O_2$, it did not solidify in a mixture of snow and salt. On dissolving this substance in the smallest possible quantity of ice-cold water a clear solution was obtained, which became turbid from 17° up to 90° C. By boiling the lacton with barium hydrate, barium and ethyloxyvalerate was prepared; the silver salt was also obtained and analysed. When either salt is decomposed by an acid a mixture of lacton and oxyacid is formed. On preparing larger quantities of the crystalline acid, which the author calls ketolactonic acid, the distillate at higher temperatures, above 265°, yielded proportionately more crystals than that between 250°–260°, so that the decomposition apparently takes place during distillation and not during saponification. The barium and silver salts of this ketolactonic acid were prepared and analysed. By the action of barium hydrate on ketolactonic acid a derived acid was prepared, the silver salt of which had the composition $C_8H_{10}O_5Ag_2$. Thorne obtained by the saponification of β-ethylacetosuccinic ether, α-ethyl β-acetopropionic acid and ethylsuccinic acid; the author separated in addition this new ketolactonic acid. α-ethyl-β-methylvalerolacton was also prepared by the distillation of β-ethyl acetomethylsuccinic ether. Thorne, by the distillation of α-ethyl-β-acetopropionic acid, obtained an anhydride, which he stated to be insoluble in water. The author has repeated these experiments and obtained the anhydride which is, however, slightly soluble in water. In conclusion, the constitution of ketolactonic acid is discussed.

Dr. Thorne said that he was able to distil the β-ethyl acetosuccinic ether *in vacuo* at 263°–264° without decomposition; as to the anhydride, he had since found that it was slightly soluble in water. At the time he first prepared the substance he had but a very small quantity at his disposal.

The Society then adjourned to March 1, when a ballot for the election of Fellows will be held and the following paper read, "On some Derivatives of the Isomeric $C_{10}H_{14}O$ Phenols," by Dr. Armstrong and E. H. Rennie.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A paper on "Glycerine and its Application to Pharmacy," was read by Mr. F. Harris Alcock, before the members of the above Association on Wednesday evening, January 31.

The author enumerated a long list of substances from the animal, vegetable and mineral world, which were soluble in glycerine. Popular pharmaceutical preparations into which glycerine largely entered were mentioned, and modes of preparation with formulæ given. The chief object of the paper was to bring forward a method of applying the wonderful solvent, antiseptic, preservative and anti-fermentive properties of glycerine, particularly with reference to the manufacture of glyceroles. The process recommended consists in the use of a menstruum of 1 part glycerine mixed with 4 parts distilled water, which has a sp. gr. 1·06. The properly comminuted drug is exhausted by the menstruum (1 oz. requiring 5 fl. ozs. of solvent as a rule) after maceration, by means of percolation, and the displacement fluid used being distilled water. The united products are then evaporated to 1 fluid ounce on the water-bath and the liquid preserved. One fluid drachm contains the soluble active ingredients from 1 drachm of solid. Experiments had been made with gentian, cinchona, sarsa, glycyrrhiza and pepsin, and the products were exhibited as clear, bright, thick, syrupy liquids having in each case the same odour, taste, appearance and general characters as other preparations of the same drugs prepared by the usual official processes.

An interesting and lively discussion followed, in which the President, Secretary, Messrs. W. T. Cooper, jun., Cox, Cracknell, Dodd, Fell, Parkinson and Ramble, took part.

A hearty vote of thanks, proposed by Mr. Packe and seconded by Mr. Winfrey, to the author for his valuable paper terminated a most enjoyable and profitably spent evening.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, February 1, 1883. Mr. R. H. Parker, Vice-President, in the chair.

The following "Dispensing Notes" were read by the Secretary in the absence of the author:—

Dispensing Notes.

BY WILLIAM JOHNSTON.

No. 1.

In the course of business, a few weeks ago, some—to me—rather remarkable results connected with the dispensing of the following prescription chanced to come under notice. I hope that the description of them may prove of some interest to the members of this Society.

The prescription was:—

Sulphate of Quinine	40 grains.
Tincture of Perchloride of Iron .	80 minims.
Dilute Phosphoric Acid	1 drachm.
Glycerine	4 drachms.
Water	to 8 ounces.

The quinine was shaken up with a little water as usual, and then dissolved by means of the phosphoric acid. On further dilution with water and addition of the tincture of iron, a copious whitish precipitate appeared. The first supposition was that it would be some compound of quinine, but after inquiry and a few experiments, it was found that there was no quinine in it, excepting, perhaps, a trace carried down mechanically.

When a little sulphate of quinine (a proportionate quantity) was dissolved in water by tincture of iron, and the phosphoric acid added last, precipitation did not take place so rapidly, though, after a time, quite as *completely*. In order to discover if the glycerine or spirit had any influence in the reaction, a small quantity of the mixture was prepared in several different ways.

First—Quinine, tincture of iron and phosphoric acid with glycerine; second—the first three with glycerine and spirit; third—with spirit; and fourth—without either glycerine or spirit. In a few days it was found that No. 1—*i.e.*, with glycerine only—had a trifle more precipitate than the others; No. 2 had next most, and so on; No. 4—without the alcohols—having slightly less than the others. The precipitate was thrown down as largely when one or other of the solvents was added to the quinine in solution *in the full quantity* of water.

It was noticed that, on adding either of the solvents in considerable excess of the proportions named, the precipitate was redissolved.

A portion of it was tested and found to be *phosphate of iron.*

An equation to represent the reaction would be:—

$$Fe_2Cl_6 + 2\,H_3PO_4 = Fe_2 2PO_4 + 6\,HCl.$$

Apparently, in that particular proportion, the quinine and, to a small extent, the two alcohols have the power of throwing the ferric phosphate out of solution. The quinine especially has that effect, as a subsequent experiment showed.

Three other mixtures were prepared.

The first containing 10 minims B.P. *solution* of ferric perchloride, 7½ minims dilute phosphoric acid, water to 1 ounce.

The second—Solution of perchloride of iron, dilute phosphoric acid, water, with 10 minims of rectified spirit added.

And the third—Solution of the perchloride, dilute phosphoric acid and water, with 5 grains sulphate of quinine added.

After standing a few days, No. 1 remained bright; No. 2 was decidedly cloudy; whilst No. 3 had in it a plentiful precipitate from the beginning, thus, I think, proving that the quinine and spirit have the power just ascribed to them.

The subject is capable of further development, but want of time compels me to abandon the investigation at present.

I may, however, add that of course the mixture was sent out with all the ferric phosphate in it,—the bottle bearing a "shake" label.

No. 2.

Another example of the power that spirit possesses of throwing throwing certain saline bodies out of solution, was observed a few days afterwards. There was brought to be refilled a bottle which had contained the following mixture:—

Phosphate of Soda	4 drachms.
Bicarbonate of Soda	2 drachms.
Aromatic Spirit of Ammonia,	
Comp. Tincture of Gentian, of each	4 drachms.
Water . . . . to	8 ounces.

When sent out the salts had been quite dissolved and the mixture bright, but now there was a lot of small crystals at the bottom of the bottle. The spirit was at once suspected of being the cause of this and an experiment undertaken in proof.

Four solutions were prepared.

The first had in it:—1 drachm phosphate of soda, ½ drachm bicarbonate of soda, 2 drachms spirit of wine, and water to 2 ounces.

The second—Phosphate of soda, spirit of wine and water.

The third—Phosphate of soda, bicarbonate of soda, and water.

And the fourth—Phosphate of soda and water.

After standing for three or four days in a cold place, Nos. 3 and 4 remained clear, but Nos. 1 and 2 had deposited a mass of oblique rhombic crystals of sodic phosphate, the former especially.

These facts speak for themselves and need little further comment. It cannot be fairly said that Nos. 1 and 2 deposited because there was *less water* in them, as the difference in that respect was only very slight; and, moreover, the ordinary solubility of the phosphate is one in four or five (Royle says *four* and Squire *five*), whereas, in this case there would be at least ten or twelve parts of water available.

This time, instead of fully dissolving the salts, they were reduced to fine powder, *partially* dissolved and the mixture sent with a "shake the bottle" label on. I may further state that, when the empty bottle was returned a second time, it was found that this plan of powdering and partial solution had been much more satisfactory, there being only a very few small crystals left at the bottom.

A vote of thanks was passed to Mr. Johnston.

In the discussion which followed the Chairman, Secretary, Messrs. Elworthy, Giles and Taylor took part.

The Reporter on Physics, Mr. H. Allen, B.Sc., then made a report upon "Secondary Batteries," which will be published in a future number of this Journal.

The Report was copiously illustrated by experiments, and several of the principal secondary batteries were exhibited, including the new Faure-Sellon-Volckmar accumulator, which was shown in working order.

A discussion followed the reading of the Report, in which the Chairman, Secretary, Messrs. Elworthy, Giles, Ince, MacDermott and Taylor took part, after which the meeting adjourned.

At a meeting held Thursday, February 15, the chair was occupied by Mr. H. G. Greenish, Vice-President.

Mr. W. E. Crow read a paper on "Linnæus," of which the following is an abstract:—

The author first alluded to the antecedents of Linnæus, observing that his predecessors had been peasants, although some of them early in the 17th century had followed literary pursuits. It was Nicholas, his father, who first adopted the name Linnæus, a remarkable linden tree, *Tilia Europæa*, growing near the place of their residence, having, it is said, given origin to this surname. After reviewing somewhat in detail the early life of this great naturalist, and pointing out that he had been intended by his parents for the church, Mr. Crow proceeded to mention the incidents connected with his meeting Rothman, Stobæus and others, men whose influence played no inconsiderable part in delineating a character which for ever would be regarded as one of the most remarkable in the annals of botany.

At the age of 22, Linnæus was eking out a most wretched existence, and it was related that he had to depend on chance generosity for a meal, and had even to repair his shoes with folded paper. The author here pointed out that in spite of all his troubles Linnæus still persevered with his studies, and shortly afterwards was discovered by Dr. Celsius, who took him under his protection and soon recommended him to pupils, by which means his finances were improved, and he was enabled thereby to assume a more creditable appearance. He then mentioned the many incidents connected with his stay at Upsala, his journey through Lapland, etc., and the steps taken by him to obtain his degree in medicine, which latter was effected at Harderwijk, in Holland. He then proceeded to notice the occasion when Linnæus convinced Professor Burman, of Amsterdam, that the cinnamon tree was a species of Laurus, and also alluded to a tradition connected with his visit to England, in which it is related that Linnæus fell on his knees in a rapture on observing the golden bloom of the furze (*Ulex Europæus*) growing on some of the commons near London, especially Putney Heath. After reviewing his visit to Paris and his meeting with Jussieu, the great French botanist, Mr. Crow proceeded to give a brief sketch of the Linnæan or Artificial System of classification.

A diagram was exhibited showing the whole of the twenty-four classes and some of the more important orders, comparing them at the same time with the Natural System. Special attention was called to the following classes:—Icosandria, Polyandria, Didynamia, Tetradynamia, Monadelphia, Syngenesia, Gynandria, Monœcia, Diœcia, etc., and the orders of the Natural System which corresponded with them.

A discussion followed in which the Chairman, Secretary, Messrs. Baily, Corder, Hamilton and Rees took part.

A vote of thanks was passed to Mr. Crow.

The Reporter upon Analytical Chemistry, Mr. C. Thompson, then made a Report upon two new methods for the separation of copper and cadmium. The first method depended upon the fact that copper is precipitated from solution as sulphide by boiling with milk of sulphur, while cadmium remains in solution, the second method depended upon a similar reaction but involved the use of sodium thiosulphate. Mr. Thompson was making experiments upon the processes and promised to give an account of his results at the next meeting.

After a short discussion the meeting adjourned.

SOCIETY OF CHEMICAL INDUSTRY.

The Present Condition of the Soda Industry.

BY WALTER WELDON, F.R.S.

(*Continued from page 638.*)

The other consideration to which I referred as having given comfort to the makers of Leblanc soda, and which constituted indeed their chief ground of hope for salvation against the ammonia process, was that the world requires chlorine as well as soda, and that while the chlorine of the salt decomposed by the Leblanc process is yielded as hydrochloric acid, from which free chlorine can be obtained readily, the chlorine of the salt decomposed by the ammonia process is yielded as a somewhat dilute solution of calcium chloride. It was thought that the ammonia process would eventually even help the existing Leblanc soda-makers, by preventing the further extension of the Leblanc process, and so restricting the production of hydrochloric acid, and thereby at length increasing the value of that body. The ammonia process, no doubt, would have produced that result, and would have produced it by this time, if the supply of hydrochloric acid in this country had not been already so largely in excess of the demand for chlorine products. That demand is always becoming larger, and within the last few years the production of hydrochloric acid has appreciably diminished; but in this country the constantly-increasing stringency of legislative enactments with respect to river and air pollution has compelled so many producers of hydrochloric acid, who would have preferred to throw their acid away, to employ it in the manufacture of chlorine, whether that manufacture were profitable or not, that the selling price of chlorine products has of late years been continually falling, until it is now at a point at which it barely pays their cost. No doubt, if all the other conditions of the problem were to remain as at present, the demand for chlorine products would in time overtake the supply of hydrochloric acid in this country, as it has long since done on the Continent, and the manufacture of chlorine in England would so again become profitable. But the other conditions of the problem are not likely to remain stationary, and both M. Solvay and myself are doing our best to change them.

M. Solvay is proposing to manufacture hydrochloric acid from the residual calcium chloride of the ammonia process. I imagine that he is urged to that course, not merely by a desire to turn that calcium chloride to account, but also by a desire to avoid making too much nuisance. For it must not be supposed that even the ammonia process, when practised on a large scale, is free from nuisance. It certainly does not send into the air any noxious vapours, but it sends into the water-courses very large quantities of calcium chloride, rarely accompanied by less, and often accompanied by much more, than an equivalent quantity of sodium chloride, and very apt to be accompanied also by both calcium carbonate and free lime. Neither calcium chloride nor sodium chloride will do much harm to a river, if sent into it in moderate quantities; but when it comes to sending into a comparatively small stream, far inland, 260 tons of calcium and sodium chlorides per twenty-four hours,—say, about ten tons per hour, night and day, all the year through: and M. Solvay must be doing something very like that at Dombasle,—the matter assumes quite another aspect. I am not myself an angler, but, if I were, I do not think that I should seek for sport immediately below Dombasle.

Be all that, however, as it may, M. Solvay is now erecting at Dombasle apparatus for an industrial trial of a process for obtaining hydrochloric acid from calcium chloride, at which he has been working for many years. The process in question consists in first concentrating by evaporation the mixed solution of calcium and sodium chlorides which is the residual product of the ammonia process; then mixing the concentrated solution with clay, making the mixture into balls and drying those balls: and then heating these balls to redness in a current of steam. This process certainly works, on condition that the temperature employed be sufficiently high, and that the quantity of steam used be largely in excess of the quantity necessary to react upon the calcium chloride. As the resulting mixture of vapour of water and vapour of hydrochloric acid would otherwise give an extremely dilute aqueous acid, M. Solvay proposes to separate from it most of its vapour of water, before condensing its hydrochloric acid, by passing the mixture of the two vapours through a very strong solution of $CaCl_2$, which he finds will absorb most of the steam from such a mixture, allowing the HCl to pass on alone, so that it can afterwards be condensed in the usual way. All this is ingenious, but it can hardly be cheap. Firstly, a solution containing only about 8 per cent. of calcium chloride has to be evaporated, we may say to dryness; then the mixture of $CaCl_2$ and clay has to be maintained at a red heat for a considerable time, in a current of steam; and then the solution of calcium chloride used to separate steam from the resulting mixture of steam and HCl has to be prepared for use again by having all the water which it has absorbed evaporated off from it. To English manufacturers who have more hydrochloric acid than they can use, this process of M. Solvay's will seem little less than ridiculous; but one must remember that it is intended for countries in which the demand for hydrochloric acid exceeds the supply, and in which countries, moreover, chlorine products are protected by import duties. In such countries, one can quite conceive its being commercially practicable; in which case the exportation of chlorine products from England to the Continent is doomed. I ought to add that M. Solvay expects that the silico-aluminate of calcium which remains after the chlorine of his mixture of calcium chloride and clay has been driven off by steam will be useful as a cement, and will thus help to pay the cost of his hydrochloric acid.

The exportation of chlorine products from England to the Continent is, moreover, threatened in another way. The Continental manufacturers of Leblanc soda, unlike the English manufacturers of Leblanc soda, do not produce enough hydrochloric acid to meet the demand of their respective countries for that acid itself and the products which are made from it. This is partly due to the production of ammonia soda, proportionately to the total production of soda, being so much greater in France and Germany than in this country; and partly to hydrochloric acid being required in those countries for industries which in this country do not exist. Large quantities of chlorine products consequently go to the Continent from this country: our production of hydrochloric acid being still sufficient to enable us to supply not only the total English demand for chlorine, and the total American demand for chlorine, but also an appreciable proportion of the Continental demand for chlorine, and, in addition to all that, to throw a large residue of hydrochloric acid into the North Sea. The Continental Leblanc soda-makers do not like this importation into their respective countries of chlorine products from England; but they can prevent it only in one or other of two ways: either by increasing their production of hydrochloric acid, or by becoming enabled to obtain from a given quantity of hydrochloric acid a larger proportion of free chlorine than is yielded by the process at present in use. Personally, I have for the process at present in use that respect which one always feels for the bridge which has carried one over, but I am well aware that it can by no means be regarded as final. It yields chlorine cheaply; but it yields only one-third of the total chlorine contained in the acid employed, the other two-thirds being lost as calcium chloride. English chlorine manufacturers will regard almost with horror the idea of a new chlorine process, which shall yield in the free state practically the whole of the chlorine contained in the acid employed; but on the Continent there is a demand for such a process,—a demand which will no doubt be lessened, but will by no means be destroyed, by what is being done in France by the Compagnie d'Exploitation,—and I am one of those who have been called upon to endeavour to supply that demand. M. Pechiney is now preparing to make at Salindres a trial on an industrial scale of a process which, I think, will supply it; and by the end of this year he will probably have obtained decisive results.

As regards the English chlorine industry, however, I do not think that its prospects are by any means so gloomy as, from what I have said so far, might at first blush appear. But I think that its salvation will come from an unexpected quarter. I think that our English manufacturers of Leblanc soda will have to cease to devote their hydrochloric acid,—when they do not throw it away,—exclusively to chlorine making. They would, of course, be only too glad to do so, if a means could be furnished them of turning it to account otherwise; but the difficulty hitherto has been as to how to turn it to account otherwise. I believe that that difficulty is about to disappear. I am not free to enter into that matter now, and, indeed, it is not yet ripe for discussion; but I have very great confidence that new applications of hydrochloric acid, admitting of being applied very extensively, at comparatively small expense, are among the things of the immediate future.

As regards soda, the position of the English Leblanc soda-makers is this. They are now working, when not actually at a loss, at least without profit. Until comparatively recently, they supplied the whole of the English demand for soda, the whole of the American demand for soda, and a large part of the Continental demand for soda. Both their home market, however, and their American market have been recently invaded by English-made ammonia soda, and now the manufacture of ammonia soda has begun in the United States themselves, and will have reached there, before the expiration of this year, a scale of 20,000 tons per annum, while a little later on that Belgian soda and copper work of which I spoke will not only have put an end to all export of English soda to Belgium, but will, doubtless, also be sending Leblanc soda to America: as will also, no doubt, the great work which is being built at Marseilles, and, eventually, those other works which are about to be built at others of the French sea-ports. The exportation of English soda to Austria, which has already dwindled to little more than 8000 tons per annum, is expected to cease entirely before the end of the present year, by reason of the increased quantity of ammonia soda which will soon be made in Austria. An increased production of ammonia soda is similarly expected to put an end, almost immediately, to the importation of English soda into Germany, which importation in 1881 was already only two-thirds of what it was in 1879. Russia, moreover, will soon be making for herself at least a portion of the soda she consumes; and France, which country has hitherto been entirely dependent upon England for her supplies of caustic soda, though she has long ceased to take from us any form of soda, will soon be making herself all the caustic soda she requires; for, apart from what may be done by the new company of which I have spoken, M. Solvay is just beginning to make caustic soda at Dombasle, and contemplates making it there on a very extensive scale.

In face of all this, how are the English Leblanc soda-makers to continue to live? For one thing, it is quite certain that they must have cheaper pyrites. The present price of 6*d.* per unit is an artificial price, entirely due to a trade combination; and that price will certainly have to be reduced by at least 50 per cent. That it can be reduced to 3*d.* per unit, and yet leave a very fair profit to the pyrites sellers, I believe there can be no doubt. At the present price of copper, and at 3*d.* per unit for sulphur, pyrites showing 2½ per cent. of copper by Swansea assay would sell for 39*s.* per ton; and, that Spanish pyrites can be delivered to English ports at that price at a fair profit, is, I believe, unquestionable. If, therefore, the existing companies refuse to supply pyrites at that price, they will simply call into existence other companies which will supply it at that price. That the Leblanc soda-makers will thus get their sulphur at a price not exceeding 3*d.* per unit, after the end of next year, when the present combination between the pyrites companies will expire, may be regarded as quite certain.

Pyrites at 3*d.* per unit, however, would by no means bring down the cost of Leblanc soda to that of ammonia soda. Without using any figures which have been given to me privately, there is no difficulty in arriving, very approximately, at the difference between the cost of ammonia soda and that of Leblanc soda, from what is matter of public knowledge with respect to the dividends paid by joint stock companies which make ammonia soda and publish balance-sheets. We learn in this way that, when Leblanc soda is yielding no profit at all, ammonia-soda is yielding fully £1 per ton. As to make a ton of actual sodium carbonate by the Leblanc process does not require more than about 13·5 cwt. of pyrites, reduction of the price of pyrites to 3*d.* per unit would thus reduce the cost of Leblanc soda only by about 7*s.* 9*d.* per ton of actual sodium carbonate.

Seven shillings and ninepence, however, is something; and, as regards the balance of the pound, there are two resources, which together will, I think, be sufficient to turn the tables upon the ammonia process, and make the good old Leblanc process the cheaper of the two.

One of these two resources consists, of course, in sulphur recovery. If sulphur recovery were the only resource,—which, however, happily it is not,—I think it not impossible that the required 12*s.* 3*d.* per ton of sodium carbonate could be gained by it alone. To this end, except in localities in which there is a demand for sulphuric acid free from arsenic, the sulphur must be recovered, not as sulphuric acid for use again, but as free sulphur, for sale as such. At the general meeting of our Society at Manchester, last July, I explained that, while the Schaffner and Helbig process would yield as sulphuric acid practically the whole of the sulphur of the calcium sulphide contained in the waste treated by it, it would probably yield as free sulphur only four-fifths of the total sulphur contained in the waste as calcium sulphide. Since then, reason has arisen for a very confident hope that the whole of the sulphur of the calcium sulphide contained in the waste may be obtained in the free state: in which case the yield will be almost exactly 6 cwt. of free sulphur per ton of actual sodium carbonate manufactured. If, therefore, one were dependent for that 12*s.* 6*s.* on sulphur recovery alone, the problem would be narrowed to this: Can free sulphur be obtained from alkali-waste at such a cost, and is there a sufficient demand for free sulphur at such a price, that it shall be possible to sell recovered sulphur, in sufficient quantity, at 2*s.* 0½*d.* per cwt., or say 41*s.* per ton, more than the cost of producing it?

To be continued.)

Parliamentary and Law Proceedings.

Prosecution under the 17th Section of the Pharmacy Act, 1868.

At the Borough Police Court, Nottingham, on Tuesday, February 6, before Mr. F. Parsons and Captain Starey, John Alfred Bailey, of 220, Alfred Street Central, was charged with having sold to Alfred Short Wright, Assistant Secretary of the Chemists and Druggists' Trade Association of Great Britain, a certain poison, to wit, "laudanum," the same being a preparation of opium, not labelled with the name of the article, or with the name and address of the seller of the same, contrary to the statute in such case made and provided.

Mr. Henry Glaisyer, solicitor, Birmingham, appeared on behalf of the Chemists and Druggists' Trade Association of Great Britain, and Mr. F. Lees, solicitor, Nottingham, conducted the defence.

Mr. Glaisyer, in opening the case, said this was a summons issued under the 17th section of the Pharmacy Act, 1868, 31 and 32 Vict., chap. 121, which stated "that it shall be unlawful to sell any poison, either by wholesale or retail, unless the box, bottle, vessel, wrapper or cover in which the poison is contained be distinctly labelled with the name of the article, the word 'poison,' and with the name and address of the seller of the poison." The section then proceeded to lay down that any person selling poison otherwise than is herein provided shall, upon a summary conviction before two justices of the peace in England or the sheriff in Scotland, be liable to a penalty not exceeding £5 for the first offence, and £10 for the second or any subsequent offence, and for the purposes of this section, the person on whose behalf any sale is made shall be deemed to be the seller. Mr. Glaisyer further stated that on January 30 last Mr. Alfred Short Wright went to Nottingham, and visited the shop of the defendant at 220, Alfred Street Central, where he purchased a quarter of a pound of linseed meal and one pennyworth of laudanum. The laudanum, on being tested by the purchaser, was found to be a preparation of opium. There could be no doubt whatever that the defendant was the person carrying on the business at the address he had given, as he should be prepared to prove, if necessary, that the defendant paid the rates and taxes of the said premises.

Alfred Short Wright, Assistant Secretary of the Chemists and Druggists' Trade Association of Great Britain, gave evidence as to the purchase of the laudanum, which he said had been supplied to him by a woman. He had examined the contents of the bottle and found it to be a preparation of opium.

William Pilgrim said he was rate collector for the Borough of Nottingham, and produced his rate book, in which the name of John Alfred Bailey appeared as occupier of the premises 220, Alfred Street Central, and that he paid him the rates.

This was the case for the prosecution.

Mr. Lees said he was quite prepared to admit the offence on behalf of his client, and addressed the Bench for mitigation of the fine, admitting that the laudanum had been sold, but not by the defendant. Defendant was preparing to undergo an examination which would enable him to be qualified as a dealer in such drugs. After taking these facts into consideration he trusted the Bench would only inflict a nominal penalty.

The Magistrates said they had carefully considered the matter and thought it was a case that had been taken up very properly for the protection of the public and they had decided to convict defendant in a penalty of £1 11*s.* 6*d.* including costs.

Prosecution of a "Herbalist" under the 17th Section of the Pharmacy Act.

At the Hanley Borough Police Court, on Monday, the 12th inst., John Wheatcroft, carrying on business as a herbalist in Parliament Row, Hanley, was summoned to answer a charge of selling poison without labelling the same, and Edward Davis was summoned that he being in the employ of Wheatcroft did vend the same on the 25th January last.

It appeared that on the day named Mrs. Bratt, a widow, went to the defendant's shop for some burdock root. The defendant Davis was in the shop, and said in reply to a question by Mrs. Bratt that burdock would do a deal of good if mixed with some other herb roots, namely, mezereum, gentian and dandelion. He gave her a paper which he said contained these roots, but on Mrs. Bratt taking a wineglassful of a decoction made from them she became black in the face and delirious.

Evidence was given to the effect that belladonna had been given instead of burdock.

Mrs. Bratt's daughter, who also took two tablespoonfuls of the decoction, became very ill, and was almost blind when she went for the doctor, and was obliged to turn back to get a drink, so great was her thirst.

Wheatcroft was fined £5 and costs, the summons against Davis being dismissed.—*Staffordshire Sentinel.*

Alleged Poisoning by a Patent Medicine.

An adjourned inquest has been held at the Stowmarket County Hall, on the body of Sarah Scurrah, before Mr. A. F. Vulliamy, Coroner.

Dr. W. G. Groome said that he had made a *post-mortem* examination of the deceased and could find no cause of death. Deceased was suffering from no disease that would rapidly cause death. His opinion was that she died from opium poisoning.

Edward Richard Gibbs said he bought the bottle of balsam produced, at his aunt's request, for her at Mr. Martin's shop in the Edgware Road, about four years ago. It was not opened till January 9, last. His aunt wished him to buy it for her, because she had previously found it beneficial. She on that occasion took a teaspoonful of the mixture three times a day. She took three doses of it. This was rather more than four years ago. He did not remember that she felt drowsy on that occasion.

Mr. A. H. Martin, chemist, of South Hampstead, described the constituents of the pectoral balsam. It contained, amongst other things, ½ ounce of crude opium in every 100 ounces. He had been very careful to keep within the limits of the dose ordered by the Pharmacopœia, which gave ½ a grain to 2 grains of opium as the maximum dose. Crude opium was not so strong as powdered opium, because the latter was deprived of the moisture. He should think one teaspoonful, which contained 6 minims of laudanum, would be absorbed as soon as taken, more especially as it is taken in combination with an alkali. He had sold hundreds of bottles, and had never had an accident. He did not believe that the dose deceased took of his mixture would have caused death.

A verdict of "Accidental death from opium poisoning" was returned.

Charge against an Assistant.

At the Southampton Petty Sessions, Charles Baker was charged on remand with stealing two florins, the property of his employers, the Southampton Drug Company, of 153, High Street.

Mr. William Day, director and secretary of the Company, stated that on January 16, defendant, who was a managing chemist in their employ, was engaged in the shop, his duty being amongst other things to serve customers, and when he took cash over the counter it was his duty to enter it in a book which duplicated the entry by means of a carbon sheet placed between the leaves. He then had to tear out two leaves, and hand one with a billhead to the customer, and the other with the carbon impression to the cashier with the money. This it was alleged he had not done in a case where a purchase had been made with marked money, which was afterwards found in his possession. The prisoner was committed for trial, but was liberated on bail, himself in £100 and two sureties in £50 each.

Charge of Theft against a Chemist's Assistant.

At the Liverpool Police Court, on Wednesday, January 31, Francis Edward Twemlow, was charged with having stolen drugs and chemicals to the value of £150, the property of the Liverpool Apothecaries' Company, Limited, Colquit Street, Liverpool. According to the evidence it appeared that the prisoner had been three months in the service of the prosecutors, and that after he had left their suspicions were excited by information that he had been advertising drugs, etc., for sale at reduced prices. Upon inquiries being made it was found that the prisoner had received two cheques, and when he was arrested drugs were found in his boxes which were identified as the property of the Company. The prisoner was committed for trial, bail being refused. —*Manchester Guardian.*

Obituary.

Notice has been received of the death of the following:—

On the 6th of January, Mr. Albert Charles Muskett, Chemist and Druggist, Park Street, Southwark. Aged 56 years.

On the 20th of January, Mr. John Hawkin, Chemist and Druggist, Bedale, Yorkshire. Aged 78 years.

On the 22nd of January, Mr. James William Barnes, Pharmaceutical Chemist, Spalding, formerly of Oxford Street. Aged 27 years. Mr. Barnes had been a Member of the Pharmaceutical Society since 1881.

On the 25th of January, Mr. Frederick Finney Flint, Chemist and Druggist, Prebend Street, Islington. Aged 44 years.

On the 25th of January, Mr. William Saxe Pearson, Chemist and Druggist, Kidsgrove, Staffordshire. Aged 67 years.

On the 27th of January, Mr. Stephen Bloxwich, Chemist and Druggist, Bloomsbury Street, Birmingham. Aged 65 years.

On the 28th of January, Mr. Charles Patrick Baker, Pharmaceutical Chemist, High Street, Chelmsford. Aged 63 years. Mr. Baker had been a Member of the Pharmaceutical Society since 1850.

On the 2nd of February, Mr. Edwin Pomeroy Webster, Pharmaceutical Chemist, Newcastle-on-Tyne. Aged 60 years. Mr. Webster had been a Member of the Pharmaceutical Society since 1853.

On the 4th of February, Mr. Joseph Dixon, Chemist and Druggist, Whitefriar Gate, Hull. Aged 62 years.

On the 6th of February, Mr. Benjamin Matthew Tippett, Pharmaceutical Chemist, Sloane Street, London. Age 71 years. Mr. Tippett was one of the Founders of the Pharmaceutical Society.

On the 8th of February, Mr. John Martin, Pharmamaceutical Chemist, Cleveden, Somerset. Aged 67 years. Mr. Martin also was one of the Founders of the Pharmaceutical Society.

On the 12th of February, Mr. Edward Bruce Oddie Chemist and Druggist, High Street, Bristol. Aged 34 years.

On the 13th of February, Mr. Alexander Maunder, Chemist and Druggist, Weston-super-Mare. Aged 66 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Aromatic Spirits of Ammonia.

Sir,—Kindly allow me space to point out an error into which Mr. Martindale fell in criticizing my paper on sal volatile.

To make 7 pints of the official compound without distillation, the 8 oz. amm. carb. must be dissolved in a mixture of 4 oz. liq. amm. ft. and 10 ozs. of water. Mr. Martindale, to disprove my statement that the amm. carb. would not dissolve in the requisite quantity of water, showed an experiment in which he used double this proportion of water.

As for Mr. Schacht's reiterated statement, that after addition of the spirit, in my process "a solution could be obtained without the aid of heat," I do not find in the paper any assertion to the contrary.

The application of heat is recommended because sal volatile made with such a solution does not deposit crystals, even at 0° C., whereas when prepared with a solution effected in the cold, a deposit forms at low temperatures.

Buxton. J. C. Thresh.

Only a Junior.—The answer to your question may be obtained by drying the extracts and observing the reduction in weight through loss of moisture. The equivalent of the dry extract is then ascertainable by calculation.

T. H. Dodd.—Your letter was not published because it did not appear to us that it threw any fresh light upon the subject.

Vibgyor.—There is no contradiction between the two statements. For an account of the ammonia process, see before, p. 455.

E. J.—Your communication was sent to the wrong address. It has now been received.

J. F. L.—(1) A candidate for a Bell Scholarship must be a Registered Student or Apprentice of the Society. (2) No. (3 and 4) No single book would be sufficient for the purpose. (5) We cannot say.

Communications, Letters, etc., have been received from Messrs. Burgoyne, Burbidge and Co., Baldock, Jones, Shirivell, Ince, Pollard, Rouch, Young, Wilkinson, Wade, Hay, Hart, W. Robert, Local Secretary, Only a Junior, Hospital Dispenser, Assistant, Asinus, Minor Associate in Business, Pestle, Nemo, Publishers of *El Sentido Catolico.*

LOCAL LIST OF SUBSCRIPTIONS

TO THE

BENEVOLENT FUND

RECEIVED DURING 1882.

	£	s.	d.
Aberaman.			
Sims, William	0	5	0
Aberayron.			
Jones, John Price	0	2	6
Aberdare.			
Jones, D. W.	0	5	0
Smith, Morgan	0	2	6
Aberdeen.			
Bremner, James	0	5	0
Broomhead, George E.	0	10	0
Coutts, Charles	0	5	0
Cruickshank, Geo. P.	0	5	0
Davidson, Charles	1	1	0
Davidson and Sim	0	10	6
Giles, William	0	5	0
Gordon, William	0	5	0
Johnston, John	0	5	0
Kay, James P.	0	5	0
Kemp, James	0	10	6
McLean, A. L. H.	0	4	6
Paterson and Sons	0	10	6
Presslie, R. D.	0	5	0
Strachan, Alexander	0	5	0
Abergavenny.			
Hollway, A. B.	0	5	0
Abergele.			
Hannah, Charles	0	10	6
Hannah, John	0	5	0
Aberystwith.			
Davies, David	0	5	0
Ellis, Robert	0	2	6
Wynne, Edward P.	0	10	6
Abingdon.			
Ballard, William	0	5	0
Preston, Alfred P.	0	5	0
Roberts, Thomas	0	5	0
Smith, William	0	5	0
Smith, William F.	0	5	0
Aboyne.			
Petrie, James J.	0	5	0
Abridge.			
Windus, Arthur E.	0	5	0
Accrington.			
Sprake, David L.	0	10	6
Stanley, Thomas	0	2	6
Addiscombe.			
Townsend, Charles	0	10	6
Alcester.			
Adcock, Isaac Dickson	0	10	6
Overbury, Henry	0	5	0
Aldershot.			
Williams, James	0	10	6
Alexandria, N.B.			
McFarlane, Peter	0	5	0
Alfreton.			
Robinson, Joseph S.	0	10	6
Alnwick.			
Newbigin, James L.	0	10	6
Newbigin, Lesslie	0		0
Alresford.			
Connor. Thomas H.	0	5	0
Richardson, J. H.	0	2	6
Ambleside.			
Bell, Thomas	0	10	6
Ampthill.			
Allen, George	1	1	0
Andover.			
Gould, Robert G.	0	10	6
Angmering.			
Freeland, Alonzo J.	0	2	6
Freeland, H. W.	0	2	6
Annan.			
Rae, Robert S.	0	10	6
Arbroath.			
Burn, David H.	0	5	0
Ashbourne.			
Bradley, Edwin Sylvester	0	10	6
Greaves, Frederick W.	0	5	0
Osborne, James	0	5	0
Reckless, A. H.	0	10	6
Wardle, Thomas	0	2	6
Ashford (Kent).			
Brothers and Son	1	1	0
Ingall, Joseph	1	1	0
Stedman, William	0	5	0
White, Charles Thomas	0	5	0
Ashton-under-Lyne.			
Arnfield, John C.	0	5	0
Bellfield, William	0	10	0
Bostock, William	0	10	6
Heap, Henry	0	2	6
Knott, E.	0	2	6
Neal, S.	0	2	6
Thatcher, Thomas	0	2	6
Waterhouse, Jabez	0	10	6
Ashwell.			
Skelton, J. H.	0	5	0
Atherstone.			
Orme, William	0	10	6
Atherton.			
Fletcher, Ellis	0	5	0
Heywood, John H.	0	10	6
Warburton, Thomas	0	5	0
Aylesbury.			
Dickins, Rowland	0	5	0
Palmer, Edwin T.	0	5	0
Turner, John	0	5	0
Badsworth (near Pontefract).			
Heald, Samuel H.	0	10	6
Bakewell.			
Carrington, Edward G.	0	5	0
Baldock.			
Bally, Edward F.	0	5	0
Banbury.			
Ball, George V.	0	10	6
Bartlett, H.	0	5	0
Falkner, Richard	0	10	6
Gilkes, W. P.	0	10	6
Watts, W.	0	5	0
Banchory.			
Lunan, Alexander	0	5	0
Bangor.			
Baker, Henry V.	0	10	6
Jones, H. L.	0	5	0
Bangor—continued.			
Jones, Owen	0	5	0
Roberts, Meshach	1	1	0
Webster, Thomas	0	2	6
Barnard Castle.			
Martin, C. B.	0	5	0
Barnstaple.			
Goss, Samuel	0	5	0
Partridge, James	0	5	0
Pratt, Edward	0	5	0
Symons, William	0	5	0
Barrow-in-Furness.			
Bryden, John	0	5	0
Chapman, Leonard P.	0	5	0
Ormandy, John S.	0	5	0
Steel, Thomas	0	5	0
Taylor, Stephen	0	5	0
Barton-on-Humber.			
Crowther, Charles H.	0	10	0
Ingoldby, William	0	2	6
Smith, Richard F.	0	5	0
Basingstoke.			
Sapp, Arkas	0	10	6
Woodman, George	0	5	0
Bath.			
Blagg, Eli	0	2	6
Bright, William	0	5	0
Capper, Edmund	0	5	0
Clarke, B. G.	0	2	6
Commans, Robert D.	0	10	6
Dunn, Richard	0	5	0
Ekin and Appleby	0	10	6
Goodman, D. H.	0	5	0
Griffin, Alfred W.	0	5	0
Hillier, Henry	0	10	6
Hughes, John Edward	0	10	6
Marsh, John H.	0	10	6
Masters, Henry James	0	5	0
Merrikin, John B.	0	10	6
Pinch, James E.	0	5	0
Rickwood, Henry	1	1	0
Thomas, Henry J.	0	10	6
Thring, Edmund J. H.	0	10	6
Tilsley, George	0	10	6
Toone, Joseph V.	0	10	6
Vigis, Joseph L.	0	10	6
Williams, Sophia	0	10	6
Wilson, Joseph	0	5	0
Batley.			
Parrington, William	0	5	0
Beaumaris.			
Slater, John	0	10	6
Bedale.			
Swinbank, J.	0	5	0
Bedford.			
Anthony and Biss	0	10	0
Cameron, William Alexander	0	5	0
Clifford, R. N.	0	5	0
Corrie, A. A.	0	1	0
Corrie, Isabella A.	0	5	0
Cuthbert, J. M.	0	5	0
Ekins, John	0	10	6
Hester, Charles	0	5	0
Jones, George	0	5	0
Norman, Joseph S.	0	5	0
Taylor, J. B.	0	5	0
Thompson, H.	0	5	0

	£	s.	d.
Bedford, Leigh.			
Haddock, James	0	5	0
Bedlington.			
Foggan, George	0	5	0
Belfast.			
Green, Thomas	0	5	0
Yoxall, Henry	0	5	0
Belper.			
Bowler, William Samuel	0	2	6
Burkinshaw, W. T.	0	5	0
Belvedere.			
Miles, George	0	5	0
Berkeley.			
Bell, Edward Collinson	0	10	6
Berkhamsted.			
Rippon, R. O.	1	1	0
Berwick-on-Tweed.			
Carr, Walter P.	0	5	0
Beverley.			
James, Kirby	0	10	0
Bexley Heath.			
Mason, Alfred J.	0	5	0
Bideford.			
Betty, Samuel C.	0	10	0
Hogg, Thomas	0	5	0
Biggar.			
Eunson, John	0	2	6
Biggleswade.			
Spong, D. M.	0	5	0
Bilston.			
Kearnes, Robert H.	0	5	0
Bingham.			
Doubleday, Frederick	0	5	0
Bingley.			
Hanson, Christopher	0	2	6
Skirrow, William E.	0	10	6
Slicer, Walter	0	7	6
Birkenhead.			
Barber, George	0	10	6
Burroughs, George H.	0	10	6
Dutton, H. O.	0	10	0
Field, H. E.	0	5	0
Fore, Thomas	0	5	0
Foulkes, William James	1	1	0
James, Thomas C	0	5	0
Mullock, Richard	0	10	6
Nicholson, Henry	0	10	6
Stewart, Alexander	0	10	6
Stewart, John	0	10	6
Wilkinson, Samuel	0	5	0
Birmingham.			
Bagshaw, Henry B.	0	10	6
Barker, Thomas	0	10	6
Bird, Alfred	1	1	0
Cattell, John T.	0	2	6
Chase, Thomas, jun.	1	1	0
Churchill, Walter J.	1	1	0
Clayton, Francis Corder	1	1	0
Cornforth, Edwin	0	2	6
Drew, John	0	5	0
Foster, Alfred H.	0	5	0
Foster, James Alfred	0	5	0
Frobisher, Frederick	0	5	0
Goldsmith, Edgar	0	2	6
Holdsworth, Thomas W.	0	10	6
Lucas, Joseph	0	10	6
Mantell, Charles	0	10	6
Mott, John C.	0	5	0
Naish, C. E.	0	10	0
Pegg, Herbert	1	1	0
Perry, George E.	0	5	0
Perry, William Henry	0	5	0
Robinson, Eardley	0	10	6
Snape and Son	0	10	0
Southall Bros. and Barclay	1	1	0
Thomason, Thomas W.	0	2	6
Thompson, William	0	5	0
Turner, Benjamin	0	2	6
Wakefield, John	1	1	0
Wilcox, George	0	10	6
Bishop Auckland.			
Dobinson, Thomas	0	5	0

	£	s.	d.
Bishop Stortford.			
Hardy, John	0	5	0
Speechly, George	0	10	6
Bishop's Castle.			
Bills, Martha Cam	0	10	6
Blackburn.			
Booth, James	0	10	6
Critchley, T.	0	5	0
Farnworth, William	1	1	0
Garland, A. P.	0	5	0
Hindle, Henry	0	5	0
Hindle, James	0	5	0
Paffard, Frank	0	10	6
Wells, William	0	5	0
Blandford.			
Groves, Mrs. W. E.	1	1	0
Bodmin.			
Williams, Joel D.	1	1	0
Bognor.			
Long, Alfred T.	0	10	6
Bolsover.			
Thornley, Thomas	0	5	0
Bolton.			
Blain, William	0	10	6
Forbes, James W.	0	10	6
Hart, James	0	10	6
Mather, James	0	10	6
Bombay.			
Kemp, D. S.	1	1	0
Bo'ness (N.B.).			
Tweedie, Alexander	0	10	6
Bonnyrigg.			
Hutcheon, W.	0	2	6
Boston (Lincs).			
Allen, Thompson	0	5	0
Cammack, John	0	5	0
Grimble, Albert	0	5	0
Haller, F. W.	0	5	0
Lewin, Edward C.	0	5	0
Pilley, Henry T.	0	5	0
Pilley, Samuel	0	5	0
Boulogne (France).			
Parsons, J. Vincett	0	5	0
Bourne (Lincs).			
Mills, Robert M.	0	10	6
Bournemouth.			
Atkins, John	0	5	0
Beale, J. H. T.	0	5	0
Bennett, Charles	0	2	6
Duncan, Alexander	1	1	0
Endle, Frederick	0	5	0
Gilbert, William	0	2	6
Hazard, James D.	0	5	0
Newbury, Samuel	0	5	0
Parkes, Harry C.	0	2	6
Shemmonds, John	0	5	0
Shipman, John J.	0	10	6
Spinney, Frank	0	10	6
Worth, Edwin	1	1	0
Bourton-on-the-Water.			
Griffin, Henry S.	0	10	6
Bovey Tracey.			
Selleck, W. R.	0	5	0
Bowness-on-Windermere.			
Birkett, Charles	0	5	0
Bradford (Yorks).			
Beanland, Samuel	0	5	0
Bell, Francis	0	10	6
Blackburn, Bailey	2	2	0
Butterworth, Albert	0	10	6
Cocker, Justus J.	0	5	0
Cockshott, William	0	2	6
Faull, John	0	5	0
Harrison, Parkinson and Co.	2	2	0
Lister, Simeon	0	10	6
Rimmington and Sons	2	2	0
Rogerson and Son	2	2	0
Stephenson, Robert	0	5	0
Tempest, Joseph	0	2	6
Watts, John	0	10	6
West, William	0	2	6
Bradford-on-Avon.			
Cooper, Albert H.	0	10	0

	£	s.	d.
Braintree.			
Row, George C.	0	2	6
Brecon.			
Meredith, John	0	10	6
Bridgend.			
Jenkins, D.	0	5	0
Lloyd, John	0	5	0
Bridgnorth.			
Hughes, Hubert	0	5	0
Steward, William	0	10	6
Bridgwater.			
Basker, J. A.	0	5	0
Woodward, John L. L.	0	5	0
Bridlington.			
Jackson, Henry J.	0	10	0
Smith, John	0	2	6
Bridlington Quay.			
Dickins, Mary	0	5	0
Bridport.			
Beach and Barnicott	1	1	0
Beach, James	0	10	6
Jones, Frederick	0	2	6
Brightlingsea.			
Cooper, George B.	0	5	0
Brighton.			
Adams, Frank	0	10	6
Barton, Charles	0	10	6
Barton, Henry	0	10	6
Chambers, Herbert	0	2	6
Chaplin, T. W.	0	5	0
Chapman, F.	0	2	6
Cornish, William	0	5	0
Cox, Arthur H.	1	1	0
Edwards, J.	0	5	0
Else, William	0	10	6
Firman, H. E.	0	2	6
Gibson, W. H.	0	5	0
Glaisyer, Thomas	0	10	6
Grinstead, J.	0	10	0
Gwatkin, James Ross	0	10	6
Hardcastle, S. B.	0	10	6
Harris, E. R.	0	10	0
Harrison, Frederick	0	10	6
Hickley, G.	0	10	6
Hornsby, George G.	0	10	6
Jeeves, Thomas	1	1	0
Knight, Lindsey	0	5	0
Leigh, M.	0	10	6
Long, Henry	0	10	6
Macdonald, D. F.	0	2	6
Metherell, K.	0	10	6
Morgan, Dr.	0	5	0
Oliver, John G.	0	5	0
Padwick, John	0	10	6
Pears, Kilby	0	10	6
Perress, J. C.	0	5	0
Robson, Thomas	0	10	6
Salmon, E. F.	0	2	
Salmon, F. W.	0	10	6
Savage and Son	1	1	0
Smith, Walter Henry	1	1	0
Smithson, J.	0	10	6
Sprackett, W. R. H.	0	5	0
Tench, Richard	1	1	0
Vizer, Edwin B.	1	1	0
Walmsley, Robert	0	5	0
Watts, Charles U.	0	10	6
Brill (Bucks).			
Tottenham and Holmes	0	10	6
Bristol.			
Ackerman, Henry	0	10	6
Ackerman, Theophilus	1	1	0
Allen, Benjamin	0	5	0
Bamfield, John	0	5	0
Bennett, Joseph	0	5	0
Berry, William	1	1	0
Butler, Samuel	1	0	0
Cuff, Robert C.	0	5	0
Dibble, J. W.	0	10	6
Dudden, Richard M.	0	5	0
Freestone, R. H.	0	5	0
Freestone, Thomas M.	0	10	6
Hatch, Richard M.	1	1	0
Hodder, Henry	0	5	0
Howell, Henry	0	5	0
Jones, William W.	1	1	0
Latrobe, Henry	0	5	0
Llewellyn, David	0	2	6
Long, John T.	0	10	6

Bristol—continued. £ s. d.

Moore, J. E. .. 0 5 0
Newman, Robert .. 0 10 6
Newcombe, William L. .. 0 2 6
Pitman, John .. 1 1 0
Plumley, James G. .. 0 5 0
Schacht, G. F. .. 1 1 0
Sprackett, G. S. .. 0 10 6
Spill, Thomas .. 0 10 6
Stewart, James .. 0 10 6
Stroud, John .. 0 10 6
Thomas, John D. D. .. 0 10 6
Towerzey, Alexander .. 0 10 6
Townsend, Charles .. 1 1 0
Troake, R. J. .. 1 1 0
Turner, W. H. .. 0 2 6
Wade, Thomas T. .. 0 2 6
Watson, E. M. .. 1 1 0
Weeks, Albert J. J. .. 1 1 0
White, James W. .. 0 10 6
Wretts, John R. .. 0 10 6

Briton Ferry.

Jones, Morgan H. .. 0 5 0
Olive, W. T. .. 0 5 0

Bromley (Kent).

Mussellwhite, W. .. 0 2 6
Shillcock, George .. 0 5 0
Shillcock, Joseph B. .. 0 10 6
Skinner, Richard .. 0 5 0

Brompton, Old.

Dadford, Thomas .. 0 5 0
Stokes, Walter E. .. 0 10 6

Brynmawr.

Evans, Alfred E. .. 0 5 0
Jones, Alfred M. .. 0 10 6

Buckingham.

Kingerlee, George .. 0 10 6

Builth.

Williams, Moses .. 0 5 0

Burgess Hill.

Kemp, John .. 0 10 6

Burnham (Bucks).

Heald, Alfred .. 0 10 6

Burnham (Essex).

Ellis, William .. 0 5 0

Burnham Market.

Spencer, William Henry .. 0 5 0

Burnley.

Barlow, Joseph A. .. 0 2 6
Cowgill, Brian H. .. 0 10 6
Heaton, Martha .. 0 2 6
Hitchin, Robert .. 0 5 0
Holden, John .. 0 2 6
Parkinson, Josiah .. 0 2 6
Parkinson, William .. 0 5 0
Smith, James Jeremiah .. 0 2 6
Wright, John W. .. 0 5 0

Burntisland.

Gilmour, Andrew .. 0 5 0

Burslem.

Blackshaw Thomas .. 0 10 6
Guest, George C. .. 0 2 6
Leicester, Thomas .. 0 10 6
Oldham, William .. 0 10 6

Burton-on-Trent.

Green, Isaac .. 0 5 0
Ottey, Thomas .. 0 5 0
Wright, George .. 0 10 6

Bury St. Edmunds.

Last, A. J. .. 0 2 6
Summers, Frank .. 0 5 0
Youngman, Edward .. 0 2 6

Buxton (Derbyshire).

Ashton, George .. 0 1 0
Bottomley, S. W. .. 0 2 6
Thresh, Arthur .. 0 2 6
Thresh, John C. .. 1 1 0
Wilson, H. .. 0 1 0

Caistor.

Levick, George A. .. 0 4 0

Cambridge. £ s. d.

Beall, George .. 0 5 0
Church, H. J. .. 0 10 0
Deck, Arthur .. 0 10 0
Field, Ebenezer .. 0 5 0
Hoare, W. P .. 0 5 0
Pain, Walter E. .. 0 5 0
Pearse, John .. 0 5 0
Throssel, John .. 0 5 0
Yeomans, John .. 0 5 0

Canterbury.

Amos, Daniel .. 0 10 6
Biggleston, E. R. .. 0 5 0
Bing, Edwin .. 0 10 6
Cooper, J. R. .. 0 5 0
Thomas James .. 0 5 0

Cardiff.

Anthony, David .. 0 5 0
Coleman, E. J. .. 0 10 6
Collier, J. A. .. 0 2 6
Drane, Robert .. 0 10 6
Greaves, John .. 0 5 0
Howell, Thomas .. 0 5 0
Mumford, Richard .. 0 5 0
Munday, John .. 0 5 0
Williams, Thomas .. 0 10 6
Williamson, J. E. .. 0 5 0

Carlisle.

Bell, John .. 0 5 0
Fisher, Catherine Hodgson .. 0 5 0
Foster, James .. 0 5 0
Hallaway, John .. 0 5 0
Parker, William .. 0 5 0
Richardson, Thomas J. .. 0 2 6
Robson, John .. 0 5 0
Thompson, Andrew .. 0 10 6
Todd, Joe .. 0 5 0

Carluke.

Hinksman, John .. 0 5 0

Carmarthen.

Davies, Richard Morgan .. 0 5 0
Smith, John H. .. 0 5 0

Carnarvon.

Jones, John .. 0 5 0
Lloyd, William .. 0 5 0

Carnforth.

Woolstencroft, John .. 0 5 0

Carrickmacross.

Strachan, Thomas C. .. 0 5 0

Carshalton.

Carter, Francis .. 0 10 6

Castle Cary.

Green, William J. .. 0 10 6

Castle Douglas.

Veitch, A. .. 0 5 0

Castle Hedingham.

Foulsham, H. B. .. 0 5 0

Chapel Allerton.

Saville, William .. 0 5 0

Chard.

Churchouse, W. B. .. 0 5 0
Woodland, W. F. .. 0 5 0

Charlestown-of-Aberlour.

Smith, John .. 0 2 6

Chatham.

Crofts, Holmes C. .. 0 10 6
French, Miss .. 0 10 6
Lamb, Thomas C. .. 0 5 0
Thompson, George Alfred .. 0 5 0
Tribe, John .. 0 10 6

Chelmsford.

Baker, Charles P. .. 0 10 6
Baker, Gerrad .. 0 10 6
Metcalfe, Wilson .. 0 10 6
Tomlinson, James .. 0 10 6

Cheltenham.

Balcomb, John .. 0 10 0
Barron, William .. 0 10 0
Beetham, William C. .. 0 10 0
Board, Thomas F. .. 0 5 0
Butcher, Thomas .. 1 1 0
Dolman, William .. 0 5 0
Fletcher and Palmer .. 1 1 0
Flooks, George .. 0 5 0

Cheltenham—continued. £ s. d.

Hands, William .. 0 5 0
Hill, Arthur .. 0 5 0
Jeffrey, Thomas A. .. 0 10 0
Mansbridge, M. C. .. 0 5 0
Moore, Edward .. 0 2 6
Pattison, Thomas .. 0 10 6
Power, J. H. .. 0 5 0
Prockter and Forth .. 1 1 0
Purnell, Henry A. .. 0 5 0
Seys, Frederick A. .. 0 2 6
Shaw, Alexander H. .. 1 1 0
Smith, Nathaniel and Co. .. 1 1 0
Smith, William H. .. 0 5 0
Stratton, William .. 1 1 0
Toone, John A. .. 0 10 0
Waite, Joseph .. 0 10 0
Walters, John .. 0 5 0
Wilkins, Henry .. 0 5 0
Wilson, John S. .. 0 5 0
Wood, Frederick .. 0 5 0
Woodward, Solomon .. 0 5 0

Chepstow.

Tame, Thomas .. 0 2 6

Chertsey.

Boyce, George .. 0 5 0

Chester.

Baxter, George .. 0 10 6
Grindley and Son .. 0 10 6
Hodges, William .. 0 10 6
Hope, John .. 0 5 0
Huke, James W. .. 0 5 0
Mills, John .. 0 5 0
Shrubsole, G. W. .. 0 5 0

Chester-le-Street.

Longbotham, Joseph .. 0 5 0

Chesterfield.

Barfoot, J. R. D. .. 0 2 6
Booth, George .. 0 10 6
Elliott, Thomas .. 0 5 0
Furness, Thomas .. 0 2 6
Greaves, A. W. .. 0 5 0
Greaves, Wm. S. .. 0 10 6
Lancaster, Wm. G. .. 0 5 0
Lowe, A. .. 0 5 0
Sampson, George .. 0 2 6
Windle, John T .. 0 5 0

Chew-Magna.

Milton, Thomas .. 0 5

Chichester.

Baker and Son .. 0 10 6
Batchelor, C. J. H. .. 0 5 0
Elildge, John W. .. 0 5 0

Chippenham.

Coles, John C. .. 0 10 6

Chipping Ongar.

Chapman, Richard J. .. 0 10 6
Ward, David .. 0 10 6

Chipping Sodbury.

Jones, Richard .. 0 10 6

Chislehurst.

Wing, Lewis .. 0 10 6

Christchurch.

Green, John .. 0 5 0

Chulmleigh.

Joint, Robert James .. 0 6 0

Cirencester.

Griffiths, Waldron .. 0 10 6
Smith, Charles S. .. 1 1 0

Claycross.

Lloyd, Robert .. 0 10 6
Smith, John .. 0 5 0

Clevedon.

Evans, Evan J. .. 0 5 0

Cockermouth.

Bowerbank, Joseph .. 1 1 0
Cooper Brothers .. 0 2 6
Robinson, William .. 0 5 0
Straughton, Joseph .. 0 5 0

Codnor (near Derby).

Farnsworth, Thomas .. 0 5 0

	£	s.	d.
Colchester.			
Bates, Thomas W.	0	5	0
Cole, Fred A.	0	5	0
Cordley, W. B.	0	5	0
Hammerton, Edward	0	5	0
Prosser, Mrs.	0	5	0
Shenstone, J. C.	0	5	0
Simpson, Hales	0	5	0
Weddell, Arthur	0	5	0
Congleton.			
Barlow, G. R.	0	2	6
Cole, Frederick	0	5	0
Goode, Charles	0	5	0
Corris.			
Thomas, Maurice	0	5	0
Corwen.			
Jones, William	0	10	6
Coventry.			
Hinds, James	0	10	6
Wyleys and Co.	1	1	0
Cowbridge.			
Thomas, John	0	5	0
Cowes (Isle of Wight).			
Beavan, George A.	0	10	0
Fennings, Alfred	1	0	0
Cradley Heath.			
Bishop and Wooldridge	0	10	6
Cranbrook.			
Turner, John	0	5	0
Crawley.			
Leach, John	0	5	0
Webb, W. J.	0	5	0
Weedon, Joseph	0	5	0
Crediton.			
Jackson, William	1	1	0
Crewe.			
Bayley, William	0	10	6
Harrop, William H.	0	5	0
Crewkerne.			
Catford, O. W.	0	5	0
Cromer.			
Priest, Edward R.	0	10	6
Croydon.			
Clarke, Josiah	0	10	6
Harwood, Charles	0	5	0
Long, Henry	0	10	6
Padwick, W. G.	0	5	0
Roberts, D. P.	0	10	6
Stannard, Frederick John	0	10	6
Croyston (Lancs.).			
Hackforth, Matthew	0	5	0
Cullen, N.B.			
Seivwright, George	0	5	0
Dalton-in-Furness.			
Preston, William L.	0	5	0
Darlington.			
Best, George	0	5	0
Best, J. W.	0	5	0
Coatsworth, Thomas	0	5	0
Cranston, John	0	10	0
Raw, James H.	0	5	0
Robinson, James	0	5	0
Swenden, James	1	1	0
Dartford.			
Cottingham, Joseph J.	0	5	0
Wilson, R. E.	0	2	6
Dartmouth.			
Humphry, Horatio	0	10	6
Rees, William H.	0	5	0
Deal.			
Green, John	0	10	6
Denbigh.			
Edwards, William	0	5	0
Denton (Lancs).			
Arrandale, William	0	10	6

	£	s.	d.
Derby.			
Bishop, E. J.	0	2	6
Blunt, W. B.	0	5	0
Clifton, Frederick	0	10	6
Cope, J. A.	0	5	0
Dickinson, David	0	2	6
Frost, George	0	10	6
Goodall, Henry	0	5	0
Monkhouse, Henry	0	5	0
Nicklinson, Thomas	0	5	0
Scholes, James S.	0	5	0
Stevenson, Richard W.	0	5	0
Devizes.			
Clark, Robert	0	10	6
Edwards, T. R.	0	2	6
Devonport.			
Codd, Francis	0	5	0
Kent, B. J.	0	5	0
Lamble, John A.	0	2	6
Dewsbury.			
Fryer, John	0	10	6
Walker, George	0	5	0
Didcot (Berks).			
Sadgrove, Arthur A.	0	5	0
Didsbury.			
Bates, John F.	0	5	0
Richardson, Allen	0	5	0
Diss.			
Cadge, John	0	5	0
Cupiss, Francis	0	10	6
Gostling, T. P.	0	10	6
Muskett, Charles	0	5	0
Notcutt, S. B.	0	5	0
Thrower, Edward A.	0	10	6
Whitrod, H. F.	0	5	0
Doncaster.			
Atkinson, Stephen	0	10	6
Cocking, Charles	0	5	0
Cocks, W. J.	0	2	6
Dunhill and Stiles	1	1	0
Hopper, Charles	0	10	0
Hough, William	0	5	0
Howorth, James	0	10	6
Pickering, John	0	5	0
Shaw, H. W.	0	5	0
Walker, E. H.	0	10	0
Dorchester.			
Durden, H.	0	5	0
Evans, Alfred J.	0	5	0
How, William	0	5	0
Pearce, William L.	0	5	0
Watts, E. P.	0	5	0
Dorking.			
Clark, W. W.	0	10	6
Clift, Joseph	0	10	6
Douglas (Isle of Man).			
Brearey, A. W.	0	5	0
Brearey, Wm. A.	1	1	0
Gore, J. R. A.	0	5	0
Dover.			
Adams, R. W.	0	5	0
Barnes, William James	0	5	0
Bolton, J.	0	5	0
Bottle, Alexander	1	1	0
Brown, Joseph Fred.	1	1	0
Cotterell, W. H.	0	5	0
Dickeson, Richard	1	1	0
Ewell, Richard M.	0	5	0
Forster, Robert Henry	0	10	6
Hambrook, John Barber	0	5	0
Peake, Henry	0	10	6
Thompson, Edward	0	10	0
Wilford, Josiah	0	2	6
Wyles, William	1	1	0
Driffield.			
Bordass, James	0	5	0
Parkinson, Thomas	0	5	0
Droitwich.			
Sandiland, R. B., jun.	0	5	0
Dublin.			
Bowles, Charles A.	0	10	6
Scott, Walter	0	5	0
Dudley.			
Green, William	0	2	6
Hollier, Elliott	0	10	6
Thompson, John W.	0	10	6

	£	s.	d.
Dufftown (N.B.).			
Sangster, William	0	5	0
Dumbarton.			
Babtie, John	0	5	0
Campbell, Colin	0	5	0
Dumfries.			
Allan, William	0	10	6
Dundee.			
McMillan, James	0	10	6
Dunfermline.			
Seath, Alexander	0	10	6
Dunse.			
Veitch, James	0	10	6
Durham.			
Bowman, S.	0	2	6
Burdon, John	0	10	6
Burn, B. P.	0	2	6
Castle, John W.	0	2	6
Greenwell, Richard Henry	0	10	6
Leighton, Mrs	0	10	6
Longman, John Ham	0	2	6
Palmer, John G.	0	2	6
Rollin, John G.	0	10	6
Sarsfield, John	0	2	6
Sarsfield, William	0	10	6
Scawin and Burn	0	10	6
Stangroom, Alfred	0	2	6
Ealing.			
Barry, Thomas S.	0	10	6
Hayles Brothers	1	1	0
Earlstown.			
Peake, Arthur	0	5	0
Eastbourne.			
Crook, Herbert	0	10	6
Cullingford, L. J.	1	1	0
Gibbs, Joseph	0	10	6
Hall, Samuel	1	1	0
East Dereham.			
Smith, William	0	5	0
East Grinstead.			
Dixon, W. H.	0	2	6
East London (Cape Colony).			
Clapton, John	1	1	0
East Retford.			
Clater, Francis	0	10	6
Eastwood.			
Cherrington, B.	0	10	6
Eccleshall.			
Smith, Edgar R.	0	5	0
Edinburgh.			
Aitken, James	0	5	0
Aitken, Robert	0	5	0
Aitken, William	0	5	0
Arthur, Charles	0	2	6
Baildon, Henry B.	1	1	0
Boa, Peter	0	5	0
Brown, J. J.	0	10	6
Brown, Robert	0	5	0
Brown, Robert S.	0	5	0
Bruce, Alexander G.	0	5	0
Buchanan, James	1	1	0
Cairnie, Robert	0	2	6
Chemists' Assistants' Association	1	1	0
Clark, William Inglis	0	10	6
Coates, Edwin	0	10	0
Cowie, George	0	3	0
Dick, Robert	1	1	0
Dick, Robert Gibson	0	5	0
Dott, David B.	0	5	0
Easton, John	0	2	6
Ewing, James L.	0	10	0
Fairgrieve, Thomas	0	10	6
Forret, John A.	0	5	0
Fraser, J. I.	0	5	0
Gamley, David	0	5	0
Gardner and Ainslie	1	1	0
Gilmour, William	1	1	0
Gorrie, Daniel	0	5	0
Gray, E. H.	0	2	6
Gunn, Alexander	0	5	0
Hannay, L. W. C.	0	10	0
Heron, James	1	1	0
Kennedy, Adam	0	10	6
King, William	0	2	6
Laird, George H.	0	5	0

Edinburgh—continued.

	£	s.	d.
Leitch, William	0	10	0
Leith, James	0	5	0
Linton, R. T.	0	10	6
Lockerbie, James	0	5	0
MacCullum, A. I.	0	5	0
McCullock, Thomas	0	10	6
Macdonald, Alexander	0	2	6
Macdonald, John	0	5	0
McDougall, R. I.	0	2	6
MacEwan, Peter	0	5	0
Macfarlan and Co.	2	2	0
Macfarlane, Andrew Y.	0	7	6
McGlashan, Duncan	0	10	6
McGlashan, J.	0	10	6
Mackay, George D.	1	1	0
Mackenzie, James	0	10	6
Maclagan, James	0	5	0
MacLaren, David	0	5	0
McPherson, Colin A.	0	5	0
Marshall, James	0	2	6
Napier, Alexander	0	10	6
Noble, Alexander	1	1	0
Pinkerton, William	0	10	6
Prentice, John	0	5	0
Purves, Samuel	0	5	0
Radford, George	0	5	0
Raimes, Blanshard and Co.	2	2	0
Ritchie, J.	0	5	0
Robertson, J.	0	5	0
Robertson and Co.	1	1	0
Scobie, James	0	5	0
Scott, James	0	10	6
Smiles, James	0	5	0
Smith, Thomas	1	1	0
Smith, William	0	5	0
Spence, William	0	5	0
Stephenson, Frederick	0	5	0
Stephenson, J. B.	0	10	6
Stoddart, T. G.	1	0	0
Symington, Thomas	0	5	0
Thomson, Robert	0	10	0
Welsh, Thomas	0	5	0
Wilson, James M.	0	5	0
Wylie, David N.	0	5	0

Edmonton.

	£	s.	d.
Ragg, William	1	1	0
Ragg, William W.	0	5	0

Egham.

	£	s.	d.
Bartholomew, William	0	10	0

Elgin.

	£	s.	d.
Robertson, William	0	5	0

Ely.

	£	s.	d.
Lincoln, William	0	5	0
Pate, Henry T.	0	10	6

Empingham.

	£	s.	d.
Johnson, F. E.	0	5	0

Emsworth.

	£	s.	d.
Sangster, John G.	0	5	0
Waters, Henry Griffith	0	10	6
Waters, William A.	0	5	0

Epping.

	£	s.	d.
Rowland, Thos.	0	10	6

Epsom.

	£	s.	d.
Oxley, Frederic	0	5	0

Evesham.

	£	s.	d.
Dingley, R. L.	0	5	0
Pumphrey, John and Son	0	5	0

Exeter.

	£	s.	d.
Bard, Jane	0	2	6
Brailey, Charles	0	5	0
Bromfield, Charles	0	5	0
Bulley, William H.	0	2	6
Butland, Charles	0	5	0
Cooper, George	0	10	6
Delves, George	0	10	6
Fouraker, Thomas E.	0	5	0
Gadd, Henry	0	10	6
Harris, Henry W.	0	10	6
Hunt, Arthur	0	10	6
Lake, John H.	0	10	6
Milton, Thomas C.	0	5	0
Napier, George L.	0	5	0
Pasmore, George	0	5	0
Sanders, W. F.	0	2	6
Stone, Frederick W.	0	10	6
Tighe, Henry W.	0	5	0
Topham, John Samuel	0	10	6

Eye.

	£	s.	d.
Bishop, Robert	0	10	6

Eynsham.

	£	s.	d.
Howe, Henry A.	0	5	0

Falkirk.

	£	s.	d.
Beeby, John	0	2	6
Murdoch, David	0	10	6

Falmouth.

	£	s.	d.
Newman, Walter F.	0	5	0
Solomon, W. H.	0	10	6

Fareham.

	£	s.	d.
Batchelor, Alfred E.	0	5	0
Batchelor, Charles	0	5	0
Franklin, Alfred	0	5	0

Faringdon.

	£	s.	d.
Ballard, Arthur	0	10	6

Farnham.

	£	s.	d.
Griffiths, J.	0	10	6

Fenton.

	£	s.	d.
Massey, Stephen	0	5	0

Filey.

	£	s.	d.
Robson, John Binnington	0	5	0

Fishguard.

	£	s.	d.
Vaughan, William	0	2	6

Flint.

	£	s.	d.
Jones, Michael	0	5	0
Jones, O. W.	0	5	0

Folkestone.

	£	s.	d.
Giles, John J.	0	10	6
Goodliffe, George	0	10	6
Lea, John	0	10	6
Stainer, John	0	10	6

Fordingbridge.

	£	s.	d.
Haydon, Frederick W.	0	5	0

Forfar.

	£	s.	d.
Ranken, James A.	0	5	0

Fraserburgh.

	£	s.	d.
Burnett, Robert	0	5	0
McDonald, James	0	10	0

Freshwater (Isle of Wight).

	£	s.	d.
Wellington, Henry A.	0	5	0

Friockheim, N.B.

	£	s.	d.
Glass, W. S.	0	2	6

Gainsborough.

	£	s.	d.
Forrest, Richard Wm.	0	10	6
Marshall, John Ferris	0	10	6

Galashiels.

	£	s.	d.
Noble, Alexander	0	5	0
Ross, William	0	5	0

Garston.

	£	s.	d.
Lloyd, T. E.	0	5	0

Gateshead-on-Tyne.

	£	s.	d.
Clarke, T. W.	0	5	0
Elliott, Robert	0	10	6
Greenwell, William C.	0	5	0
Prosser, Thos. W.	0	2	6
Smith, E. B.	0	2	6

Georgetown (Demerara).

	£	s.	d.
Courtenay, Alexander	0	10	6

Gedney.

	£	s.	d.
Harrison, William	0	5	0

Glasgow.

	£	s.	d.
Adams, John	0	10	6
Brodie, Robert	0	5	0
Clarke, Joseph A.	0	5	0
Crocher, Joseph	0	5	0
Currie, John	0	5	0
Currie, William L.	0	5	0
Davison, Thomas	0	10	6
Dickie, James	0	5	0
Fenwick, John	0	5	0
Flint, C. B.	0	10	6
Foster, John	0	5	0
Frazer, Daniel	1	1	0
Garry, George	0	2	6
Glasgow Apothecaries' Co.	1	1	0
Glen, Robert	0	5	0
Greig, William	0	10	6
Henderson, John	0	5	0
Illingworth, George S.	0	5	0

Glasgow—continued.

	£	s.	d.
Jaap, John	0	10	6
Kinninmont, Alexander	0	10	6
Kitchen, James	0	2	6
Laing, James	0	2	6
Lambie, Hugh	0	5	0
Lawrence, John	0	10	6
McMillan, John	0	10	6
McNichol, John	0	5	0
Moir, James	0	5	0
Murdoch Brothers	0	10	6
Paris, Walter	0	5	0
Rose, Alexander	0	10	6
Simpson, William	0	5	0
Twaddle, Robert	0	5	0
Wallace, William	0	10	6
Ward, William A.	0	5	0
Whitelaw, James	1	1	0

Glass (N.B.).

	£	s.	d.
Aberdein, James	0	1	0

Gloucester.

	£	s.	d.
Berry, Edward	0	5	0
Franklin, James	0	5	0
Hughes, Evan G.	0	5	0
Jenkins, Henry	0	5	0
Meadows, Henry	0	10	6
Sadleir, John	0	10	6
Stafford, William	0	10	6
Trotman, A. C.	1	1	0

Gorleston.

	£	s.	d.
Thurlby, George	0	5	0

Gorton.

	£	s.	d.
Plant, Frank G. L.	0	5	0

Gosforth.

	£	s.	d.
Gaitskell, James	0	5	0

Gosport.

	£	s.	d.
French, Benjamin	0	10	6
Hunter, John	0	10	6
Mason, Philip H.	1	1	0
Mumby, Charles	0	10	6
Mumby, Charles J. E.	0	10	6
Smith, W. B.	0	5	0

Govan.

	£	s.	d.
Dunlop, Thomas	0	5	0
Skinner, John	0	5	0

Graaff Reinet (Cape Colony).

	£	s.	d.
Tebb, Henry	1	1	0

Grantham.

	£	s.	d.
Cooper, H. G.	0	5	0
Gibson, John B.	0	10	0
Hall, R. A.	0	10	6
Lynn, J. R.	0	2	6
Stewart, James	0	2	6

Grantown (N.B.).

	£	s.	d.
Duncan, William	0	2	6

Gravesend.

	£	s.	d.
Bulgin, William	0	5	0
Clarke, Richard F.	0	5	0
Lucas, Joseph M. M.	0	5	0
Mitchell, Mrs.	0	2	6
Spencer, Charles	1	1	0

Great Bedwyn.

	£	s.	d.
Gerard, George R.	0	10	6

Great Grimsby.

	£	s.	d.
Mason, William D.	0	2	6

Great Malvern.

	£	s.	d.
Metcalfe, Edmund Henry	0	10	6

Great Warley.

	£	s.	d.
Hayes, James	0	5	0

Greenhithe.

	£	s.	d.
Cox, Edwin J.		5	0

Greenock.

	£	s.	d.
McNeilage, Alexr.	0	2	6

Guernsey.

	£	s.	d.
Arnold, Adolphus	0	10	6
Cumber, Henry	0	2	6

Guildford.

	£	s.	d.
Burton, William	0	5	0
Doubleday, F. W.	0	2	6
Jefferies, Henry	2	2	0
Martin, Edward W.	0	10	6
Thompson, Thomas	0	5	0
Wheeler, Frederick	0	5	0

	£	s.	d.
Guisborough.			
Fairburn, Robert W.	0	5	0
Haddington.			
Mather, Ellen	0	5	0
Watt, James	0	5	0
Hailsham.			
Jenner, Charles U.	0	5	0
Halesworth.			
Gostling, John H.	0	5	0
Halifax.			
Brook, Robert	0	10	6
Cobb, George M.	0	5	0
Dyer, William	0	5	0
Farr, James	0	10	6
Jessop, Jonathan	0	5	0
Swire, Jabez	0	5	0
Halstead.			
Hoddy, Benjamin	0	2	6
Hampton.			
Shawyer, John J.	0	5	0
Hampton-in-Arden.			
Ratheram, William	0	5	0
Hampton-Wick.			
Watts, John T.	0	2	6
Hanley.			
Insull, E. S.	0	2	6
Jones Edmund	0	10	0
Moore, John William	0	5	0
Smith, Arthur H.	0	10	6
Tirrell, John	0	5	0
Harleston.			
Muskett, James	0	10	6
Woods, Charles	0	5	0
Harrogate.			
Broomfield, R. W.	0	5	0
Coupland, Joseph	0	10	6
Davis, Richard H.	0	10	6
Greenwood, Charles	0	10	6
Greenwood, John	0	10	6
Mather, J. H.	0	5	0
Taylor, Joseph H.	0	10	6
Hartland.			
Cole, Samuel John	0	2	6
Hartlepool.			
Emmerson, C.	0	10	6
Hill, J.	0	10	6
Jackson, William George	1	1	0
Pattrick, George	0	10	6
Harwich.			
Bevan, Charles F.	0	10	6
Bevan, William	0	5	0
Harding, Joseph	0	5	0
Worts, Augustine	0	5	0
Haslingden.			
Blayney, Joseph J.	0	5	0
Hastings.			
Amoore, Charles	0	5	0
Beck, Albert N.	0	5	0
Bell, J. A.	0	10	6
Bolton, Thomas	0	5	0
Jameson, W. E.	1	1	0
Kernot, Dr. G. C.	0	10	6
Mackenzie, Chas. A.	0	5	0
Richards, James G.	0	10	6
Rossiter, Frederick	0	5	0
Snowdon, Robert	0	5	0
Tottle, Henry J.	0	5	0
Haverfordwest.			
Davies, John	0	2	6
Jenkins, Jabez	0	5	0
Saunders, Charles P.	0	5	0
Saunders, David P.	0	10	6
Hawick.			
Blaine T. J. S.	0	2	6
Craig, John	0	5	0
Maben, Thomas	0	5	0
Ross, William R.	0	5	0
Hawkhurst.			
Corke, Edward	0	10	6
Pridgeon, W. J.	0	5	0
Hay.			
Davies, John Lutwiche	0	5	0

	£	s.	d.
Hayhead (near Walsall).			
Allen, Frederick C.	0	2	6
Hayward's Heath.			
Watts, Edward	0	5	0
Hebburn.			
Puttuck, Fredk. W.	0	4	0
Hebden Bridge.			
Hey, David	0	10	6
Hey, Thomas K.	0	10	6
Lawton, John D.	0	5	0
Heckington.			
Sumners, Michael Cole	0	5	0
Heckmondwike.			
Booth, John	1	1	0
Stephenson, James N.	0	5	0
Helensburgh.			
Harvie, George	0	5	0
Helmsdale.			
Fraser, John	0	2	6
Helston.			
Wakeham, Charles	0	5	0
Hemel Hempstead.			
Argue, James	0	5	0
Henley-on-Thames.			
Hunn, Benjamin	0	5	0
Hereford.			
Chave, William F.	0	10	6
Dillon, F. R.	0	5	0
Guy, E.	0	5	0
Jackson, J. J.	0	10	6
Walker, John	0	10	6
Williams, W. and H. B.	0	10	6
Hertford.			
Aldridge, J. H.	0	5	0
Wilshaw, Samuel T.	0	10	6
Hexham.			
Gibson, J. P.	1	1	0
Richardson, George	0	5	0
Riddle, W. R.	0	5	0
Heywood.			
Beckett, William	0	10	6
Mills, W. H.	0	5	0
Hirwain.			
Sims, Joseph	0	10	6
Hitchin.			
Perks and Llewellyn	1	1	0
Hoddesdon.			
Green, William G.	0	5	0
Whitmore, W. F.	0	2	6
Honiton.			
Turner, George	0	10	6
Hong-Kong.			
Woolnough, H. A.	0	10	6
Horley.			
Philp, Joseph	0	10	6
Horncastle.			
Betts, William	0	5	0
Carlton, E. P.	0	5	0
Horndean.			
Bettsworth, Henry T.	0	5	0
Horsforth.			
Wynn, Frederick	0	10	6
Horsham.			
Williams, Philip	1	1	0
Huddersfield.			
Higgins, Tom Sellers	0	10	6
Kaye, Hamor	0	5	0
King, William	0	10	6
Swift, C. H.	0	5	0
Sykes, Henry	0	5	0
Wheatley, Charles W.	0	10	0
Hull.			
Allison, E. and H.	1	1	0
Baynes, James	0	15	6
Bell, Charles B.	1	1	0
Bousfield, —	0	5	0
Campbell, Charles	0	5	0

	£	s.	d.
Hull—continued.			
Chapman, E.	0	5	0
Chapman, Joseph	0	2	6
Creasser, Matthew	0	5	0
Desforge, J. H.	0	5	0
Dixon, Joseph	0	10	0
Dobson, J. B.	0	5	0
Dunlop, J.	0	5	0
Dyson, George	0	5	0
Earle, Francis	1	1	0
Fowler, Edwin	0	5	0
Gibson, C. P. (Trustees of)	0	5	0
Goldsmith, William	0	5	0
Gregory, Mrs.	0	2	6
Grindell, John	0	10	6
Hall, Henry R. F.	0	5	0
Hammond, William H.	0	5	0
Hart, George William	0	10	6
Hay, W.	0	2	6
Hebblethwaite, G. A.	0	2	6
Hollingsworth, James	0	5	0
Holmes, J. W.	0	2	6
Howe, H. M.	0	2	6
Hoyles, George	0	2	6
Kellington, M. L.	0	10	6
Linford, John S.	1	1	0
Lofthouse and Saltmer	1	1	0
Loten, W. L.	0	5	0
Milner, John G.	0	5	0
Myers and Saunders	0	10	6
Parsons H. J.	0	5	0
Shaw, Ward	0	5	0
Shepherdson, Welburn	0	10	6
Snape, E.	0	5	0
Souter, Jas. S.	0	10	6
Staning, Walter	0	5	0
Stoakes, Benjamin M.	0	5	0
Walton, W. H.	0	5	0
Wilson, Mrs.	0	2	6
Hunstanton.			
Twiss, Wm.	0	10	6
Huntingdon.			
Baxter, Robert	0	10	6
Huntly (N.B.).			
Chalmers, G.	0	2	6
Hyères (France).			
Skinner, A. J. P.	0	5	0
Hyde.			
Oldfield, Henry	0	10	6
Hythe.			
Lemmon, R. A.	0	7	6
Idle (Yorks).			
Hopton, Edwin	0	5	0
Ilfracombe.			
Crang, Walter	0	10	6
Lacey, James	0	5	0
Ilkeston.			
Potts, R. S.	0	10	6
Ilkley.			
Worfolk, George William	0	5	0
Ilminster.			
Callander, W. W.	0	2	6
Ingatestone.			
Stuart, Henry James	0	5	0
Invergordon.			
Sinclair, Robert	0	5	0
Inverness.			
Galloway and Son	0	10	6
MacRitchie, David	0	5	0
Ipswich.			
Anness, Samuel R.	0	10	6
Chapman and Pain	0	10	6
Clifton, E. S.	0	5	0
Cornell, William	1	1	0
Cossey, James D.	0	5	0
Eyre, Henry R.	0	5	0
Lyon, Robert	0	5	0
Matcham, Edward	0	5	0
Miller, T. T.	0	5	0
Pain, Arthur	0	5	0
Spurgeon, Fredk. J.	0	5	0
Younger, Robert E.	0	5	0
Irvine.			
Gillespie, James	0	7	6

	£	s.	d.
Isleworth.			
Reece, James	0	5	0
Jarrow-on-Tyne.			
Huckebridge, J. M., jun.	0	5	0
Jedburgh.			
Peters, J. F.	0	5	0
Jersey.			
Barker, John T.	0	10	0
Cole, George	0	10	6
Duprey, Jean A. B.	0	2	6
Ereaut, George	1	0	0
Ereaut, John, jun.	1	0	0
Millais, Mrs.	1	1	6
Miller, Henry	0	5	0
Kendal.			
Bateson, Thomas	1	1	0
Burton, Matthew	1	1	0
Hind, Thomas W. L.	1	1	0
Severs, Joseph	1	1	0
Kenilworth.			
Barton, Henry Emlyn	0	10	6
Keswick.			
Townley, Thomas	0	10	6
Kettering.			
Denston, John Thomas	0	10	6
Gray, William	0	5	0
Thursfield, John F.	0	5	0
Kidsgrove.			
Griffiths, Edwin H.	0	10	6
Kimberley (South Africa).			
Helmore, W. H.	0	5	0
Kilmarnock.			
Borland, John	1	1	0
Borland, John, jun.	0	10	6
King's Lynn.			
Atmore, George	0	5	0
Cocher, John A.	0	5	0
Wigg, William C.	0	10	0
Kingston-on-Thames.			
Bond, C. R.	0	10	6
Brewster, William	0	10	6
Higgs, Alfred	0	5	0
Walmsley, Samuel	0	5	0
Whaley, Edward	1	1	0
Kingstone.			
Ackrill, George	0	10	6
Kington.			
Venables, Samuel H.	0	5	0
Kirkcaldy.			
Kennedy, William	0	2	6
Storrar, David	1	11	6
Kirkham (Lancs).			
Ward, Henry S.	0	5	0
Kurrachee (India).			
Brown, Leonard H.	0	8	6
Lancaster.			
Arkle, William	0	5	0
Bagnall, W. H.	0	5	0
Holmes, Edward	0	5	0
Troughton, Henry	0	5	0
Vince, James	0	5	0
Landport.			
Alderslade, William	0	5	0
Hackman, Leonard L.	0	10	6
Perfect, George	0	5	0
Read, William	0	10	6
Langholm.			
Beattie, Thomas	0	5	0
Langport.			
Chant, Herbert A.	0	10	6
args (N.B.).			
Fraser, Alexander	0	5	0
Launceston.			
White, Thomas	0	10	6
Laxey.			
Whineray, Edward	0	2	6

	£	s.	d.
Leamington.			
Barnitt, John	0	10	6
Barrett, Josephus T.	1	1	0
Bell, Robert	0	2	6
Bloomfield, E. J.	0	2	6
Chapman, W. H.	0	2	6
Clagur, F. Maltby	0	2	6
Clower, John	0	5	0
Davis, Benjamin	0	5	0
Davis, Henry	1	1	0
Lemmon, Eric	0	5	0
Marston, James	0	2	6
Matthews, H. J.	0	2	6
Morgan, J. C.	0	2	6
Newby, Charles A.	1	1	0
Pearson, W. J.	0	2	6
Pullin, William H.	0	10	6
Sansom, Henry	0	10	6
Skidmore, John	0	2	6
Smith, Samuel A.	1	1	0
Smith, Samuel H.	0	5	0
Spilsbury, James	0	5	0
Stanley, Herbert	0	10	6
Thornton, Edward	0	5	0
Leatherhead.			
Waugh, Mrs. Alexander	0	10	6
Lechlade.			
Ballard, Edwin	0	5	0
Ledbury.			
Freeman, Ernest	0	10	6
Leeds.			
Archer, Joseph S.	0	2	6
Bilbrough, Joseph B.	0	10	6
Bottomley, A. F.	0	5	0
Branson, F. W.	0	10	6
Cole, E. H.	0	5	0
Exley, George	0	5	0
Fawthorp, James	0	5	0
Ferguson, William K.	0	10	6
Goodall, Backhouse and Co.	2	2	0
Hardcastle, John	0	5	0
Harvey, Thomas	1	1	0
Hirst, Brooke and Hirst	2	2	0
Hirst, David	0	5	0
Holmes, Joseph	0	10	6
Iredale, Thomas	0	5	0
Jefferson, Peter	0	10	6
Morgan, Edward	0	5	0
Pierson, Clement	0	5	0
Reynolds, Richard	1	1	0
Smeeton, William	0	10	6
Staning, William	0	2	6
Taylor and Fletcher	1	1	0
Taylor, Samuel	1	1	0
Woolford, James	0	5	0
Leek.			
Blades, Josiah B.	0	2	6
Johnson, William	0	5	0
Leicester.			
Berridge, Alfred	0	5	0
Broof, R.	0	10	6
Burford, S. F.	0	5	0
Butler, E. H.	0	5	0
Butler, J. A.	0	5	0
Butler, T. E.	0	5	0
Cadoux, S. K.	0	2	6
Carr, William	0	10	0
Clark, E. A.	0	5	0
Clark, John W.	2	2	0
Clark, Walter B.	0	10	6
Cleaver, Samuel	0	5	0
Cooper, Henry	0	5	0
Cox, S. G.	0	10	0
Ellis, George	0	5	0
Esam, Richard	0	5	0
Gammidge, Samuel	0	5	0
Garrett, John	0	5	0
Harvey, William R.	0	10	6
Hodgson, C.	0	2	0
Lloyd, T. H.	1	1	0
Marston, S.	0	2	6
Pechey, Thomas P.	0	5	0
Pickering, Henry	0	5	0
Sharp, Edward K.	0	5	0
Wand, Stephen	1	1	0
West, J. L.	1	1	0
Wilby, Frederick W.	0	10	6
Woolley, G. J. B.	0	5	0
Leigh.			
Bennett, John W.	0	5	0
Leighton Buzzard.			
Herington, Joseph	1	1	0

	£	s.	d.
Leith.			
Alexander, W. G.	0	5	0
Black, George	0	5	0
Bowman, J.	0	10	
Dow, William	0	2	6
Duncan, Flockhart, Powell and Co.	0	10	6
Finlayson, Thomas	0	5	0
Guthrie, Andrew D.	0	2	6
Halley, William	0	5	0
Mair, Alexander	0	2	6
Smith, Wilson and Co.	0	10	6
Walker, Alexander	0	2	6
Lenton.			
Wilson, Thomas	0	5	0
Leominster.			
Davis, David F.	1	1	0
Leven.			
Gibson, Adam	0	10	6
Lewes.			
Briscoe, Charles	0	5	0
Head, John	0	10	6
Head, John T.	0	10	6
Martin, Thomas	0	10	6
Martin, W. T.	0	5	0
Leyland.			
Hackforth, Frederick	0	10	6
Lincoln.			
Battle, Son and Maltby	0	10	6
Tomlinson, Charles K.	1	1	0
Woodcock, Page D.	0	5	0
Liskeard.			
Young, Richard	0	5	0
Little Chishill.			
Jefferson, Thomas	0	10	6
Littlehampton.			
Smart, C. F.	1	0	0
Little Sutton.			
Sherlock, John	0	5	
Litherland.			
Edwards, Richard	0	5	0
Liverpool.			
Abraham, Alfred Clay	1	1	0
Abraham, Thomas Fell	1	1	0
Adams, Thomas E.	0	10	6
Adams, T. E., jun.	0	5	0
Albright, Henry	0	5	0
Alexander, George	0	5	0
Alexander, John	0	10	6
Aris, G. H.	0	2	6
Ashbourne, C.	0	5	0
Ayrton and Saunders	0	10	6
Bache, William	0	2	6
Bathgate, William Lorimer	0	10	6
Baxter, William	0	10	6
Bell, W.	0	5	0
Bennett, W. R.	0	5	0
Billington, Frederic	0	5	0
Blabey, J. J.	1	0	0
Blackbourne, H. J.	0	5	0
Blake and Mackenzie	0	10	6
Blood, Charles	0	5	0
Blundell, John	0	10	0
Bond, Henry	0	2	6
Bowman, William	0	10	6
Bramwell, Rhodes	0	5	0
Brown, Joseph	0	2	6
Buck, Richard C.	0	5	0
Budden, Frederick	0	2	6
Budden, William	0	5	0
Caley, J. C.	0	10	6
Chemists' Association	2	2	0
Clark, F.	0	5	0
Clarke, R. T.	0	5	0
Clay, Dod and Case	1	1	0
Collins, E. de Tedney	0	5	0
Coupland, Henry	0	10	6
Crawley, B.	0	5	0
Dale, John	0	10	6
Day, J. R.	0	5	0
Dickins, B.	0	5	0
Drawbridge, Joseph G.	0	10	6
Drawbridge, T. F.	0	5	0
Drew, S.	0	5	0
Edisbury, John	0	10	6
Edisbury, Lawton	0	5	0
Edwards, E. W.	0	2	6
Ellams, George	0	10	6
Elliott, Robert John	0	10	0
Evans, Sons and Co.	5	5	6

Liverpool—continued.

	£	s.	d.
Evans, William	0	5	0
Fergusson and Co.	1	1	0
Fergusson, Margaret	1	1	0
Field, C.	0	10	6
Fingland, James	0	10	0
Fleming, Mrs.	0	5	0
Flint, John	0	10	6
Furniss, Thomas	0	5	0
Gabites, W.	0	2	6
Girvan, John	0	5	0
Greenall, Alfred	1	1	0
Greenwood, Harriet E.	0	5	0
Hackett, Thomas	0	10	0
Hallawell, Joseph	1	1	0
Hall, Thomas	0	10	6
Hannaford, William	0	10	6
Harriman, E.	0	5	0
Harris, F. G.	0	10	6
Hay, Thomas	0	10	6
Herbert, John	0	2	6
Hocken, Joshna	0	10	6
Hodges, E. G.	0	5	0
Hughes, Michael	0	5	0
Hughes, Thomas I. J.	0	5	0
Hunt, Thomas	0	10	6
Jackson, F.	0	2	6
Jackson, H.	0	10	6
James, John	0	5	0
Jones, Frank	0	5	0
Jones, R. H.	0	5	0
Jones, William	0	5	0
Lee, Samuel	0	10	0
Lett, Arthur J.	0	5	0
Longrigg, W. S.	0	10	0
Machin, Frederick J.	0	10	6
McGuffie and Co.	1	1	0
Mackinlay, F. J.	1	1	0
Manduell, Thomas	0	2	6
Maries, D. R.	0	5	0
Maskery, Samuel	1	1	0
Merrett, R. H.	0	5	0
Midgley, John E.	0	2	6
Palmer, H. J.	0	5	0
Parkinson, Richard	0	10	6
Parry, William	0	5	0
Pearson, E. S.	0		6
Pheysey, Richard	0	10	6
Ratcliffe, George	0	5	0
Redford, A.	0	5	0
Richardson, Richard T.	0	10	6
Ridgway, T. E.	0	5	0
Rodgerson and Co.	0	2	6
Roe, R. P.	0	2	6
Salter, T.	0	10	6
Sawden, Alfred	1	1	0
Shaw, John	1	1	0
Shields, S.	0	2	6
Sleggs, G. R.	0	5	0
Smith, J. J.	0	5	0
Smith, R. G.	0	5	0
Smith, W. R.	0	5	0
Stavely, F.	0	5	0
Stott, Walter H.	0	5	0
Sumner, Robert, and Co.	1	1	0
Swain, William H.	0	2	6
Symes, Charles	3	3	0
Taylor and Co.	0	10	6
Taylor, Charles	0	10	0
Thomas, Robert	1	1	0
Thompson and Capper	1	1	0
Thompson and Co.	1	1	0
Thompson, John	0	5	0
Towler, G. B.	0	2	6
Troughton, Christopher	0	5	0
Warhurst, W. T.	1	1	0
Williams, John	0	5	0
Williams, R. P.	0	2	6
Williams, Thomas	0	3	6
Williams, William	0	5	0
Williams, William	0	2	6
Williams, William	0	2	6
Williams, William	0	5	0
Woodhead, H. C.	0	10	6
Wright, William	0	10	0
Wright, W. Owen	0	10	0
Wyatt, H.	0	5	0
Yeats, Thomas F.	0	5	0

Llandilo.

	£	s.	d.
Williams, W. J.	0	2	6

Llandudno.

	£	s.	d.
Penney, W. S.	0	10	6

Llanelly.

	£	s.	d.
Evans, G.	0	10	6

Llanerchymedd.

	£	s.	d.
Williams, Griffith	0	5	0

Llangollen.

	£	s.	d.
Jones, Humphrey	0	5	0

Llanrwst.

	£	s.	d.
Jones, Owen	0	2	6

Lockwood.

	£	s.	d.
Lister, C. E.	0	5	0

Loddon.

	£	s.	d.
Ellis, T. W.	0	10	6

London.

	£	s.	d.
Alcock, Frank H.	0	2	6
Allan, James H.	1	1	0
Allden, John	0	10	6
Allen, Charles B.	1	1	0
Allgood, E. J.	0	5	0
Allwright, Isaac B.	0	10	6
Andrews, Frederick	0	10	6
Applegate, Edwin	0	10	6
Arkinstall, William	0	10	6
Atkinson, James	0	2	6
Atkinson, John G.	0	5	0
Attwood, Alfred	1	1	0
Attwood, Henry E.	1	1	0
Austin, Henry Felix	1	1	0
Babb, James	0	5	0
Baily, John	0	10	6
Baines, James C.	0	5	0
Baker, Alfred P.	0	10	6
Ball, The Chemists' (Committee of), per J. F. Savory.	31	10	0
Ball, The Junior Pharmacy, per W. H. Kerr	15	15	0
Barber, Joseph	0	10	6
Barnard, John	1	1	0
Barnes, James Benjamin	1	1	0
Barret, Edward Louis	1	1	0
Barritt, J.	0	2	6
Barron, Frederick	10	10	0
Bartlett, G. F. H.	0	5	0
Bartley, George A.	0	10	6
Barton, William H.	0	10	6
Bascombe, Frederick	0	5	0
Bate, Henry	0	10	6
Baxter, William	1	1	0
Beard, T. W.	0	10	6
Beasley, Frederick	0	5	0
Beddard, John	1	1	0
Bedford, C.	0	10	6
Beere, L. E.	0	5	0
Bell, Matthew W.	1	1	0
Bell, William H.	1	1	0
Bennett, George	0	5	0
Bennett, Thomas	0	5	0
Bently, William Jas.	0	10	6
Best, James	0	10	6
Bettinson, W. T.	0	5	0
Bigg, Thomas	1	1	0
Bilson, F. E.	0	5	0
Bindloss, G. F.	0	5	0
Bingley, Richard	0	10	6
Birch, Henry C.	1	1	0
Bird, Augustus	2	2	0
Bird and Storey	1	1	0
Bird, Robert	0	10	6
Bishop, Henry	0	2	6
Blain, A. Lucas	0	5	0
Blake, Charles A.	0	10	6
Bland, John	0	10	6
Blyth, Utton	0	5	0
Bond, Peter G.	0	5	0
Boothby, H. N.	0	5	0
Bourdas, Isaiah	1	1	0
Bowden, A.	1	1	0
Bowen, John W.	0	5	0
Bradshaw, C. H.	0	5	0
Brand and Co.	1	1	0
Bray, William	0	10	6
Bridges, C. W.	0	5	0
Bright, Frederick	0	5	0
Brisley, George	0	5	0
Brodribb, J. B.	0	10	0
Brookes, Samuel	0	10	6
Brooks, Charles	0	2	6
Brown, Alfred James	0	10	6
Brown, H. F.	0	10	6
Buckle, Christopher Francis	0	10	6
Bullen, George William	0	10	6
Bullock, J. Lloyd and Co.	2	2	0
Bunker, James	0	2	6
Burgess, Willows and Francis	1	1	0
Burgoyne, Burbidges, Cyriax and Farries	2	2	0
Burn, Henry	0	5	0

London—continued.

	£	s.	d.
Burton, Joseph	0	2	6
Bush, Arthur	0	5	0
Butler, Charles	0	10	6
Butler, E. D. Barry	0	10	6
Butt, Edward Northway	3	3	0
Butterworth, John	0	5	0
Cadman, Daniel	1	1	0
Callaway, Lemuel	0	10	6
Campbell, E. K.	0	2	6
Cannon, Charles	1	1	0
Carteighe, Michael	1	1	0
Cartwright, William B.	0	10	6
Caseley, Thomas	0	5	0
Catterns, Heneage P.	0	10	6
Cawdell, George	0	10	6
Chapman, Joseph J.	0	5	0
Chapman, Walter	0	5	0
Charity, William	0	10	6
Cheetham, W. H.	0	10	6
Churchill, J. and A.	1	1	0
Clapp, Edward F.	0	10	6
Clark, John A.	0	10	6
Clarke, Isabella Skinner	0	10	6
Clayton, Thomas	0	5	0
Cleaver, E. L.	0	10	6
Clift and Crow	1	1	0
Cocker and Son	0	10	6
Colchester, William M.	0	5	0
Colchester, William M., jun.	0	5	0
Coldwell, David B.	0	10	6
Cole, A. C.	1	1	0
Coleman, John	0	5	0
Coles, Ferdinand	0	10	6
Coles, J. W.	0	10	6
Collett, Charles B.	0	5	0
Collier, Henry	0	5	0
Constance, Edward	0	10	6
Constance, Herbert E.	0	10	6
Constance, Sidney W.	0	10	6
Cooper, Henry	0	10	6
Cooper, Wm. Henry	0	10	6
Cooper, William Temple	0	10	6
Corbyn, Stacey and Co.	1	1	0
Cornelius, James	0	10	6
Cory, J. T. H.	0	10	6
Cosway, Edwin C.	0	10	6
Cottrill, John W.	0	10	6
Couper, F.	0	10	6
Coverley, Edwd. C.	0	5	0
Cracknell, Herbert	0	5	0
Cranwell, W. B.	2	2	0
Crosby, James	0	10	6
Cross, Henry	0	2	6
Croyden, Charles	0	10	6
Cull, Joseph	0	10	6
Curtis, Fred. G.	0	5	0
Dampney, Richard S.	0	10	6
Darby and Gosden	2	2	0
Darnill, Charles	0	5	0
Davenport, Horace	1	1	0
Davenport, J. T.	2	2	0
Davies, Charles	1	1	0
Davies, John	0	5	0
Davies, Robert H.	1	1	0
Davis, H. S. E.	0	10	6
Davy, Yates and Routledge	2	2	0
Day, Thomas Sweeting	0	10	6
Dean, S.	0	5	0
Deane (Henry) and Co.	1	1	0
De Peare, John Thomas	0	5	0
Dewar, Mary Ann	0	10	6
Dinneford and Co.	2	2	0
Dobell, Dr. Horace	1	1	0
Dodman, Robert	0	2	6
Dodridge, Thos.	0	2	6
Doulton and Co.	1	1	0
Drane, William	0	10	6
Drew, Henry Wm.	0	5	0
Drury, Sydney	0	5	0
Duckett, F. W.	0	10	6
Dymott, Frank	0	5	0
Dyson, William B.	1	11	6
Eade, George	1	1	0
Eade, James	1	1	0
Eastman, J. E.	0	10	6
Edwards, Charles	0	10	6
Edwards, William Staples	0	5	0
Elliott, J. D.	0	5	0
Elvey, Thomas	1	1	0
Emslie, Joseph	0	5	0
Epps, James	1	1	0
Evans, Lescher and Webb	1	1	0
Eve, Charles	1	1	0
Evershed, G. S.	0	5	0
Eyre, Jonathan S.	0	10	6
Fallowfield, Jonathan	1	1	0
Farmer, John	0	5	0

London—continued.	£	s.	d.
Ferguson, W. H.	1	1	0
Field, William	1	1	0
Fitch, Robert Owen	0	10	6
Fitt, Francis E.	0	10	6
Forrest, Richard	1	1	0
Fowler, William	0	2	6
Fox, William	1	1	0
France, J. M.	0	5	0
Francis, George Baggett	1	1	0
Francis, Matthew R.	0	10	6
Francis, W. H.	0	10	6
Froom, William Henry	1	1	0
Frost, John H.	0	2	6
Frost, W. T.	0	10	6
Fryer, Arthur	0	5	0
Furze, Mrs. H.	0	10	6
Gadd, Charles	0	10	6
Gadd, Robert	0	10	6
Gale, Henry	0	10	6
Gale, Samuel	1	1	0
Garner, James	0	10	6
Garner, Thomas	0	5	0
Garnham, A. W.	0	5	0
Garrett, John H.	0	5	0
Gaunt, Rann Dolphin H.	1	1	0
Gedge, William S.	0	10	6
Gerrard, A. W.	0	10	6
Glasspoole, H. G.	0	10	6
Godfrey, H. E.	0	5	0
Goff, Richard	0	5	0
Golding, John F.	1	1	0
Goodall, William A.	0	5	0
Goodchild, Alfred C.	0	5	0
Goodger, David	0	10	6
Goodwin, John	1	1	0
Gorton and Sons	0	10	6
Gossling, William R.	0	5	0
Gostling, W. A.	0	10	6
Gower, A. J.	0	5	0
Graham, Henry	0	5	0
Granger, Edwin John	1	1	0
Green, Samuel	0	5	0
Greenish, T. Edward	0	10	6
Greenish, Thomas	1	1	0
Griffiths, Alfred William	0	10	6
Grimwood, William	0	10	6
Gristock, Thomas	1	1	0
Groves, H. F.	2	2	0
Gudgeon, Frederick G.	0	2	6
Gulliver, William	0	10	6
Gulliver, Wm. Inchle	0	5	0
Hairsine, H. S.	1	1	0
Hall, Ralph	0	10	6
Hampson, Robert	1	1	0
Hanbury, Cornelius	1	1	0
Hardy, Samuel C.	1	1	0
Harris, Daniel R.	0	10	6
Hart, Thomas	0	2	6
Harvey, Edward	1	1	0
Harvey, John William	0	2	6
Harwood, Charles	0	10	6
Hatfield, George B.	0	10	6
Hawkins, Thomas	1	1	0
Hayward, Charles	0	10	6
Hearn, John	0	5	0
Heath, Frederick D.	0	5	0
Heathcoat, Thomas	0	10	6
Henty, Henry Martin	0	5	0
Herbert, William	0	5	0
Hick, John	0	5	0
Hickey, Evan Lewis	0	10	6
Hickman, William	0	10	6
Higgins, James	0	10	6
Hill, Arthur B.	1	1	0
Hill, Arthur S.	2	2	0
Hill, William	0	5	0
Hillgenberg, Louisa	1	1	0
Hills, Henry William	0	10	0
Hills, Thomas Hyde	10	10	0
Hills, Walter	1	1	0
Hodgkinson, George A.	0	10	6
Hodgkinson, Stead and Treacher	2	2	0
Hodgkinson (Thomas), Prestons and King	2	2	0
Hodgkinson, William	1	1	0
Hodsoll, Thomas W. H.	1	1	0
Hogg, E. G.	0	10	6
Hogg, Robert	0	10	6
Holford, T. Constantine	0	10	0
Holl, Edmund	0	5	0
Holmes, C. J.	1	1	0
Holmes, Walter M.	0	10	6
Hooper, Leonard	1	1	0
Hopkin, William King	2	2	0
Hora, Henry Whinfield	1	1	0
Horncastle, John	1	1	0
Horne, John	0	5	0

London—continued.	£	s.	d.
Horsley, T. W.	0	10	6
Howard, George	1	1	0
Howard, J. H. H.	1	1	0
Howell, Maurice	0	10	6
Howlett, Samuel	1	1	0
Hucklebridge, J. M.	1	1	0
Hudson, T. F.	0	5	0
Huggins, Richard	0	10	6
Hughes, Evan	0	7	6
Hugill, John	1	1	0
Hugill, John H.	1	1	0
Humpage, Benjamin	0	10	6
Hunt, Charles	1	1	0
Huskisson, Henry Owen	1	1	0
Hussey, Robert	0	5	0
Hutton, Harry	0	2	6
Hyslop, John Cahill	0	10	6
Icke, Henry S.	0	10	6
Idris and Co.	2	2	0
Ingham, John	0	5	0
Ingram and Royle	1	1	0
Ive, William	1	1	0
Izod and Son	1	1	0
Jacka, Vivian T.	0	10	6
Jacks, D. R.	0	5	0
Jackson, C.	0	10	6
Jackson, Charles	0	10	6
Jackson, William F.	0	10	6
Jackson, William H.	0	5	0
Jagg, J. Henry	0	10	6
Jameson, W. G., junr.	1	1	0
Jarvis, John S.	0	10	6
Jeffcoat, Joseph	1	1	0
Jenkins, Henry	1	1	0
Johnson, Joseph	0	10	6
Johnson and Sons	1	1	0
Jones, Edwin	0	5	0
Jones, Henry Stevens	0	5	0
Jones, John H.	0	10	6
Jones, Thomas	0	5	0
Jones, W. Cadwaladr	0	10	6
Jones, William	0	10	6
Jones, William	0	5	0
Jones, William E.	0	2	6
Jones, William John	0	10	6
Jones, William N.	0	2	6
Jones, William O.	0	10	0
Jozeau, G.	1	1	0
Keer, Thomas H.	0	10	6
Kemp, Robert	0	10	6
Kendall, Charles F.	0	10	6
Kent, James S.	0	10	6
Kent, Thomas	0	10	6
Kent, Thomas Ramsey	0	10	6
Kinch, Edward	0	10	6
King, Henry	0	10	0
King, William	0	5	0
Kingsford, Frederick	1	1	0
Kirk, Snowden	0	10	6
Kitson, Samuel	0	2	6
Laing, John S.	0	5	0
Lance, W. N. G.	0	10	6
Lang, Alfred	0	5	0
Large, John H.	0	10	6
Lavers and Son	1	1	0
Lawrence, Frederick	0	10	6
Laws, John	0	10	6
Leath and Ross	2	2	0
Leech, Elizabeth	0	10	6
Legg, H. A.	0	10	6
Lescher, Joseph S.	1	1	0
Lewinton, Alexander B.	1	1	0
Lewis, Thomas	0	2	6
Leyland, Thomas W.	0	2	6
Little, John A.	0	5	0
Lloyd, Thomas	0	10	6
Long, Henry	1	1	0
Longley, Charles	0	5	0
Lovegrove, G. E.	0	5	0
Lowe, William E.	2	2	0
Lowther, M. K.	0	5	0
Luff, Richard	0	10	6
McDougall, James	0	2	6
MacGeorge, William	0	10	6
Maitland, John	1	1	0
Maizey, E.	0	10	6
Manley, W. F.	0	10	6
Marks (Henry) and Sons	1	1	0
Marsh, E. R.	0	10	6
Marston, John Thomas	0	10	6
Marten, Frederic	0	5	0
Martindale, William	1	1	0
Mason, H. C.	1	1	0
Mathews, Henry	0	10	6
Matthews, E. S.	0	5	0
Matthews, J. H.	0	5	0
Matthews, Thomas	0		0

London—continued.	£	s.	d.
Maw, Charles	1	1	0
Maw, Son and Thompson	2	2	0
Mead, Charles J.	1	1	0
Meggeson and Co.	1	1	0
Melhado, Howard E.	0	2	6
Mellin, Charles J.	0	5	0
Merrell, James	1	1	0
Middleton, Francis	1	1	0
Miller, Cecil B.	0	5	0
Miller, Charles Bayfield	0	10	6
Miller, W. E.	0	5	0
Mills, W. D.	0	2	6
Milward, S.	0	10	6
Minshull, Flora	0	5	0
Minshull, Rose C.	1	1	0
Moore, John	0	5	0
Morrell, Thomas	0	5	0
Morris, Thomas	1	1	0
Mortiboy, John	1	1	0
Mould, Samuel	0	10	6
Muskett, Albert C.	0	10	6
Mutch, John Pratt	0	5	0
Muter, Dr. John	3	3	0
Naylor, W. A. H.	0	5	0
New, Walter W.	0	10	6
Newey, J. T.	0	10	6
Newton, T. A. C.	0	5	0
Newzam, Henry Samuel	0	10	6
Nicholls, Joseph C.	0	5	0
Nicholson, Frederick	1	1	0
Nicholson, Thomas T.	0	5	0
Nind, George	0	10	6
Nobbs, W. N.	0	10	6
Norburn, A. H.	0	10	6
Norfolk, J. W.	0	5	0
North, George T.	0	10	6
Nosworthy, Robert	0	10	6
Odell, George W.	0	5	0
Oldfield, Henry	0	10	6
Orpe, Thomas M.	0	10	6
Owen, John	1	1	0
Palmer, Francis	0	10	6
Palmer, Robert	1	1	0
Paramore, Dr. R.	0	5	0
Parker, J. W.	0	5	0
Parker, Robert Henry	0	10	6
Parkes, J. C.	0	10	6
Parkes, J. P.	1	1	0
Parkinson, Charles	0	10	6
Parkinson and Son	1	1	0
Parrott, Joseph	0	10	6
Parry, C. D.	0	5	0
Parsons, G. H.	2	2	0
Pasmore, F. R.	0	10	6
Pass, Horatio	0	10	6
Passingham, G. W.	0	5	0
Pattison, George	1	1	0
Peacock, George	0	5	0
Peck, Edward	0	5	0
Peel, Alfred	0	10	6
Penrose and Son	1	1	0
Pepper, John	0	10	6
Pharmacy Club (per Richard Bremridge, Hon. Sec.)	10	10	0
Pickard, William	2	2	0
Pidduck, J. W.	0	10	6
Pike, William	0	10	6
Pinyon, William	0	5	0
Pipe, Walter	0	10	6
Place, John N.	0	10	6
Plaister and Hillen	1	1	0
Plowman, Sidney	1	1	0
Poingdestre, C. R.	0	10	6
Pond, B. C.	0	5	0
Pond, George P.	1	1	0
Potts, Robert A.	1	1	0
Pound, Matthew	1	1	0
Powell and Sons	1	1	0
Powell, T. H.	1	1	0
Prebble, John G.	0	5	0
Preston, Richard	0	10	6
Pretty, Charles	0	5	0
Price, Robert John	0	2	6
Price and Wardle	0	10	6
Prichard, Edward	1	1	0
Prime, Thomas R.	0	10	6
Radermacher, C. J.	0	10	6
Rawlinson, Ralph	1	1	0
Read, John Henry	0	5	0
Reece, Thomas	0	5	0
Rees, Harding	0	10	6
Richardson, George	0	10	6
Richardson, James	0	5	0
Richardson, John	0	5	0
Ridding, William	0	10	6
Rigg, G. F.	0	5	0
Roach, H. W.	1	1	0

London—continued.	£	s.	d.
Roach, Pope	1	1	0
Roberts, Peter	1	1	0
Robinson, Charles J.	0	10	6
Robinson, H. S.	0	5	0
Robinson, R. A.	0	10	6
Robinson, William P.	0	10	6
Rogers, James	0	10	6
Rogers, Oliver	0	5	0
Rose, Alfred	1	1	0
Roper, R. F.	0	5	0
Rowden, Lewis	0	5	0
Rowe, Robert	1	1	0
Rowntree, Thomas	0	10	6
Rowson, Henry	1	1	0
Rutter, Edmund Yates	1	1	0
Rutter, John	0	5	0
Sadler, William	0	10	6
Sadler, William, jun.	0	5	0
Sainsbury, Samuel	1	1	0
Sandford, Geo. W.	2	2	0
Sandy, Frederick William	0	10	6
Sangster, Arther	1	1	0
Saunders, C.	0	10	6
Schacht, William	0	10	6
Schweitzer, Julius	2	2	0
Scoley, Thomas E.	0	5	0
Scrase, Richard	0	5	0
Sell, W. H.	0	10	6
Selleck, Edward	0	10	6
Severs, Samuel Thomas	1	1	0
Shapcott, W. H. P.	0	2	6
Sheffield, Arthur J.	0	5	0
Shephard, Thomas F.	0	10	6
Shepley, Frederick Thos.	0	5	0
Sherwood, N.	0	5	0
Shields, R. H.	0	5	0
Shirley, J. G.	2	2	0
Shirley, S. S.	0	10	6
Silverlock, Henry	5	5	0
Silvers, Francis T.	0	10	6
Simpson, Henry	0	10	6
Simpson, John	0	5	0
Simpson, Thos.	0	5	0
Sims, C. R. H.	0	10	6
Slipper, James	0	10	6
Smart, John	0	10	6
Smart, W.	0	10	6
Smith, C. B.	0	5	0
Smith, James W.	0	5	0
Smith, John Ord	0	10	6
Smith, Percy John	1	1	0
Smith, William	0	10	6
Smith, William	0	2	6
Smith, William Frederick	1	1	0
Smith, William L.	0	10	6
Spurling, W. E.	0	5	0
Spyer, Newton	0	10	6
Squire, P. and P. W.	5	5	0
Stableforth, J. W.	0	5	0
Stacey, Samuel Lloyd	1	1	0
Stammwitz, Louisa	1	1	0
Stamp, Edward B.	0	10	6
Stansfield, Richard	0	5	0
Starkie, Richard S.	1	1	0
Starkey, E. B.	0	2	6
Steer, Philip R.	0	10	6
Stenson, Joseph	0	5	0
Stevens, Felix	0	5	0
Stevens, Peter Augustus	0	10	6
Stickland, W. H.	1	1	0
Stiling, John E.	0	5	0
Stoneham, Philip	0	10	6
Strickett, John	0	10	6
Strongitharm, W. G.	0	5	0
Summers, James R.	0	10	6
Swan, M. E.	0	5	0
Swift, Francis	0	10	0
Symons, William H.	1	1	0
Taplin, William Gilbert	1	1	0
Taubman, Robert	0	10	6
Taylor, George S.	1	1	0
Taylor, Horatio	0	10	6
Taylor, John	0	10	6
Taylor, Peter	0	5	0
Tebbutt, Edwin	0	5	0
Thompson, C.	0	5	0
Thompson, Henry	0	10	6
Thompson, Henry Ayscough	1	1	0
Thompson, John	1	1	0
Thorn, John James	1	1	0
Thornley, F.	0	2	6
Tijou, Tom	0	5	0
Tingle, Thomas	1	1	0
Tippett, Benjamin M.	0	10	6
Tomlinson, Thomas	1	1	0
Trask, Thomas	1	1	0
Tregear, A. F.	0	5	0

London—continued.	£	s.	d.
Trick, William B.	0	5	0
Troke, Charles	0	10	6
Tugwell, William H.	0	10	6
Turner, Charles E.	0	10	6
Turner, Edward A.	1	1	0
Tyrer, Peter	0	10	6
Van, Frederick W. S.	0	5	0
Vaughan, John	0	5	0
Vialls, J. B.	1	1	0
Vincent and Son	1	1	0
Voelcker, Augustus	1	1	0
Wakefield, Henry	2	0	0
Walker, Byatt A.	0	5	0
Walker, Charles	0	5	0
Wallis, George	0	5	0
Wallis, John T. W.	0	10	6
Wallis, Owen	0	10	6
Waring, A. W.	0	5	0
Warren, William	0	10	6
Wastie, Francis	0	2	6
Watson, William	0	10	6
Watts, Alfred	0	5	0
Way, J. F.	0	5	0
Weatherley, Richard J.	0	5	0
Webb, E. A.	1	1	0
Wells, Thomas	0	5	0
Weston, Samuel John	1	1	0
Westrup, Joseph B.	0	10	6
Whiffen, Thomas	3	3	0
Whigham, Robert L.	0	5	0
White, Charles	0	5	0
White, Charles E.	0	5	0
White, W. T.	1	1	0
Whittle, Elias C. C	0	5	0
Wickham, W.	0	10	6
Wigg, Henry J.	1	1	0
Wiggins, Henry	0	10	6
Wilkes, Henry	0	5	0
Wilkinson, Benjamin John	0	10	6
Wilkinson, Thomas	1	1	0
Will, William W.	0	5	0
Willats, Richard	0	5	0
Williams, Hugh	0	5	0
Williams, James	0	10	6
Williams, John	2	2	0
Williams, Joseph J.	0	5	0
Williams, J. W.	1	1	0
Williams, Thomas H.	0	5	0
Williams, William	0	5	0
Wills and Wootton	1	11	6
Winpenny, F. W.	0	10	6
Winter, William	1	1	0
Wise, Walter	0	10	6
Wisken, Robert	0	2	6
Wodderspoon and Co.	1	1	0
Wood, Edward	0	10	6
Woodland, John	0	10	6
Woolldridge, John	0	10	6
Woollings, Frank	0	2	6
Wooster, J. R.	2	2	0
Wootton, Alfred C.	2	2	0
Wright, Layman and Umney	2	2	0
Wyatt, Francis J.	0	10	6
Wylde, George	0	10	6
Yates, Samuel P.	0	5	0
Young George	0	5	0

Long Bennington.

Bemrose, John	0	10	6

Longton.

Barlow, F.	0	2	6
Hemming, George	0	2	6
Hulme, George	0	2	6
Litchfield, John	0	10	6
Prince, Arthur G.	0	10	0
Sibary, George	0	10	6
Turner, Thomas	0	5	0

Looe.

Poad, John	0	5	0

Loughborough.

Handley, Thomas	0	10	0

Louth.

Dennis, J. W.	0	5	0
Hurst, John	0	5	0
Hurst, John B.	0	5	0

Lowestoft.

Chaston, Anna Maria	0	10	6
Good, Thomas	0	10	6
Moverley, Robert	0	10	6
Sale, Thomas John	0	5	0
Wright, Arthur	0	5	0

Ludlow.	£	s.	d.
Bessell, J. W.	0	5	0
Cocking, George	0	5	0
Marston, Alfred	0	5	0
Nickson, James	0	5	0
Smith, F. W.	0	2	6
Woodhouse, George	0	5	0

Luton.

Hall, Ephraim	0	5	

Lutterworth.

Brown, Thomas	0	10	6

Lyme Regis.

Henley, George	0	5	0

Lymington.

Allen, Adam U.	0	5	0
Badcock, Henry	0	10	6
Madge, James C.	0	10	6

Lymm.

Evans, Isaac H.	0	5	0
Henshall, James	0	5	0

Lytham.

Hartley, John	0	5	0
March, Richard	0	5	0

Macclesfield.

Bates, William I.	0	10	6
Bower, John	0	5	0
Cooper, Thomas	0	5	0
Duncalf, Thomas H.	0	10	6
Lawrence, George P.	0	5	0
Thomas, Richard	0	10	6
Wood, Richard	0	10	6

Macduff.

Henry, J. Hay	0	5	0

Machynlleth.

Rees, Edward	0	5	0

Maidenhead.

Walton, Ralph	0	10	6

Maidstone.

Corfe, Alfred F.	0	5	0
Evans, D. C.	0	2	6
Ridley, Charles H.	0	5	0
Rowcroft, Albert E.	0	5	0
Stonham, Thos. G.	0	10	6

Malden, New.

Stone, Thomas William	0	5	0

Maldon (Essex).

Crick, George E.	0	10	6
Wallworth, David	0	10	6

Malmesbury.

Brown and Ratcliffe	1	1	0

Malta.

Woolldridge, G.	0	10	6

Malton (Yorks).

Buckle, James	0	5	0
Hardy, George	0	5	0
Laverack, W. H.	0	5	0
Longbotham, Mrs. M.	0	5	0

Malvern Wells.

Clark, Edward J.	0	5	0
Wakefield, Cecil H.	1	1	0

Manchester.

Balmforth, A.	1	1	0
Bates, Frederic W.	0	5	0
Benger, F. Baden	0	10	6
Bew, John	1	1	0
Blyton, John	0	10	6
Boor, Frederick	0	10	6
Booth, William G.	0	10	6
Brown, William Scott	1	1	0
Carter, William	0	10	0
Casey, Edward	0	2	6
Darling, William	1	1	0
Drinkwater, P. B.	0	5	0
Gibbons, Thomas G.	1	1	0
Gibson, Robert	1	1	0
Glanville, Robert	0	5	0
Hart, James	1	1	0
Jackson, George	0	10	6
Jackson, Thomas	0	10	6
Lane, William	0	2	6
Lowe, Walter	0	10	6
Marsden, Thos. B.	0	5	0
Maunder, Robert	0	10	6

	£	s.	d.
Manchester—continued.			
Mitchell, John	0	5	0
Mumbray, H. G.	0	10	6
Nuttall, R. H.	0	10	6
Oldfield, Pattinson and Co.	1	1	0
Paine, Standen	0	10	6
Pickup, Robert L.	0	10	6
Pidd, Arthur J.	0	10	6
Royle, John	0	5	0
Scaife, Samuel	0	5	0
Schofield, George T.	0	5	0
Stones, William	1	1	0
Stretch, J. H.	0	5	0
Swinn, Charles	0	10	6
Sylvester, Paul	0	5	0
Terry, Thomas	0	5	0
Thornley, C.	0	10	6
Tomkins, Dr. Henry	0	5	0
Tompsett, Leighton S.	0	5	0
Walsh, Edward	0	10	6
Wealthall, Alfred	0	10	6
West, Thomas	0	5	0
Whittaker, Ellis	0	10	6
Wilkinson, George	0	5	0
Wilkinson, William	1	1	0
Woolley, Sons and Co.	2	2	0
Wright and Barnaby	1	1	0
Yates, Ebenezer	0	5	0
Manningham.			
Pullan, Thomas	0	10	0
Mansfield.			
Adams, Benjamin	1	1	0
Oldham, John	0	10	6
Patterson, Douglas J.	0	5	0
March.			
Davies, P. H.	0	5	0
Vawser, Jesse	0	5	0
Margate.			
Cadby, Saml. K.	0	5	0
Candler, Joseph T.	0	10	6
Harvey, William S.	0	10	6
Wootton, Edward S.	0	10	6
Market Drayton.			
Cooke, William H.	0	2	6
King, William George	0	10	6
Market Harborough.			
Bragg, William B.	1	1	0
Markinch.			
Robertson, Andrew	0	2	6
Maryport.			
Cockton, John	0	5	0
Masham (Yorks).			
Barker, Mathew M.	1	1	0
Kendall, George	0	5	0
Matlock Bath.			
Platt, William	0	2	6
Melbourne (Australia).			
Stewart, W.	0	2	6
More (Wilts).			
Bracher, Edwin	0	5	0
Merthyr.			
Thomas, J. E.	0	2	6
Mevagissey.			
Kemble, James	0	2	6
Mexborough, New.			
Greaves, Eccles	0	2	6
Greaves, George S.	0	2	6
Shields, Robert J.	0	10	6
Micheldean.			
James, Henry	0	5	0
Middlesborough.			
Buck, Thomas	0	5	0
Charles, W. F.	0	5	0
Hall, R.	0	5	0
Harrington, P. J.	0	5	0
Hume, William A.	0	5	0
Middleton, Joseph	0	5	0
Sowerby, Richard	0	5	0
Taylor, H. H.	0	5	0
Taylor, William R.	0	5	0
Turner, Thos. E.	0	5	0
Midhurst.			
Cowap, Samuel E.	0	5	0

	£	s.	d.
Millom.			
Richardson, Thomas	0	10	6
Minchinhampton.			
Simpkins, John	0	10	6
Mintlaw, (N.B.).			
Hardie, Alexander	0	5	0
Mirfield (Yorks).			
Crook, Charles	0	5	0
Monkwearmouth.			
Sayer and Gilbert	0	5	0
Monmouth.			
Key, Hobson	0	10	6
Montrose.			
Burrell, George	0	5	0
Davidson, A.	0	5	0
Morecambe.			
Birkett, John	0	5	0
Morpeth.			
Marshall, G. T.	0	5	0
Mussoorie (India).			
Samuel, James B. and Edward	1	1	0
Nailsworth.			
Mason, William W.	0	2	6
Nantwich.			
Manley, Henry	0	2	6
Naples.			
Bateman, J. M.	1	7	8
Natal.			
Taylor, Edward	0	7	10
Neath.			
Hayman, Alfred	0	10	6
Hutchins, Charles	0	2	6
Needham Market.			
Harrington, Allen	0	10	6
Nether Stowey.			
Ham, John	1	1	0
Newark.			
Bennett, William	0	5	0
Cooling, W. J.	0	5	0
New Barnet.			
Young, Robert Fisher	0	10	6
Newbottle.			
Hunter, Frederick W.	0	5	0
New Brighton.			
Rose, Charles	0	5	0
New Brompton (Kent).			
March, William	0	5	0
Willis, Henry J.	0	5	0
Newbury.			
Davis, Henry J.	0	5	0
Fielder, T. W.	0	5	0
Pratt, Thomas H.	0	5	0
Strawson, G. F.	0	10	6
Taylor, R. A.	0	2	6
Newcastle-on-Tyne.			
Bascombe, William	0	5	0
Bolan, John	0	10	6
Coates, John M.	0	10	6
Frater, G.	0	5	0
Gatward, Oswald	0	5	0
Ismay and Sons	0	10	6
Johstone, W. B.	0	5	0
Mann, Robert	0	10	6
Marley, William	0	10	6
Martin, N. H.	1	1	0
Mawson, R. O.	0	5	0
Owen, William	0	10	6
Payne, J. B.	0	5	0
Pike, John	0	2	6
Proctor, Barnard S.	1	1	0
Roberts, J.	0	10	6
Smith, G. F.	0	10	6
Stuart, Charles E.	0	10	6
Swan, Joseph W.	1	1	0
Watson, Mason	0	10	6
Weddell, George	0	5	0
Whitehead, G.	0	5	0
Wray, E.	0	2	6
Wright, Alfred	0	10	6

	£	s.	d.
Newcastle-under-Lyne.			
Cartwright, William	0	10	6
Heathcote, Thomas S.	0	10	6
Newmarket.			
Barrow, Frank A.	1	1	0
Newport (I. W.).			
Millidge, Alfred	0	5	0
Shepperd, William J.	0	2	6
Newport (Mon.).			
Faulkner, H.	0	5	0
Garrett, James	0	5	0
Garrett, J. O.	0	5	0
Gratte, Henry J.	0	5	0
Morgan, Mrs.	0	2	6
Paine, Charles	0	10	6
Phillips, John	0	10	6
Price, George	0	5	0
Seys, James A.	0	5	0
Young, John	0	10	6
Newport (Salop).			
Picken, Thomas William	0	10	6
New Radford.			
Jenkins, John Thomas	0	5	0
Newthorpe.			
Robinson, Whiteley	0	5	0
Newton Abbot.			
Poulton, John	0	5	0
Wright, W.	0	5	0
Newtown (Mont.).			
Morgan, Richard	0	10	6
New Whittington.			
Slater, Arthur	0	5	0
Nice (France).			
Jobson, Thomas	0	5	0
Watson, James	1	0	0
Norbiton.			
Greenwood, J.	0	10	0
North Kelsey.			
Dixon, James	0	3	0
North Newbald.			
Everatt, Robert	0	2	6
Northallerton.			
Fairburn, Joseph	0	10	0
Squince, John A.	0	5	0
Warrior, Henry	0	5	0
Warrior, William	0	10	6
Northampton.			
Armitt, A.	0	5	0
Ashford, Evan Charles	0	5	0
Barry, James	1	1	0
Berry, J. P.	0	5	0
Bingley, John	0	10	6
Clarke, W. R.	0	5	0
Gulliver, George E.	0	5	0
Kirby, Frederick	0	5	0
Mayger, William D.	1	11	6
Negus, Samuel	0	15	0
Osborne, George C.	0	5	0
Saul, W. B.	0	5	0
Sindall, J. W. (Executors of)	0	5	0
North Walsham.			
Bailey, George Wm.	0	5	0
Northwich.			
Lee, William	0	5	0
Ramsey, Joseph	0	5	0
Norwich.			
Baker, Parsons C.	0	10	6
Caley, Albert J.	0	10	6
Cooke, William	0	5	0
Corder, Octavius	1	1	0
Cossey, John	0	5	0
Cripps, Johnson	0	5	0
Cubitt, Charles	0	5	0
English, Joseph	0	5	0
Gardiner, W. J.	0	5	0
King, H. A.	0	5	0
Nicholson, D. G.	0	5	0
Pentney, James C.	0	2	6
Roberts, R.	1	1	0
Robinson, James	0	5	0

Norwich—continued.

	£	s.	d.
Stebbing, W.	0	2	6
Sutton, Francis	0	10	6
Taylor, H. E.	0	5	0
Thompson, H.	0	2	6
Watson, J. E. H.	0	10	0
Wilson, O. B.	0	5	0

Nottingham.

	£	s.	d.
Beardsley, J.	0	5	0
Beverley, R. H.	0	5	0
Bolton, Charles Alfred	0	10	6
Chemists' Association	6	6	0
Dadley, Elijah	0	10	6
Dennis and Roberts	0	5	0
Dennis, John L.	0	10	6
Edgson, Hugh	0	10	6
Fitzhugh, Richard	1	1	0
Fletcher, Thomas	0	5	0
Flowerdew, W. C.	0	2	6
Holgate, S. V.	1	1	0
Hopkins, J. H.	0	2	6
Jackson, Roberts	0	10	6
Lomas, Joseph	0	5	0
Manfull, H. J.	0	5	0
Mason, Thomas	0	10	6
Parker, W. H.	0	5	0
Patchitt, Edwin C.	1	1	0
Pearson, Edward	1	1	0
Potts, Charles	0	10	6
Rayson, J. T.	0	5	0
Smithurst, John	0	10	0
Taylor, Thomas C.	0	10	6
Warriner, C. W.	0	5	0
White, Frank	0	10	6
Whitworth, John	0	10	6
Wilford, J.	0	10	0

Nuneaton.

	£	s.	d.
Iliffe, George	0	5	0
Lester, Henry	0	5	0

Oakham.

	£	s.	d.
Wellington, James	0	10	6

Oldbury.

	£	s.	d.
Briggs, George	0	10	6

Oldham.

	£	s.	d.
Potts, Walter	0	5	0

Old Swindon.

	£	s.	d.
Smith, William John	0	5	0

Olney (Bucks).

	£	s.	d.
Wright, Ann	0	5	0

Oswaldtwistle.

	£	s.	d.
Haworth, William	0	10	0

Oswestry.

	£	s.	d.
Evans, John	0	10	6
Jones, Thomas	0	10	0
Roberts, William Carey	0	2	6
Smale, Mary E.	0	5	0
Smale, Richard B.	0	5	0
Vaughan, David	0	10	6

Otley (Yorks).

	£	s.	d.
Blade, E.	0	5	0
Pratt, Richard M.	0	10	6

Oundle.

	£	s.	d.
Turner, Robert	0	10	6

Over Darwen.

	£	s.	d.
Shorrock, R.	0	5	0

Oxford.

	£	s.	d.
Bessant, Frederick Railton	0	10	6
Bloxham, W. E.	0	5	0
Clayton, C.	0	2	6
Cousins, Thomas G.	0	10	6
Druce, George C.	0	5	0
Hill, James H.	0	5	0
Hitchcock and Son	1	1	0
Houghton and Sons	0	10	6
Jenkins, Alexander	0	5	0
Luff, William	0	5	0
Modlen, Robert	0	2	6
Prior, George T.	0	10	6
Squire, James	0	5	0
Thurland, Henry	0	10	6
Turpin, A. B.	0	5	0
Varney, Henry G.	0	2	6
Walsh, Edward	0	10	6

Paignton.

	£	s.	d.
Sherriff, George	0	5	0

Paisley.

	£	s.	d.
Cullen, Thomas	0	5	0

Partick (N.B.).

	£	s.	d.
Rait, Robert C.	0	10	6

Pau (France).

	£	s.	d.
Jarvis, John	1	1	0
Smith, Charles C.	0	5	0

Paulton (Somerset).

	£	s.	d.
Bush, Thomas	0	5	0

Pembroke Dock.

	£	s.	d.
Bowling, John H.	0	2	6
Laen, William	0	5	0

Pendleton.

	£	s.	d.
Hume, Thomas	1	1	0
Robinson, Benjamin	0	5	0

Penrith.

	£	s.	d.
Kirkbride, William	0	5	0
Redfern, Tom	0	5	0
Wilson, Joseph	0	5	0

Penzance.

	£	s.	d.
Buckett, A. H.	0	5	0
Harvey, Joseph S.	0	10	6
Shakerley, Benjamin	0	5	0

Perth.

	£	s.	d.
Blair, R. P.	0	5	0
Donald, David	0	5	0
Newby, W. H.	1	1	0

Peterborough.

	£	s.	d.
Bridges, G. A.	0	5	0
Bright, Richard	0	10	6
Carlton, Arthur	0	10	6
Heanley, Marshall	0	10	6
Pearson, John H.	0	10	6
Sturton, J. R.	0	10	6
Willson, Stephen J.	0	10	6

Petersfield.

	£	s.	d.
Nichols, Frederic B.	0	5	0

Petherton.

	£	s.	d.
Wellington, Frederick G. N.	0	5	0

Petworth.

	£	s.	d.
Morgan, Frank G.	0	10	6

Pickering.

	£	s.	d.
Place, James A.	0	5	0
Robinson, G. D. R.	0	2	6

Pinner.

	£	s.	d.
Trist, Richard	0	5	0

Plymouth.

	£	s.	d.
Adams, W. T.	0	5	0
Allen, Joseph	0	2	6
Balkwill, A. P.	0	10	6
Ball, —	0	10	0
Barge, John	0	10	6
Bennett, R. M.	1	1	0
Burdwood, James	0	5	0
Eliott, Samuel	0	5	0
Goodwin, Medmer	0	10	6
Hearder, H. P.	0	10	0
Herron, T. T.	0	5	0
Hetherington, J. H.	0	5	0
Hill, Richard C.	1	1	0
James, John B.	0	10	6
Luke, R. S.	0	5	0
Marsh, John	0	5	0
Marshall, Charles W.	0	5	0
Maurice, James	0	10	6
Nicholls, S. J. H.	0	5	0
Rossiter, John	1	1	0
Saunders, R. A.	0	10	6
Sloggett, Thomas C.	0	5	0
Squire, F. J. C.	0	2	6
Starkey, G. T.	0	5	0
Steele, Samuel	0	10	6
Tatam, Samuel B. C.	0	5	0
Turney, Samuel B.	0	5	0
Williams, J. V.	0	10	6
Woods, William	0	10	0

Pocklington.

	£	s.	d.
Gordelier, Frank H.	0	5	0

Pontardulais.

	£	s.	d.
Bowen, Ebenezer	0	10	6

Pontypool.

	£	s.	d.
Ford, Edward B.	0	10	6

Pontypridd.

	£	s.	d.
Key, W. H.	1	1	0

Poole.

	£	s.	d.
Penny, William	0	2	6
Williams, William F.	0	2	6

Porthcawl.

	£	s.	d.
Thomas, J. J.	0	2	6

Portishead.

	£	s.	d.
Frowd, Edward F.	0	10	6

Portobello.

	£	s.	d.
Kemp, David	0	10	6
Nesbit, John	1	1	0

Portsmouth.

	£	s.	d.
Parsons, William	0	10	6

Portsoy.

	£	s.	d.
Clark, James	0	5	0

Preston.

	£	s.	d.
Carter, James	0	5	0
Foster, E.	0	5	0
Goring, Richard	0	2	6
Hinkley, E.	0	2	6
Miller, Nathaniel	0	5	0
Parker, Thomas	0	5	0
Ryder, John L.	0	5	0
Scott, Joseph	1	1	0
Sharples, George	0	5	0
Smith, William	0	5	0
Tomlinson, John	0	10	0
Waterworth, Alfred	0	10	6
Willan, William	0	5	0

Prestwich.

	£	s.	d.
Mercer, A.	0	10	6

Ramsey (Hunts.).

	£	s.	d.
Palmer, Frederick W.	0	5	0

Ramsgate.

	£	s.	d.
Franks, Alfred	0	5	0
Morton, Henry	0	5	0
Saunders, Charles J. H.	0	2	6

Reading.

	£	s.	d.
Bradley, Charles	0	5	0
Cardwell, E.	0	10	6
Craft, James	0	5	0
Cross, John	0	2	6
Eminson, John M. O.	0	5	0
Hayward, William G.	0	5	0
Noad, Joseph	0	5	0
Powell, John	0	5	0
Rowell, John C.	0	5	0
Smith, Harry J.	0	2	6
Tunbridge, Frederick	0	5	0
While, William J.	0	5	0
Wilson, J. P.	0	2	6
Young, J. M.	0	5	0

Reddish.

	£	s.	d.
Robinson, John T.	0	1	6

Redditch.

	£	s.	d.
Moule, William	0	5	0

Redhill.

	£	s.	d.
Shillitor, F. S.	1	1	0

Retford.

	£	s.	d.
Baker, William	1	1	0
Kirk, William P.	0	5	0

Rhondda Valley.

	£	s.	d.
Lloyd, Rees	0	5	0

Rhyl.

	£	s.	d.
Foulkes, William Henry	0	10	6

Rhymney.

	£	s.	d.
Dixon, Franklin	1	1	0

Richmond (Surrey). £ s. d.
Bletsoe, John 0 10 6
Clarke, Thomas M. 0 10 6
Hornby, Alfred 0 5 0
Lissiter, F. W. 0 2 6
Mumbray, R. G. 0 2 6
Parrott, John 0 10 6
Thacker, William 0 10 6

Richmond (Yorks).
Thompson, John Thomas 0 5 0
Thompson, Thomas 0 10 6

Ringstead.
Abington, Herbert J. 0 5 0

Ringwood.
Bowring, John W. 0 5 0

Ripley.
Morley, John T. 0 5 0

Rochdale.
Highley, William 0 5 0
Robinson, Ralph 0 10 6
Taylor, Edward 0 5 0

Rochester.
Barnaby, Henry 0 5 0
Foster, Alexander J. 0 5 0
Hewitt, Joseph S. 0 5 0

Rock Ferry.
Dutton, John 1 1 0

Roehampton.
Swain, James 0 5 0

Romford.
Lasham, John W. 0 10 6
Pertwee, Edward 0 10 6

Romsey.
Blissett, W. 0 10 6
Francis, George 0 5 0

Ross.
Matthews, Thomas A. 0 5 0

Rothbury.
Farrage, Robert 0 10 6

Rotherham.
Horsfield, J. M. 0 5 0
Macaulay, William H. 0 10 6

Rotherfield.
Field, William 0 5 0

Rothesay.
Duncan, William 0 5 0
Macintosh, Archibald 0 5 0

Rugby.
Brown, John 0 5 0
Chamberlain, A. G. 0 5 0
Lauder, Henry 0 5 0

Rugeley.
Hawkins, Henry F. 0 10 0

Ruthin.
Magin, Arthur E. 0 2 6

Ryde (Isle of Wight).
Dixon, Henry 0 10 6
Flower, Thomas S. 0 10 0
Gibbs, William 0 10 6
Miller, Charles S. 0 5 0
Pollard, Henry H. 0 10 6
Smith, Tenison 1 1 0
Smith, William 0 2 6
Wallis, George 0 2 6

Rye (Sussex).
Smith, Alfred W. 0 5 0
Waters, William A. 0 10 6

Saffron Walden.
Machon, H. 0 15 0

St. Albans.
Allenby, Henry 0 2 6
Ekins, Arthur E. 0 10 6
Martin, Henry G. 0 10 6
Myers, L. J. 0 5 0

St. Andrews. £ s. d.
Cleghorn, Dr. H 0 10 0
Govan, Alexander 0 10 6
Kennedy, William 0 2 6
Kennath, W. R. 0 10 0
Kirk, John J. 0 2 6

St. Austell.
Geldard, John 0 5 0
Smith, Albert 0 5 0

St. Blazey.
Nettle, W. R. P. 0 5 0

St. Clears.
David, Albert 0 2 6
Williams, Evan 0 10 6

St. Day.
Corfield, Charles 0 10 6
Corfield, Thomas J. T. 0 10 6

St. Helens.
Cotton, John, jun. 1 1 0
Harrison, James 0 5 0
Sherlock, Thomas 0 5 0

St. Just.
Wearing, John 0 2 6

St. Leonards.
Feaver, John 0 5 0
Field, H. 0 2 6
Joseph, Arthur I. 0 5 0
Maggs, F. W. 0 5 0
Maggs, Samuel B. 0 10 6
Neve, Francis C. 0 10 6
Thomas, Horace 1 1 0

St. Neots.
Mellor, J. G. 0 5 0

Sale.
Smith, Allen 0 5 0

Salisbury.
Atkins, Samuel Ralph 0 10 6
Atkins, William R. 0 5 0
Hardy, R. E. 0 5 0
Newton, J. W. 0 10 6
Orchard, E. J. 0 10 6
Rowe, J 0 5 0
Westmoreland, W. H. 0 2 6

Saltash.
Mathew, William H. 0 5 0

Saltburn-by-the-Sea.
Taylor, William 0 5 0

San Remo (Italy).
Squire, Frank R. 0 10 6

Sandgate.
Jenner, William M. 0 5 0
Kennett, Edward 0 2 6
Walton, George C. 0 10 6

Sandwich.
Baker, Frank 0 10 6
Dixon, William 0 5 0

Saundersfoot.
Matthias, Thomas 0 10 6

Sawston.
Crampton, John 0 5 0

Scarborough.
Chapman, Henry 0 5 0
Clare and Hunt 1 1 0
Cuttle, Arthur E. 0 2 6
Eccles, H. 0 5 0
Jones, Alfred 0 5 0
Southwell, John W. 0 5 0
Whitfield, John 1 1 0

Scottow.
Betts, George 1 1 0

Seacombe.
Holt, Richard W. 0 5 0

Seaham Harbour.
Storey, W. 0 5 0

Selby.
Brown, George 0 5 0
Burton, John 0 5 0
Cutting, Thomas John 0 5 0

Selkirk. £ s. d.
Dunn, Thomas 0 5 0

Settle.
Shepherd, J. W. 0 5 0

Shaftesbury.
Barry, Frederic 0 5

Shanklin (Isle of Wight).
Brown, Andrew Henry 0 10 6

Sheepshed.
Moore, Thomas 0 5 0

Sheerness.
Saffery, John 0 10 6

Sheffield.
Bradwall, J. H. 0 2 6
Carr, George 0 5 0
Clark, John 0 10 6
Clayton, William 0 10 6
Cubley, G. A. 0 10 6
Dobb, Joseph T. 0 15 0
Dunnill, G. H. 0 5 0
Ellinor, George 0 10 6
Elliott, John G. 1 0 0
Fletcher, Howard Bennett 0 10 6
Fox, A. R. 0 10 6
Froggatt, John 0 2 6
Froggatt, F. W. 0 2 6
Furness, Joseph M. 0 5 0
Hall, Thomas H. 0 10 6
Harrison, Henry 1 0 0
Jervis, William 1 1 0
Jones, G. M. 0 5 0
Learoyd, E. R. 0 5 0
Miller, John T. 0 5 0
Newham, Benjamin 0 10 6
Otley, John 0 10 6
Owen, George 0 10 0
Preston, Job 0 10 6
Priestley, Henry 0 10 6
Salisbury, John M. 0 10 6
Turner, John 0 5 0
Ward, William 0 10 6
Watson, H. J. 0 5 0
Watson, Robert W. 0 10 6
Westbrook, Dr. Charles 1 1 0
Wilkinson-Newsholme, G. T. 1 1 0
Wood, Alfred 0 10 6

Shefford (Beds).
Baigent, William Henry 0 10 6

Shepton Mallet.
Cottrill, Gilbert Jones 0 5 0
Fudgé, Charles William 0 5 0

Shields, North.
Burn, Thomas 0 2 6
Gibson, James 0 10 6
Hogg, Joseph F. 0 2 6
Irvin, William G. 0 2 6
Stobbs, Robert 0 10 6
Wilson, Richard H. 0 2 6

Shields, South.
Forrest, Robert 0 10 6
Mays, Robert J J. 0 10 6
Noble, John 0 5 0
Raffle, William 0 10 6
Rowell, Robert 0 5 0
Williamson, Bamford 0 10 6

Shifnal.
Clarke, Thomas E. 0 5 0

Shildon.
Veitch, Thomas D. 0 5 0

Shoreham.
Fenner, Edwin 0 5 0

Shrewsbury.
Adams, William 0 5 0
Blunt and Moses 1 1 0
Cross, William G. and Son 1 1 0
Goucher, John 0 10 6
Goulbourne, William 0 5 0
Hickin, Henry 0 2 6
Jones, William 0 10 6
Longhurst, Edward 0 5 0
Pattison, Henry 0 2 6
Salter, Joseph B. 0 10 6

	£	s.	d.
Sidcup.			
Baker, William R.	0	5	0
Sidmouth.			
Chessall, Rowland	0	5	0
Silverdale.			
Wilson, Edward	0	5	0
Sittingbourne.			
Gordelier, William G.	1	1	0
Sleaford.			
Harrison, T. E.	0	5	0
Slough.			
Elliman, Samuel F.	0	10	6
Griffith, Richard	0	10	6
Smallthorne.			
Fletcher, Thomas	0	10	6
Snaith.			
Bean, John	0	10	6
Southam.			
Archer, Thomas	0	2	6
Southampton.			
Bates, William	0	2	0
Bienvenu, John	1	1	0
Bishop, Samuel	0	2	6
Borchert, Heinrich T. G.	1	1	0
British Pharmaceutical Conference	55	16	7
Culverwell, John S.	0	5	0
Dawson, Oliver R.	0	10	6
Fletcher, J. B.	0	10	0
Horsey, H. V.	0	2	6
Hughes, J. H.	0	5	0
Humby, Lewis W.	0	5	0
Mumford, Alfred	0	10	6
Pell, John	0	5	0
Randall, William B.	1	1	0
Spearing, James	0	10	6
Troake, C. F.	0	5	0
Southend.			
Dawson, George R.	0	5	0
South Molton.			
Cocks, James	0	2	6
Swingburn, Richard H.	0	10	6
Southport.			
Ashton, William	1	1	0
Ball, George	0	10	6
Bannerman, C. G.	0	2	6
Britten, Caroline	0	5	0
Ellis, George	0	5	0
Gillett, Joseph	1	1	0
Horsefall, John	0	10	6
Laslett, E. A.	0	12	0
Loadman, James	0	5	0
Mainwaring, R.	0	10	6
Moore, G. B.	0	5	0
Radley, William V.	0	10	6
Righton, James	0	5	0
Round, Frederick	1	1	0
Surr, Edward	0	5	0
Sykes, Thomas H.	0	10	6
Whitworth, James	0	10	0
Wimpenny, James M.	0	5	0
Wright, Thomas D.	1	0	0
Southsea.			
Cruse, Thomas H.	1	1	0
Ford, Horace S.	0	5	0
Futcher, Alfred J.	0	10	6
Parris, T. W.	0	5	0
Rowell, Robert H.	0	10	6
Sapp, John J.	0	10	6
Southwell.			
Downing, J. H.	0	5	0
Southwold.			
Critten, Robert P.	0	5	0
Sowerby Bridge.			
Stott, William	0	10	6
Spalding.			
Asling, Brelsford	0	5	0
Maxey, William H.	0	5	0
Spennymoor.			
Burden, Thomas A.	0	5	0
Spilsby.			
Steeper, Samuel	0	5	0

	£	s.	d.
Stafford.			
Averill, Henry Alcock	1	1	0
Averill, John	1	1	0
Stalybridge.			
Simpson, Allwood	0	5	0
Stamford.			
Dickinson, Frederick	0	10	6
March, Frederick	0	5	0
Stanmore.			
Blackwell, S. J.	2	2	0
Stevenage.			
Fresson, Lewis Francis	0	10	6
Stirling.			
Duncanson, William	0	10	6
Stockport.			
Chemists' Association	1	1	0
Johnson, Thomas J.	0	5	0
Kay, Brothers	1	1	0
Lowndes, Hervey	0	5	0
Orton, William B.	0	2	6
Sidley, Thomas I.	0	10	6
Stockton, South.			
Ronchetti, T. A.	0	5	0
Stockton-on-Tees.			
Bainbridge, Robert R.	0	2	6
Brayshay, Thomas	1	1	0
Brayshay, William B.	1	1	0
Thompson, Thomas	0	10	6
Thomson Brothers	0	10	6
Stoke-on-Trent.			
Adams, Frank	0	10	6
Adams, William H.	0	10	6
Harris, E. A.	0	5	0
Jones, John	0	10	0
Walker, Thomas D.	1	1	0
Wilson, Clement Fisher	0	5	0
Stone (Staffs).			
Jenkins, Thomas H.	0	10	6
Slater, Thomas	0	10	6
Slater, Thomas, jun.	0	5	0
Stoneham.			
Sutton, Charles W.	1	1	0
Stonehouse.			
Daymond, Samuel	0	2	6
Netten, Henry J. T.	0	5	0
Snell, H. B.	0	5	0
Stony Stratford.			
Cox, Julia Jane	0	10	6
Robinson, William H.	0	10	6
Stourbridge.			
Bland, Thomas F.	0	10	6
Burgess, William	0	5	0
Clark, Thomas P.	0	5	0
Hughes, Samuel	0	10	6
Jones, Rowland G.	0	5	0
Loverock, Henry	0	10	0
Morris, Alfred P.	0	10	6
Perks, Francis	0	10	6
Whitwell, George	0	5	0
Stowmarket.			
Gostling, George J.	0	10	6
Simpson, Robert G.	0	5	0
Wilson, Thomas	0	5	0
Stratton.			
Pickard, Henry	0	5	0
Strichen.			
Lee, Alexander M.	0	5	0
Strood.			
Picnot, Charles	1	1	0
Stroud.			
Blake, William Frederick	0	10	6
Coley, Samuel J.	0	10	6
Smith, David	0	10	
Sunbury-on-Thames.			
Truman, H. V.	0	2	6

	£	s.	d.
Sunderland.			
Fairman, George P.	0	10	6
Harrison, John	0	10	0
Harrison, W. B.	0	10	0
Hopper, Richard	0	2	6
Leadbetter and Son	0	2	6
Mitchinson, John	0	2	6
Purse, Alfred D.	0	5	0
Surbiton.			
Acfield, William	0	5	0
Mence, W. C.	0	10	0
Sutton Coldfield.			
Smith, William	0	10	6
Sutton-in-Ashfield			
Littlewood, Samuel	0	5	0
Swaffham.			
Bell, Frederick R.	0	5	0
Finch, Jacob	1	1	0
Swansea.			
Bonnett, Frederick	0	2	6
Cule, Taliesin	0	10	6
Davies, John	0	5	0
Davies, John	0	10	6
Davies, John	0	2	6
Davies, J. M.	0	5	0
Grose, Nicholas M.	0	10	6
Hughes, James	0	5	0
Jones, H. Ellis	0	2	6
Jones, Moses	0	10	6
Lloyd, John W.	0	5	0
Rees, Daniel	0	5	0
Richards, J.	0	5	0
Roberts, J. H.	0	5	0
Trick, M.	0	5	0
Williams, D.	0	2	6
Yorath, Christopher	0	10	6
Sydney (N.S.W.).			
Sloper, Frederick E.	2	2	0
Tarporley.			
Aston, Walter	0	5	0
Taunton.			
Biffen Thomas	0	10	6
Dyer, E. H.	0	5	0
Field, W. C.	0	5	0
Gregory, George H.	0	5	0
Hambly, Charles J.	0	10	6
Kirkpatrick Samuel	0	5	0
Redman, Sidney	0	5	0
Sargent, John C.	0	10	6
Woollatt, Richard	0	5	0
Tavistock.			
Gill, William	0	2	6
Teignmouth.			
Cocking, Frederick J.	0	5	0
Cornelius, Joseph	0	10	0
Evans, Joseph J. O.	0	5	0
Pryer, H.	0	5	0
Tenbury.			
Slade, John	0	10	6
Tenby.			
Davies, Moses P.	0	5	0
James, George	0	5	0
Williams, William	0	5	0
Tewkesbury.			
Allis, Francis	0	5	0
Walker, Joseph	0	5	0
Wilkes, D. T.	0	2	6
Thame.			
Sutton, W. D.	0	5	0
Thirsk.			
Smithson, F. W.	0	2	6
Thornhill (N.B.).			
Fingland, James	0	5	0
Thornton Heath.			
Knott, Samuel	0	5	0
Thornton-in-Craven.			
Wilson, Thomas	1	1	0

	£	s.	d.
Thrapston.			
Pars, R. C.	0	10	6
Titchfield.			
Smith, W. O.	0	10	6
Tiverton.			
Havill, Paul	0	5	0
Rossiter, Thomas E.	0	5	0
Sanders, George Lee	0	5	0
Todmorden.			
Stevenson, W.	0	2	6
Torquay.			
Bathe, William	0	5	0
Bridgman, William Louis	0	5	0
Cocks, John W.	0	5	0
Guyer, James B.	1	0	0
Knight, Benjamin	0	5	0
Ness, Thomas H.	0	2	6
Riches, Thomas	0	5	0
Shapley, Charles	0	10	0
Sloman, Richard	0	10	6
Smith, Edward	0	10	6
Taylor, John	0	10	6
Totnes.			
Michelmore, P. W.	0	5	0
Morse, C. H. Stafford	0	5	0
Tredegar.			
Giles, William E.	0	2	6
Phillips, Charles L.	0	5	0
Treherbert.			
Jones, Rees T.	0	2	6
Trowbridge.			
Hayward, W. H.	0	5	0
Truro.			
Anstey, J. U.	0	5	0
Bird, Matthew M.	0	5	0
Bucher, W. H.	0	5	0
Feaver, Samuel	0	10	6
Percy, Thomas B.	1	1	0
Tunbridge.			
Gower, Alfred	0	10	0
Millidge, Thomas E.	0	10	6
Wibmer, Lewis Michael	0	5	0
Tunbridge Wells.			
Arnold, Spencer	0	10	6
Batting, Thos. G.	0	10	6
Cheverton, George	1	1	0
Dunkley, Edward	0	10	6
Howard, George W.	0	10	6
Howard, Richard	0	10	6
Mason, Michael	0	5	0
Sells, Robert J.	0	10	6
Whitrow, Benjamin	1	1	0
Tunstall.			
Keightley, Joseph	0	5	0
Tweedmouth.			
McIntyre, Peter S.	0	7	6
Twickenham.			
Alexander, William	0	5	0
Amoore, Lewis P.	0	10	6
Bishop, Thomas	0	10	6
Peake, Henry F.	0	5	0
Shelley, Henry	0	10	6
Tynemouth.			
Atkinson, Joseph	0	5	0
Uckfield.			
Salter, Benjamin	1	1	0
Ulverston.			
Downward, John	1	1	0
Willan, Robert	0	5	0
Uppingham.			
Killick, C. R.	0	5	0
Upton-on-Severn.			
Gibbs, John	0	10	6
Urmston.			
Duncalf, Richard	0	5	0
Uttoxeter.			
Johnson, John B.	0	10	6
Parker, Alfred	0	5	0
Woolrich, Charles B.	0	10	6

	£	s.	d.
Ventnor (Isle of Wight).			
Starling, Henry W.	0	5	0
Weston, Charles	1	1	0
Victoria (British Columbia).			
Jones, Hugh Lloyd	1	1	0
Wakefield.			
Cardwell, James	0	5	0
Chaplin, John Lambert	0	10	6
Clarkson, B. F.	0	5	0
Duffin, Thomas	0	10	6
Hudson, Frank	0	5	0
Ibbotson, Fred	0	5	0
Moorhouse, Walter	0	5	0
Quarmby, J. A.	0	5	0
Saville, George	0	5	0
Smith, G. E.	0	10	6
Wice, J. H.	0	10	6
Wallingford.			
Ashmall, George	0	5	0
Payne, Sidney	1	1	0
Upton, Eustace J.	0	10	0
Walmer.			
Wood, Henry	0	5	0
Walsall.			
Bate, Joseph William	0	5	0
Elliott, George	0	5	0
Partington, John J.	0	5	0
Walsham, North.			
Denney, E. J.	0	10	6
Walsham-le-Willows.			
Harrington, Arthur	0	2	6
Waltham.			
Teat, Thomas	0	5	0
Waltham Abbey.			
Griffiths, J. M.	0	10	6
Marshall, A.	0	10	6
Walton-on-Thames.			
Davies, C. E.	0	5	0
Power, Edward	0	5	0
Wantage.			
Candy, J. W. G.	0	5	0
Marks, F. C.	0	5	0
Ware.			
Medcalf, Benjamin	0	10	6
Medcalf, Benjamin Pearce	0	10	6
Wareham.			
Marshallsay, Richard J.	0	5	0
Randall, Thomas	1	1	0
Warminster.			
Rogers, John M.	0	2	6
Rogers, Sydney	0	2	6
Warrington.			
Greenough, H. F.	0	2	6
Woods, J. H.	0	10	6
Young, John R.	0	10	6
Waterford.			
Goodchild, Thos. A.	0	5	0
Watford.			
Chater, Edward M.	1	1	0
Chater, Matthew Taylor	1	1	0
Cottle, Alfred James	0	5	0
Maries, H. D.	0	5	0
Wath-upon-Dearne.			
Hick, Allan	1	1	0
Watton.			
Vincent, Lacey A.	0	5	0
Weaverham.			
Manifold, John J.	0	10	6
Wednesbury.			
Gittoes, Samuel J.	0	10	6
Welshpool.			
Williams, Thomas	0	5	0
Wells (Norfolk).			
Mann, George F.	0	5	0
Rump, Robert R.	0	5	0

	£	s.	d.
Wells (Somerset).			
Manning, Richard James	0	10	6
Slater, Jonathan	0	5	0
Welton.			
Myers, George Henry	0	5	0
Welwyn.			
Lawrance, Edmund	0	10	6
Wem.			
Bailye, W. R.	0	10	6
West Bromwich.			
Bullus, John	0	5	0
Haddock, Benjamin	0	10	6
Tunley, John	0	5	0
Westbury.			
Taylor, Stephen	0	2	6
Westbury-on-Trym.			
Collie, John C.	0	5	0
Westgate-on-Sea.			
Hutchinson, George B.	0	5	0
West Malling.			
Oliver, Henry C. H.	0	5	0
Stedman, Richard B.	0	5	0
Wetherby.			
Jackson, John	0	5	0
Weybridge.			
Griffin, Thomas	0	10	6
Weymouth.			
Cole, W. B.	0	5	0
Gregory, William	0	5	0
Groves, Thomas B.	0	10	6
Hill, Henry	0	5	0
Livesey, James T.	0	2	6
Smith, Joseph	0	5	0
Stedman, Samuel S.	0	10	0
Targett, Charles G.	0	5	0
Whitby.			
Corner, Thomas B.	0	10	6
Frank, John	1	1	0
Sewell, Edward E.	0	2	6
Stevenson, John	0	10	6
Whitechurch (Hants).			
Bailey, John H.	0		
Whitehaven.			
Wilson and Kitchin	1	1	0
Wick (N.B.).			
Miller, Kenneth	0	5	0
Wigan.			
Dawson, Francis Robert	0	5	0
Hothersall, John	0	10	6
Johnson, Thomas	0	10	6
Kellett, Richard E.	0	5	0
Mather, John	0	5	0
Phillips, Jonathan	0	10	6
Wilmslow.			
Charnley, Charles	0	10	6
Wimbledon.			
Dowdeswell, Jonathan	0	5	0
Fuller, R. T. C.	0	10	6
Spencer, W. G.	0	5	0
Wimborne.			
Jones, Henry	0	10	6
Winchcombe.			
Hall, Alfred L.	0	5	0
Winchester.			
Barratt, F. J.	0	5	0
Knight, George E. Moses	0	5	0
Powell, Edward	1	1	0
Powell, Edward F.	0	10	6
Windsor.			
Collins, Henry G.	0	5	0
Grisbrook, Edward	0	5	0
Harmer, J. D.	0	5	0
Leigh, John	0	10	0
Russell, Charles J. L.	0	10	6
Westlake, Bernard	0	10	6
Wood, Robert	0	5	0

	£	s.	d.
Wingham.			
Palmer, Henry B.	0	5	0
Winnebah (Africa).			
Jones, Thomas	1	7	4
Winslow.			
Parrett, Edward	0	5	0
Wisbeach.			
Maxey, John T.	0	5	0
Witham.			
Green, Robert P.	0	10	6
Ward, Francis E.	0	5	0
Witney.			
Purdue, Thomas	0	5	0
Wokingham.			
Spencer, Thomas	0	10	6
Wolverhampton.			
Cannell, William	0	10	6
Coleman, William	0	10	6
Fleeming and Son	0	10	6
Gibson, F. J.	0	5	0
Hamp, John	0	5	0
Stanway, Edward Thomas	0	10	6
Weaver, Alfred C.	0	5	0
Woodbridge.			
Betts and Son	0	10	6
Worboys.			
Nichols, Arthur F.	0	2	6
Worcester.			
Ferneley, Charles	0	10	6
George, Henry	0	10	6
Hall, Frederick J.	0	5	0
Hinks, John	0	10	6
Hogg, James E.	0	5	0
Horniblow, W. T.	0	5	0
Kitson, Edward J.	0	10	6
Lunn, Thomas	0	10	6
Masters, Charles	0	5	0
Steward, John A.	0	10	6
Timms, Mrs.	0	10	6
Twinberrow, John	1	1	0
Virgo, Charles	1	1	0
Workington.			
Bowness, William	0	5	0
Mason, Joseph R.	0	5	0
Worksop.			
Baxter, George	0	5	0
Hadfield Henry M.	0	5	0
Jones, George W.	0	5	0
Worthing.			
Chaplin, Alfred	0	10	6
Cortis, A. B.	1	11	6
Wrotham.			
Romans, Thomas W.	0	10	6
Wycombe.			
Furmston, S. C.	0	5	0
Harding, Robert	0	5	0
Lansdale, John A.	0	5	0
Mawer, Edward	0	5	0
Wyke.			
Drake, William	0	5	0
Wymondham.			
Skoulding, William	0	5	0
Yarm.			
Reed, George	0	10	6
Yarmouth.			
Mornement, Henry J.	0	5	0
Poll, W. S.	0	2	6
Pratt, Edward J.	0	5	0
Skoulding, George S. F.	0	10	6
Steward, Alfred	0	5	0
Welch, Alfred E.	0	5	0
Yaxley.			
Farr, Joseph	0	10	6
Yeadon.			
Blatchley, Thomas	0	10	6
Yeovil.			
Harwood, Henry T.	0	10	6
York.			
Batty, Thomas	0	5	0
Capes, John Henry Cooper	0	5	0
Croskell, C.	0	10	6
Davison, Ralph	0	10	6
Leak, Frederick	0	10	0
Parker, Thomas	0	5	0
Saville, John	1	1	0
Wand, Thomas	0	5	0
Wilson, Thomas W.	0	5	0

DONATIONS RECEIVED DURING 1882.

	£	s.	d.
Bird, Augustus, Wood Lane, Shepherd's Bush, London, W.	10	10	0
Bishop, Alfred, 17, Speck's Fields, Mile End, London, E.	68	5	0
Buck, Thomas, Stamford Hill, London, N.	5	5	0
Burden, Edward M'Mullen, 38, Duke St., Grosvenor Sq., London, W.	10	10	0
Burnell, John S., Glossop Road, Sheffield	5	5	0
Butt, E. Northway, 13, Curzon St., Mayfair, London, W.	52	10	0
Cuff, J. H., 291, Camden Road, London, N.	5	5	0
Davenport, J. T., 33, Great Russell Street, London, W.C.	5	5	0
Evans, Sons & Co., 56, Hanover Street, Liverpool	10	10	0
Fennings, Alfred, Salus Villa, West Cowes, I.W.	5	10	0
Kemp, D. S., Bombay	5	5	0
Lee, William, High Street Honiton	10	10	0
Richardson, J. G. F., Stoneygate, Leicester	50	0	0
Robbins, John, 147, Oxford Street, London, W.	106	16	0
Scruby, W. Y., Acton, W.	5	5	0
Searle, George G., Fakenham, Norfolk	5	5	0
Squire, William, 5, Coleman Street, London, E.C.	10	10	0
Stooke, Arthur, King Street, Milton next Sittingbourne	5	5	0
Thorburn, Henry W., Cradock Villa, Bishop Auckland	5	5	0
W. S., Dover	5	5	0

LEGACIES RECEIVED DURING 1882.

Howden, Robert	£100	0	0
Lloyd, Arthur	100	0	0
Pearson, Charles James	100	0	0

ANNUITANTS.

There are at present *forty-one* annuitants, receiving £1350 per annum, and casual relief is also granted, involving a total annual expenditure of upwards of £1800.

The scale of pensions is £30 per annum to pensioners under 65 years of age, and £35 per annum to pensioners 65 years of age and upwards.

ABSTRACT OF RULES IN REFERENCE TO VOTES AT THE ELECTIONS OF ANNUITANTS.

Annual Subscribers of—Half-a-crown are entitled at each election of Annuitants to ONE Vote.
Five Shillings ... ... TWO Votes.
Half-a-guinea ... ... FIVE Votes.
One Guinea ... ... TEN Votes.
And to increase in the same proportion.
Five Guineas are entitled to ... ... FIVE Votes for life.
Ten Guineas ... ... TEN Votes for life.
And to increase in the same proportion.

Should any Subscriber or Donor, or the widow of any Subscriber or Donor, become a Candidate for an annuity, such number of votes shall be placed to his or her credit, at the first succeeding election, as shall be represented by the whole amount of subscriptions or donations to the Benevolent Fund he or she (or, in the case of a widow, her husband) may have contributed.

Cheques and post office orders to be made payable to Elias Bremridge.

FORM OF BEQUEST TO THE BENEVOLENT FUND.

"*I give and bequeath the sum of* *unto the* Pharmaceutical Society of Great Britain, *the same to be paid out of my pure personal estate, and to be applied for the purposes of the* Benevolent Fund *of the said Society.*"

N.B.—Devises of land and bequests of money savouring of realty, or, in other words connected in any way with land, will be void.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 623.)

ELATERINUM, U.S.P.—The unequal strength of commercial elaterium led some years ago to the introduction of a standard dilution of the active principle, elaterin, which was subsequently adopted in the public hospitals of New York under the name of "lactosum elaterini." The strength of this was one part in 100, and the dose about 10 grains (*New Remedies*, Jan., 1883, p. 28). The "trituratio elaterini" is the only preparation now official, and although the dose is not mentioned, it is probably understood to be one grain, since it is ten times the strength of the lactosum. Although a more convenient preparation, inasmuch as the bulk of the powder is smaller, the thoughtless substitution of the one preparation for the other in dispensing might lead to dangerous results. The lactosum will therefore now probably drop out of use in view of this possible risk. The non-precipitation of elaterin by tannic acid, salts of mercury and platinum is given as a test for the absence of, and difference from, alkaloids.

ERYTHROXYLON, U.S.P.—The consistence of the leaf is not mentioned. The "curved line running from base to apex" of the leaf, and formed by the vernation of the leaf is not always discernible, nor, at least as met with in this country, would the leaf be called somewhat aromatic and bitter.

EUCALYPTUS GLOBULUS, U.S.P. — The leaves should be "lanceolately scythe-shaped, 6 to 12 inches long, and "collected from rather old trees."

EUONYMUS, U.S.P.—Removed from the secondary list, probably in consequence of the discovery of the cholagogue property of euonymin by Rutherford. An alcoholic extract is the only preparation. It is probably intended to be the official representative of "euonymin."

FARFARÆ FOLIA, P.G.—The date for collection (May), and the warning against confounding the leaves of *Petasites officinalis*, Mœnch, and *P. tomentosus*, with those of coltsfoot, are now omitted; and the measurement of the leaf is given as being frequently a decimetre in length and breadth.

FEL BOVIS, U.S.P.—The sp. gr. should be 1·018 to 1·028. It is to be evaporated at a temperature of 176° F., to form *Fel Bovis Inspissatum*.

The mode of preparation of *Fel Bovis Purificatum* differs from that adopted in the B.P. in the use of only 1 part of alcohol to 3 parts of fresh ox-gall, and in the mixture being allowed to stand for twenty-four hours before evaporation.

FŒNICULUM, U.S.P.; FRUCTUS FŒNICULI, P.G.—The U.S.P. now mentions *F. vulgare*, Gærtn., and the P.G. *F. capillaceum* as the official source of the fruit. The U.S.P. permits the use of seed from 4 to 8 millimetres long, and by this measurement, as well as by simply stating "odour and taste aromatic, anise-like," without mentioning sweetness, it evidently allows the use of different varieties. The P.G. now requires fennel fruit to be 8 millimetres long and 3 broad, and to have a sweet taste, indicating probably the Maltese rather than the German fennel.

FRANGULA, U.S.P.; CORTEX FRANGULÆ, P.G.—The U.S.P. directs that the bark should be collected at least one year before being used. The P.G. does not make any such provision, although it was stated several years ago by Fristedt that the fresh bark produces colic and vomiting; and by Lamm that it is less active as an aperient than after it has been kept for a year or more (*Pharm. Journ.*, [3], vii., 102), owing possibly to changes taking place in the bark, when kept, which cause the formation of emodin, and possibly other substances (*Pharm. Journ.*, [3], vii., 616). The thickness of the bark is limited in the U.S.P. to 1 millimetre, and in the P.G. to 1½ millimetre, probably to prevent the use of the thicker stem bark, which, according to Baildon, gives a nauseous decoction (*Pharm. Journ.*, [3], iv., 889).

FUNGUS CHIRURGORUM, P.G.—This name replaces that of *Fungus igniarius præparatus*. As there is a *Polyporus igniarius*, Fr., as well as a *Polyporus fomentarius*, Fr., and the latter only is official, it is well that the name of *Fungus igniarius* is dropped. It should consist, as seen under the microscope, only of filiform cells and should quickly absorb twice its weight of water, which when expressed from it and evaporated should leave but very little residue. Amadou impregnated with nitrate of potassium or other salts is to be rejected.

GALBANUM, U.S.P. and P.G.—In the U.S.P. *Ferula galbaniflua*, Boiss. et Buhse, is alone given as the source of the drug. In the P.G. both *Ferula galbaniflua* and *F. rubricaulis* are mentioned. The U.S.P. remarks that when moistened with alcohol galbanum acquires a purple colour on the addition of a little hydrochloric acid. The P.G. states that hydrochloric acid which has been poured on galbanum becomes of a fine red colour in the course of an hour, which, on the gradual addition of spirit, if heated to 60°, becomes of an intense violet colour.

GALLÆ, U.S.P.; GALLÆ, P.G.—In the P.G. the tree yielding the official galls is stated to be *Quercus Lusitanica;* and in the U.S.P. *Q. Lusitanica*, Webb, *var. infectoria*, D.C. In the former the limit of diameter of the official galls is given as ¾ inch, and in the latter as 25 millimetres, thus excluding the large Algerian and Bussorah and other galls. The U.S.P. directs that light, spongy and whitish nutgalls should be rejected.

GELSEMIUM, U.S.P.—The rhizome and rootlets are now official. This description is more suitable to the commercial article, which usually consists in larger proportion of the rhizome. It is rarely seen in this country of the size mentioned, viz., "occasionally an inch and a quarter thick."

GENTIAN, U.S.P.; RADIX GENTIANÆ, P.G.—In the P.G. the other official species besides *G. lutea* are now mentioned. These are *G. Pannonica*, *G. purpurea*, and *G. punctata*, the roots of which are said to be more slender than that of *G. lutea*, the size of which is given as longer than 6 decimetres, and about 4 centimetres thick in the upper portion. Gentian roots should not contain starch. The roots are more correctly described than in the B.P., as transversely annulate in *the upper portion*.

GERANIUM, U.S.P.—A description of the rhizome of *G. maculatum* is now given.

GLYCYRRHIZA, U.S.P.; RADIX LIQUIRITIÆ, P.G.—The root of *G. glabra*, L., only is official in the U.S.P. "The underground stem, which is often present, has the same appearance, but contains a thin pith." In the P.G. the stolons, which have "the pith a little darker, often angular, and the cambial ring distinctly marked," are official; but both roots and stolons of Russian liquorice (*Radix Liquiritiæ mundata*) are official, and should be derived from "*Glycyrrhiza glabra* (*Glycyrrhiza glandulifera*)."

Gossypium, U.S.P.; Gossypium depuratum, P.G. —Absorbent cotton is now official. When thrown upon water it should immediately absorb the latter and sink (U.S.P.), and the water should not acquire either an acid or an alkaline reaction. On combustion it should not leave more than 0·8 (0·6 to 0·8 P.G.) per cent of ash.

Granatum, U.S.P.; Cortex Granati, P.G.—In the U.S.P. the root bark only, but in the P.G. the bark of the stem as well as that of the root is official. Under these circumstances there seems no necessity for giving in the latter the names of lichens found on pomegranate stem bark as a means of distinguishing it from that of the root, especially as *Arthonea astroidea* and *A. punctiformis* are by no means confined to the pomegranate. The stem and root bark almost always occur mixed in commerce, and as they both possess the same properties, and are not easily separated, the recognition of the fact in the P.G. is an advantage.

Grindelia, U.S.P.—The description is sufficiently indefinite to allow the use of *G. squarrosa*, although *G. robusta* is the only official species.

Guaiaci lignum, U.S.P.—The heartwood of *G. sanctum* is now official in addition to that of *G. officinale*, although "guiaci resina" is to be obtained only from the last-named species. Guaiacum wood should be a greenish-brown, containing few particles of a whitish colour, and should acquire a dark blue-green colour on the addition of nitric acid. The water test to ascertain how much alburnum is present is not given.

Hamamelis, U.S.P.—The leaves collected in autumn are official for the preparation of a fluid extract. This will hardly replace the preparations in common use, which are mostly distilled, and appear to contain comparatively little extractive matter.

Humulus, U.S.P.—The strobiles should be about 1¼ in. long, and the scales of a greenish colour.

Hyoscyamus, U.S.P.; Herba Hyoscyami, P.G. —In the U.S.P. the leaves collected from plants of the second year's growth are now official. No test for distinguishing the leaves from those of the first year's growth is given, the size of the leaf, "sometimes ten inches long and four broad," being a not uncommon size for the autumn leaves of the first year's growth of the biennial plant. This character would be almost useless as applied to the broken-up leaves met with in commerce. There are, however, good tests for distinguishing the annual from the biennial plant. See *Pharm. Journ.*, [3], i., 907, 921; and [2], xi., 134. In the P.G. the leaves and flowering stalks are official, the limit of size of the basal leaves being given as 3 decimetres long and 1 broad. The maximum dose of the leaves is 0·3 gram.

Icthyocolla, U.S.P.—The solution in 24 parts of boiling water should form on cooling a transparent jelly.

Illicium, U.S.P.—A warning is given against the use of the very similar but poisonous fruit of *Illicium religiosum*, Siebold. These are to be distinguished by the more woody shrivelled carpels, having a thin, mostly curved beak, a faint clove-like odour, and an unpleasant taste.

Inula, U.S.P.; Radix Helenii, P.G.—The root is official in the U.S.P. in the form of transverse, concave slices or longitudinal sections, and in the P.G. the rhizome and branches of the root. The P.G. observes that *Radix Helenii* does not contain starch, without alluding to its being replaced by inulin. The directions for time of collection are now omitted.

Ipecacuanha, U.S.P.; Radix Ipecacuanhæ, P.G. —The P.G. mentions *Psychotria Ipecacuanha* (*Cephaëlis Ipecacuanha*) as the source of the drug. The aqueous infusion of the root should give a copious amorphous white precipitate with solution of iodohydrargyrate of potassium. Iodine water should give a blue colour to a filtered solution, made by agitating 0·2 gram of the root with 10 grams of hydrochloric acid, and with chloride of lime a colour described as "igneum." Mr. L. R. Power has mentioned (*Pharm. Journ.*, [3], viii., p. 344) as a distinctive test for emetine the production of a *bright orange* or *lemon yellow* colour with chloride of lime, most other alkaloids being found to assume a reddish coloration with the same reagent. It would have been an improvement if directions had been given for using a weighed quantity of the bark separated from the root by bruising it, the stem, which has a very thin bark, being often present in considerable quantity in the commercial article, whereby considerable variation is liable to occur inthe official preparation.

Iridis Rhizoma, P.G., may now be obtained from *Iris Germanica* and *I. pallida*, as well as *I. Florentina*.

Iris versicolor, U.S.P.—Retained from the secondary list; it is official in the preparation of an alcoholic extract and fluid extract, the former of which would appear to be the official representative of irisin or iridin. The activity and acridity are said to be impaired by age (U.S. Dispens., 14th ed., p. 520); but the U.S.P. does not impose any limit as to the age of the root. A description of the root is given in the U.S.P., but is not sufficiently definite to distinguish the rhizome from that of other species which, in this country at least, are sometimes substituted for it.

Jaborandi Folia, P.G.—The leaves should be the produce of *Pilocarpus pennatifolius*, and their size is given as 16 centimetres long by 4 to 7 broad. In the drug market there are two varieties of jaborandi, one of which contains more alkaloid than the other, and is distinguishable by the greater prominence of the veinlets on the upper surface of the leaf, and its firmer consistence, features which may be worthy of notice in future Pharmacopœias.

Jalapa, U.S.P.; Tubera Jalapæ, P.G.—The name *Ipomœa purga* is now adopted by the P.G. while that of *Exogonium purga*, Benth., is retained by the U.S.P. According to the latter 100 parts of jalap should yield not less than 12 parts of resin, of which not over 10 per cent. should be soluble in ether. The P.G. directs that jalap should yield not less than 10 per cent. of resin, easily soluble in spirit, but not in bisulphide of carbon; also that the resin should be soluble in 5 parts of warm solution of caustic ammonia, forming a solution which should not gelatinize on cooling and should remain clear when supersaturated with acid, the residue of the liquid when evaporated being soluble in water.

Juglans, U.S.P.—The bark of *Juglans cinerea*, L. (butternut), should now be collected in autumn, and should be free from soft cork.

Juglandis Folia, P.G.—The leaves of *Juglans regia* (walnut). The date of collection (June) is now omitted; the leaves should not be of a blackish colour.

Kamala, U.S.P., P.G.—The U.S.P. defines this drug as consisting of the glands and hairs from the capsules of *Mallotus Philippinensis*, but the P.G. evidently holds that the powder cannot properly be placed under "Glandulæ" with lupulin, since it is given under the name of "Kamala," and is described as "indumentum fructuum." The U.S.P. gives the percentage of ash as not more than 8 per cent.; the P.G. as not more than 6 per cent. The pure drug, according to 'Pharmacographia,' yields only about 1·37 per cent. of a grey ash. Kamala not unfrequently gives as much as 15 per cent. of ash and has been known to yield 50 per cent. A process directing its purification would therefore be an advantage.

Kino, U.S.P.—The official kino is now restricted to the inspissated juice of *Pterocarpus Marsupium*, Roxb. The inspissated juice of some species of *Eucalyptus* might perhaps yield a more satisfactory tincture (*Pharm. Journ.*, [3], ii., p. 102.

(*To be continued.*)

VEGETABLE ALKALOIDS, AND THE METHODS FOR THEIR SEPARATION.*

BY MATTHEW HAY, M.D., DEMONSTRATOR OF MATERIA MEDICA, UNIVERSITY OF EDINBURGH.

Historical and Introductory.—The alkaloids are among the most important of all the substances of the materia medica, either from a pharmaceutical or from a therapeutical aspect, for it is to their presence that a very large number, and, in many instances, the most valuable, of the natural organic drugs owe their remedial activity. That many plants possessed a highly poisonous action, and that this action when moderated might be utilized in the treatment of disease, has been known from time immemorial; but that the activity of the plant was in the majority of cases confined, and in a highly concentrated form, to a separable alkaloidal constituent of the plant, was not anticipated until shortly after the beginning of the present century, when Sertürner, Derosne and Seguin, working each apart from the other, shared the honour of preparing in a tolerably pure state the main active principle of opium, and to which the name of morphium (Gr. μορφή, *form*,—on account of its crystalline form) was given by Sertürner. Sertürner was an apothecary of Hamelin, and Derosne an apothecary of Paris. It was the former who first clearly recognized the basic or alkaline qualities of the newly found active principle; but, although he observed in his first communication, published in 1806, that the morphium possessed an alkaline reaction, yet it was not until eleven years later, in his classic work, 'Ueber das Morphium, eine neue salzfähige Grundlage, und das Mekonsäure, als Hauptbestandtheile des Opiums," that he could write with perfect confidence as to the morphium possessing the character of a base. For his further examination of it had shown that in addition to possessing a well-marked alkaline reaction it was capable of uniting with acids to form salts. He even hazarded the opinion that in many respects it was closely related to ammonia, an opinion the correctness of which has since been amply verified, not only for morphia but for all other alkaloids.

The discovery of morphia, and the observation that it possessed the action of opium in a highly concentrated form, most naturally suggested to the minds of chemists and physicians the probability of other vegetable drugs besides opium containing an alkaloidal principle, to whose presence the activity of the drug was to be ascribed. The better known of the toxic and medicinal plants were accordingly, one after another, submitted to chemical analysis, and not without much persevering and ingenious labour were their active principles brought to light. The discovery of strychnine, brucine, quinine and cinchonine by Pelletier and his associate Caventou, of narcotine and codeine by Robiquet, of veratrine by Meissner, of caffeine by Runge, of coniine by Giesecke, of atropine by Mein, of nicotine by Reimann and Posselt, and of aconitine and hyoscyamine by Geiger and Hesse, and of several other less important alkaloids, followed in rapid succession within the sixteen years subsequent to the publication of Sertürner's completed work. Since then, almost every year has furnished its quota of separated alkaloids until at the present day their number is beyond being readily computed, and the chemistry of the alkaloids now claims for itself almost a special department in the broad and ever extending domain of organic chemistry. But, numerous as are the alkaloids which have already been separated and the plants that have been analysed for their presence, there yet remain many plants of considerable toxic activity, and presumably of some medicinal value, whose active principles have not yet been determined. Travellers and explorers, but more particularly our colonists, are bringing year after year such plants to our knowledge. And not only in newly discovered drugs is there much room for future chemical research, but even in the very drugs which have been longest known and are most used the labours of the chemist in his search for their active principles have not yet been brought to a close. For earlier investigators have sometimes failed to separate the principles in a perfectly pure state, or in certain cases to recognize that the product obtained was a mixture of various alkaloids, necessitating the separation of the one alkaloid from the other; and in other cases the drug is so rich in alkaloids, as, for example, opium, that chemists are by no means certain, when now and again we hear of the discovery of an additional alkaloid, that all the alkaloids which the drug actually contains have as yet been recognized and separated. It is not by any means Utopian to expect that the time is not far distant when our present organic materia medica, in so far as it consists of substances of highly complex and of very variable and in some instances of unknown composition, will give place to bodies with constant characters and a definite chemical constitution, the nature and extent of whose activity is to be relied upon with the greatest exactitude. We all of us can do a little to help towards the attainment of this most desirable end; and it is because I think that all of you, as chemists, would find it both pleasurable and profitable to be engaged in so laudable a work, that I have chosen in quite a general manner to place before you, for the instruction more particularly of the younger members of your Society, an outline of the processes most commonly employed for the separation of these basic bodies which are destined to occupy a very important position in a pure organic materia medica such as I speak of. This instruction might have been unnecessary, were a description of such methods to be obtained from any of our ordinary text-books, or from other readily accessible works; indeed they are in great part to be met with only in original and separate memoirs.

The method used for the separation of each alkaloid, it is true, is fully stated in most works on materia medica; but the operations required in the one case differ so widely in appearance from those required in the next, that, in the event of your meditating the separation of an unknown alkaloid you are quite at a loss which of the various methods to adopt; and the probability is, even did you select one of the methods given, that it is so specially adapted for the particular alkaloid which it is designed to separate that it may absolutely fail when applied to the drug you are investigating. And here lies the difficulty in the task I have assigned to myself. For to provide you with a method, or methods, absolutely comprehensive in application, is, and probably always will be, practically an impossibility. Some alkaloids are so erratic in their chemical deportment that specially devised methods are

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* Read by request before the North British Branch of the Pharmaceutical Society, Feb. 15, 1883.

necessary for their separation. I have not, however, permitted this consideration to deter me from presenting to you the principles which in all cases should guide us, and from detailing a few of the methods of most general application, in the search for an unknown alkaloid.

CHARACTERS OF ALKALOIDS.—In order that we may clearly understand these general principles and the methods based on them, it is necessary that we first consider the characters of the alkaloids. They are all of them nitrogenous organic bases; and, although the name "alkaloid" is usually applied only to such bases obtainable from plants, yet they do not differ materially from other nitrogenous organic bases which have been artificially prepared in large number during recent years, as ethylamine, aniline, pyridine and picoline; nor from the similarly constituted bodies which are met with in animals, as choline and kreatine, and the recently discovered bases of dead bodies, the so-called ptomaines. Until lately, one distinction between the artificial bases and the natural bases or alkaloids was, that the latter, in addition to possessing a more powerful and more subtle physiological action, were incapable of being prepared artificially. This distinction has failed us since Hugo Schiff, in 1870, prepared coniine synthetically from butylaldehyde, and Schmiedeberg and Harnack, six years later, obtained muscarine by the oxidation of hydroxylentrimethylammonium (neurine), and Ladenburg has all but accomplished the synthesis of atropine. The alkaloids are not, therefore, to be chemically distinguished from other nitrogenous organic bases, although the exact constitution or intra-molecular arrangement is known for only a very few of them. Much work has been done in order to determine the constitution of alkaloids, and the conclusions arrived at all agree in this, that the alkaloids are to be regarded as substitution or other products of ammonia. For our present purpose it is unnecessary to consider more fully their constitution, except to remind you of the elementary fact that, whilst the alkaloids, as a rule, contain oxygen in addition to carbon, hydrogen and nitrogen, yet a very few of them are non-oxygenated. With the exception of the latter, which, until recently, were only three in number, namely, coniine, nicotine and sparteine, but whose number has been extended to four by the discovery of piturine, all the known alkaloids are solid, and, unless under special circumstances, non-volatile bodies. The oxygen-free alkaloids are, on the other hand, volatile liquids, a character, which by enabling us to adopt the method of distillation, renders their separation a matter of easy accomplishment. The solid alkaloids are generally colourless, odourless, bitter to the taste, and, in most cases, crystallizable.

Solvents.—A knowledge of their relation to solvents is of the greatest importance in their separation. With a few exceptions (colchicine, curarine), they are either insoluble or difficultly soluble in water. In alcohol they are almost without exception, and, in most cases, tolerably freely, soluble. Ether is for many alkaloids the most active solvent we possess, but there are others which it hardly at all acts on (cinchonine, morphine, strychnine). Amylic alcohol is a very general and very capable solvent, and so also are chloroform, benzol, acetic ether and petroleum ether, although there are a very few alkaloids which are not acted on by these solvents. In fatty oils they are soluble only to a very small extent, but with the help of oleic acid they can be mixed in nearly every proportion with oils, a fact of pharmaceutical value. The solutions of the alkaloids in the various menstrua have generally a strong alkaline reaction, but in certain cases (*e. g.*, colchicine, narcotine), the reaction is extremely feeble.

Chemical relations.—Besides the action of solvents on the alkaloids, it is not of less importance, before we proceed to undertake the separation of an alkaloid, to know something of the chemical relations of the alkaloids, and more particularly of their behaviour towards acids. They comport themselves very like ammonia in most of their combinations with acids, for being bases they readily unite with acids to form salts; but, unlike ammonia, do not, as a rule, form salts with carbonic acid. If an alkaline carbonate be added to a solution of the salt of an alkaloid, the alkaloid is liberated, and carbonic acid evolved. This fact is of importance, because it enables us, when we so desire it, to set free the alkaloids by means of an alkaline carbonate, instead of employing the alkali itself, which, as in the case of atropia, may decompose the liberated base.

The salts formed with the mineral acids, as with sulphuric, hydrochloric, and nitric acids, and with the more simple of the organic acids, as acetic, tartaric, citric, oxalic, and malic acids, are highly crystalline, and are, as a rule, freely soluble in water, and still more soluble in alcohol. On the contrary, in ether, acetic ether, chloroform, amyl alcohol, benzol, and petroleum ether, they are, for the most part, completely, or almost completely insoluble. In those cases where the alkaloid *e. g.*, quinine) unites with the acid in more than one proportion, the salt containing the highest proportion of acid is, as a rule, much the most soluble. Ammonia and the alkaline bases and the alkaline earths liberate the alkaloid from its combinations with acids, and the alkaloid, if insoluble in water, is precipitated; but this precipitation may be prevented if excess of the alkali be used, as several of the alkaloids (*e. g.*, morphine) are soluble in excess of alkali, whilst all of them, with only one or two exceptions, are soluble in excess of ammonia.

It is of great service in the separation of the alkaloids that they practically, without exception, form insoluble salts with tannic acid, picric acid, the double iodide of potassium and mercury, the double iodide of potassium and cadmium, the double iodide of potassium and bismuth, iodine dissolved in iodide of potassium or in alcohol, phospho-molybdic acid, metawolframic acid, phospho-wolframic acid, and with a mixture of chloride of antimony and phosphoric acid. Further, with the double cyanide of potassium and platinum, with the chlorides of gold, platinum, iridium, palladium, and mercury, and with nitro-prusside of sodium, nearly all the alkaloids form more or less insoluble salts.

Decomposition.—It is important also to remember that the alkaloids are not as a rule very stable bodies, so that when exposed in solution to the sunlight many of them undergo gradual decomposition. Similar and other decompositions of alkaloids are more readily effected if a solution of an alkaloid is boiled for some time or is kept for too long a period at a high temperature, as is apt to occur whilst evaporating the various extracts in the processes sometimes employed for the separation of the alkaloid. Decomposition is still more liable to occur if the alkaloid be heated along with dilute mineral acids, as with hydrochloric acid; and in some instances the decomposition results in the formation of a new alkaloid more or less different in its properties and action from the original alkaloid. Solanidine is such a decomposition product of solanine, ecgonine of cocaine, tropine of atropine or hyoscyamine. In the presence of nitric acid decomposition usually occurs to a still greater extent, resulting often in the formation of reddish resinoid substances. The oxidizing action of nitric acid may exhibit itself in the production of well-characterized oxidation bodies, as cinchonic acid from cinchonine, and nicotic acid from nicotine.

Similarly, if a solution of an alkaloid be heated for some time in the presence of an alkali, the alkaloid is apt to undergo decomposition, forming in many cases methyl-, dimethyl-, and trimethylamine, and bases belonging to the pyridine and chinoline series. A few alkaloids, as atropine, are very readily decomposed in contact with alkalies even without the application of heat, so that in the course of their separation the use of free alkali, and, especially, prolonged contact of the alkaloid with the alkali, is as far as possible to be avoided.

(To be continued.)

The Pharmaceutical Journal.

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THE PHARMACY ACTS AMENDMENT BILL.

THE copious correspondence which we publish this week, on the subject of the Pharmacy Acts Amendment Bill, may fairly be taken as evidence of wholesome interest in the work that has so long engaged the attention of the Society's Council, and the discussions that have taken place at the several meetings reported in the present number also point in the same direction. It would perhaps be expecting too much if we sought in the various comments on the Bill for unqualified and general concurrence with all its details, and, highly as we estimate the importance of eventual agreement as to the fitness of any measure of this kind, we cannot ignore the probability of adverse opinions being formed at the outset in regard to some of the provisions contained in the Bill. The state of pharmacy in this country is still so far from being perfect, and the conditions under which the trade bearing that designation is carried on are so diverse, that these circumstances alone would insure difference of opinion as to details, and if such difference were not expressed the fact would only be indicative of an apathetic feeling in regard to the interests of the business which would be far more deplorable.

But after considering the various criticisms passed on certain clauses of the Bill there seem to be scarcely any which are radically antagonistic to the measure as a whole, while many of the objections that are apparently most cogent rest on misconception of the objects and intentions of its framers or upon misinterpretation of the scope and bearing of particular clauses. Under these circumstances, therefore, we may reasonably anticipate that when these misconceptions are corrected, and when the contemplated operation of the Bill shall be more thoroughly appreciated, there will be a very general concurrence of opinion that, if it does not secure all that might be desired, it is at least a measure which adapts itself to existing conditions, and provides as far as practicable for that advancement of pharmacy which it has always been the aim of the Pharmaceutical Society to promote.

It would be impossible within the limits of a single article to deal with all the points referred to in the discussion of the Bill by our correspondents, and we shall, therefore, on the present occasion confine our remarks to some general considerations respecting the circumstances which gave rise to the drawing up of the Bill, the extent to which there is a probability of obtaining an amendment of the law relating to pharmacy, and the expediency of conceding individual opinion for the sake of obtaining some modicum of improvement in the present position of affairs.

In the first place we will refer to the objections which have been raised to clause 2, objections which have found expression not only from members of the trade but also from some of those who took part in the framing of the Bill. It will be in the recollection of our readers that some months ago the Council of the Society submitted to the Privy Council a recommendation that certain articles should be added to the schedule of poisons and sold only in conformity with the provisions of the existing Act as regards the sale of poisons. It will also be remembered that the Privy Council refused to endorse this recommendation and that as a result of subsequent communications upon the subject the Council of the Society was requested to prepare and submit a Draft Bill for the amendment of the Pharmacy Acts. This request, while furnishing an opportunity for seeking that amendment of the law which has been so long felt necessary, was, however, associated with the proviso that the Council should, in the interests of the public, devise safeguards applicable to the sale of certain articles without interference with general trade, such as it was considered by the Privy Council would result from the addition of those articles to the Poison Schedule of the existing Act. It was simply upon this point and the restriction of sales of patent medicines containing poison that the Privy Council insisted. It was only in this light, and to this extent, that amendment of the Pharmacy Act presented itself to the consideration of the Privy Council as being desirable, and the Council of the Society, in availing itself of this opportunity for introducing a Bill for the general amendment of the law, was constrained to acquiesce in the conditions thus laid down. It will be seen, therefore, that the requirements on the part of the Government in regard to this matter were precisely such as Mr. HARRISON said he would submit to, when he moved, at the Meeting of the Executive Committee of the Trade Association, that clause 2 should be expunged from the Bill, and we venture to think that this position of the matter might have been perceived if the antecedent circumstances and the previous action of the Council of the Society had been duly considered.

It follows, therefore, from what we have above stated that any objection to clause 2 based upon the assumption that its provisions were independently originated by the Council of the Society falls to the ground, and that this clause must be regarded with tolerance, if not with entire approval, as being the pathway by which the entire Bill was to find its way into the Legislature and furnish opportunity for removing more serious difficulties.

Having so far given an explanation of the *raison d'être* of clause 2 of the Bill, let us consider the objection that its provisions involve a breach of the principle laid down in the preamble of the Pharmacy Act, and upon which the Society has always acted since its origin. With all respect to those who hold this opinion, we look upon the objection to clause 2 on this ground as having a merely sentimental foundation. The principle recited in the preamble to the Pharmacy Act is a good and laudable one, and from the point of view of the Council of the Pharmaceutical Society it—and the means by which it is to be maintained—cannot be too constantly borne in mind; but it would be quixotic to endeavour to enforce that principle at the present time by legislative enactments interfering with general trade and with the convenience of the public, which will certainly be considered by the public itself quite as much as the Legislature will be disposed to consider its safety. We have here practical limitations beyond which it would be imprudent to attempt to enforce consideration for the sound principles of the Pharmaceutical Society.

But we will even go further than this and deal with the precise details to which the provisions of clause 2 relate. We contend that the sale of such articles as are referred to in that clause do not constitute a part of the true business of pharmacy, regarded from that abstract point of view from which it is fitting the Council of the Pharmaceutical Society should regard it. From that point of view it is not admissible that consideration for the safety of the public should be made use of as a pretext for seeking to obtain trade monopoly, and if it be insisted upon at all, as within the province of the Council representing the Society, it must be only for the purpose of imposing such restriction upon general trade as may be evidently conducive to that end. It is, we think, a total mistake to take exception to clause 2 as involving a departure from what we may call the fundamental principle of the Society. The trade in the articles referred to in clause 2 is not to be conceded to persons outside the pharmaceutical body, for they already possess the right to it, and the provisions of the clause simply limit the exercise of that right by imposing restrictions as to the future, which are all that the Government is disposed to sanction.

When the clause of the Bill now referred to is considered in this light, and with regard to the circumstances under which the Bill was proposed, there will be, we think, a great modification of the adverse opinions that have been expressed, and it must moreover be remembered that continued opposition to it might have the effect of seriously damaging the prospect of amending the Pharmacy Act altogether. If it should appear that dissension prevails within the body which seeks to obtain amended legislation, there would be the danger that the Government might confine its attention solely to that portion of the Bill which is considered to affect the interests of the general public and abandon those parts which are more essential to the pharmaceutical body as a bone of contention to be disputed over at its leisure. We trust that no such contingency is in store for the proposed Bill, but that, in accordance with the wishes expressed by many of our correspondents, its really important recommendations as a means of promoting the advance of pharmacy will be recognized so far as to ensure its being passed with the general conviction that it will do something in that direction, if not all that might be desired.

THE VALUE OF ANALYTICAL RESULTS AS INDICATIVE OF THE QUALITY OF POTABLE WATER.

From the very important annual report presented by Dr. Buchanan as Medical Officer to the Local Government Board, which has been issued within the last few days, it appears that among the auxiliary scientific investigations that have been carried on under the superintendence of the Medical Department, is one that was prompted by the observation that on many occasions sanitary authorities and their advisers had shown a tendency to estimate unduly the value of chemical analysis as a means of demonstrating the wholesomeness of drinking waters. The investigation, which was conducted by Dr. Cory, whose report is printed *in extenso* in an an appendix, had for its main object therefore to test the nature of the evidence derivable from chemical analysis, by adding various polluting matters, to a series of samples of known waters and submitting them, together with samples of the original waters, to experts for chemical examination. In a large number of the experiments the polluting material used consisted of the stools of enteric fever patients, this disease having manifested a special faculty of spreading by means of drinking water, and Dr. Buchanan selects these for the purposes of his report as conveniently showing some of the results obtained in the investigation. In the first place, as might have been expected, it was found that the customary methods of chemical analysis do not furnish any evidence to distinguish enteric fever pollution from any other form of excremental pollution, and, indeed, up to the present time chemistry fails to give any indication which will help in deciding whether such pollutions have had their source in a healthy or a diseased body. This remark applies equally to the permanganate test, and the "albumenoid ammonia" and the "combustion" processes, all of which were used. But Dr. Buchanan restricts his comments to the results obtained by the "process which is most "popularly trusted for the recognition of animal "impurity, the amount of albumenoid ammonia "yielded by the water." A water was purposely polluted with enteric fever stool in the proportion of one grain to a gallon, and after the coarser particles had been allowed to deposit, the water was decanted and sent to Dr. DUPRÉ for analysis. Dr. DUPRÉ'S analyses showed that the resulting increment of albumenoid ammonia amounted in an average of experiments to only one-thousandth part of a grain in a gallon, or fourteen thousandths of a part per million parts. Another sample of water was purposely polluted with 3·5 grains of fever stool to the gallon and sent, with a sample of the original water, to Mr. WANKLYN, who found the yield of albumenoid ammonia to have been increased in the proportion of twenty thousandths of a part per million parts for the entire 3·5 grains, or fifty-seven ten thousandths of a part per million parts for each grain of the contaminating stool added to the gallon of water.

Of course some scepticism may be felt as to the possible influence of so minute a contamination as one grain in a gallon of water, and Dr. BUCHANAN quotes, as bearing upon this point, some figures, which though evidently liable to be affected in their meaning by many possible contingencies, have a certain value in the absence of more precise data. In an outbreak of enteric fever at Caterham, in the year 1880, nearly two hundred of the earlier attacks were traced to the use, during a fortnight, of water that had been pumped from a well in which a man had been at work while suffering from enteric fever. During this particular fortnight as much as 1,861,000 gallons of water was pumped from the well, and to have infected this quantity of water to the extent of one grain per gallon would have required the addition of 19 lbs. of excremental matter to each day's supply. Of course under the conditions stated this would have been impossible, while on the other hand, it would not follow, and indeed it is not likely, that the pollution was equally diffused throughout the whole of the water. But Dr. BUCHANAN considers the evidence is sufficient to show that one grain in the gallon is a very large amount of polluting matter to be present in a gallon of water, and one that is not likely to have been exceeded in the particular samples of Caterham water that did actually produce disease in the individuals who drank it. Since, therefore, the chemical evidence of this dangerous proportion of pollution is expressed in terms of albumenoid ammonia as low as ·014 part per million parts of water, Dr. BUCHANAN is of opinion that it is not permissible to accept the doctrines that have been formulated as to the significance of a particular amount of albumenoid ammonia present in an otherwise unknown water. With an evident reference to Mr. WANKLYN'S classification of waters, he remarks that polluting matter potent for harm might be present in a water "yielding from 0·0 up to 0·05 parts of albumenoid ammonia per million" without removing it from the rank of waters of "extraordinary organic purity;" and he denies that there is evidence that an unknown water showing from 0·05 to 0·10 parts of albumenoid ammonia per million may be assumed to be "safe organically."

The lesson which Dr. BUCHANAN believes to be taught afresh and significantly by this investigation is that whilst it is desirable to be ever on the watch for any indications that chemistry may afford of the access of contaminations to drinking waters, it is at present necessary to go beyond the laboratory for evidence that any water is free from dangerous organic pollution. In the words of Dr. BUCHANAN, "Unless the chemist is well acquainted with the "origin and liabilities of the water he is examining, "he is not justified in speaking of a water as 'safe' "or 'wholesome,' if it contains any trace whatever of "organic matter; hardly, indeed, even if it contain "absolutely none of such matter appreciable by his "very delicate methods. The chemist can, in brief, "tell us of impurity and hazard, but not of purity "and safety."

An Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, at half-past eight o'clock, when a paper will be read, on "Uranium Oleate," by Mr. Walter Gibbons, and another on "Liquid Extract of Cinchona, with Data illustrating the Results obtained in its Preparation by the Process of the British Pharmacopœia," by Dr. B. H. Paul. There will also be a Note read descriptive of an important series of Cinchona specimens recently received by the Pharmaceutical Society from the Government Plantations, Jamaica.

* * *

The next meeting of the Chemists' Assistants' Association will be held on Tuesday, the 6th inst., when a paper on "Photography" will be read by Mr. C. F. Wyatt.

* * *

A meeting of the School of Pharmacy Students' Association will be held on Thursday, March 8, at 8.30 p.m., when a "Note on Dried Alum" will be read by Mr. E. Baily, and a Report on "Two New Methods for the Separation of Cadmium and Copper" will be made by Mr. C. Thompson. There will also be a Report upon "Inorganic Chemistry," made by Mr. F. W. Short.

* * *

At a meeting of the House Committee and Medical Council of the London Hospital last week a resolution was passed declaring that it was expedient that a suitable resident college for students should be established in connection with the hospital, and a Committee was appointed to consider and report on the best method for giving effect to the resolution.

* * *

Arkansas is now to add another to the numerous organizations of pharmacists already in existence in the United States. At a recent meeting it was decided to form a pharmaceutical association for the State, the head quarters being fixed at Little Rock.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

February 21, 22 *and* 23, 1883.

Present on each day—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Corder, Ekin, Fletcher, Gale, Greenish, Linford, Plowman, Southall, Tanner, Taylor and Thresh.

MAJOR EXAMINATION.

21*st.*—*Three* candidates were examined. *One* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Ball, Henry ....Southport.
Dangerfield, William Henry ...Devizes.

22*nd.*—*Four* candidates were examined. *Three* failed. The undermentioned passed, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Deeks, William Thomas ....Shanklin.

23*rd.*—*Four* candidates were examined. *Two* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Prosser, Frank Henry ....Birmingham.
Wilson, Joseph.....................Chislehurst.

MINOR EXAMINATION.

21*st.*—*Twenty-nine* candidates were examined. *Twenty two* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Barlow, Arthur.....................Hull.
Boyden, John Augustus C.......Wisbeach.
Caffyn, Ernest John ....Crawley.
Capper, Fred. William Noad ...Tetbury.
Ensor, John Thomas ....Birmingham.
Foster, Henry Simpson ....Rotherham.
Gill, Reginald ....Yeovil.

22*nd.*—*Twenty-seven* candidates were examined. *Nineteen* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Davies, William ....Newcastle Emlyn.
Hadfield, James Havelock......Manchester.
Heyes, Thomas Harry............Bolton.
Laverty, Joshua ... .Jersey.
Lockyer, Joseph Ernest ....Deptford.
Marten, John Reed ....Brighton.
Mason, Hubert Huxley ....Clevedon.
Smith, Harry James ....Speenhamland.

23*rd.*—*Twenty-eight* candidates were examined. *Fifteen* failed. The undermentioned *thirteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Corder, Edward ....Norwich.
Passmore, Arthur Bradshaw ...Bristol.
Ranken, Charles ... .Sunderland.
Rees, David ....Newcastle Emlyn.
Robinson, Richard Fredk. Wm.Manchester.
Rye, Frank ....Northampton.
Sewell, Edward Ernest ....Whitby.
Stacey, Frederick Charles ......London.
Thomas, Daniel Griffith ....Cardigan.
Thompson, Frederic...............Scarborough.
Tilley, Joseph ....Chelmsford.
Wall, Edward John................Peckham.
Woolliscroft, Henry...............Wrexham.

PRELIMINARY EXAMINATION.

The following certificates were received in lieu of the Society's Preliminary examination:—

Certificate of the College of Preceptors.

Widgery, John.......................South Molton.

Certificates of the University of Cambridge.

Day, John Thomas ....London.
Griffith, Martin Luther ....Weston-super-Mare.
Harrison, George William ......Reading.
Payne, William ....Wendover.
Sloan, William G. ....Barking.
Spyer, George Nathan............London.
Thompson, Herbert ....Manchester.

Certificate of the University of Oxford.

Dorning, Herbert Rigby.........Chorley.

Provincial Transactions.

CHEMISTS AND DRUGGISTS' TRADE ASSOCIATION OF GREAT BRITAIN.

A meeting of the Executive Committee was held at the office of the Association, 23, Burlington Chambers, New Street, Birmingham, on February 19, 1883, at 12·45 p.m. Mr. Robert Hampson (London), President, in the chair. Mr. John Harrison (Sunderland), Vice-President.

Present—Messrs. Andrews (London), Arblaster (Birmingham), Barclay (Birmingham), Bell (Hull), Churchill (Birmingham), Cross (Shrewsbury), Davis (Leamington), Jervis (Sheffield), Jones (Llanrwst), Laird (Edinburgh), Mason (Liverpool), Parker (Nottingham), Paterson (Aberdeen), and the Solicitor of the Association.

The minutes of the previous meeting of the Executive were read and confirmed.

The report of the Law and Parliamentary Committee was then read. The report stated that the Committee had considered the case of a member of the Association, residing at Longton, who had been summoned under the Sale of Food and Drugs Act for having sold lime water alleged to be not of the nature, substance, and quality of the article demanded by the purchaser. The Secretary had investigated the case on the spot and explained the means by which the lime water was made, and other facts incidental to the sale of the same. A sealed sample of the lime water left by the inspector with the defendant had been analysed by the Analytical Referee of the Association, who had reported that he found that 10 fluid ounces contained 2 grains of lime, whereas the same quantity of the official B.P. lime water should contain 5·6 grains of lime, and that he could not recommend defence. The Committee consequently decided not to defend. The Committee had authorized the Assistant Secretary to investigate several cases of illegal trading in poisonous sheep dips in Scotland when the sheep dipping season again commenced. The appointment of Local Secretaries in Scotland had been considered and postponed until the Committee of the Scotch Branch had made recommendations for those posts. The appointment of Local Secretaries for London had been relegated to the London Committee, the President and Mr. Andrews being empowered to take all necessary steps in the matter. The Committee had appointed the members who had been acting as correspondents to the Association in all towns in England and Wales containing six or more chemists, Local Secretaries of the Association. The Committee had considered the advisability of instituting proceedings under the 17th section of the Pharmacy Act against two companies registered under the Limited Liability Companies Acts, and the Assistant Secretary had made purchases of poisons for that purpose, but the Committee had decided to take no further action in the matter at that time. The Committee had passed the following resolution:—"That this Committee, on behalf of the Association, beg to express their deep regret at the loss they have sustained by the death of Mr. Stead, who was a firm supporter and friend of the Association; they likewise desire to record their sympathy with his bereaved family." A considerable amount of the business of the

Association had been conducted by the Sub-Committee appointed by the Law and Parliamentary Committee to deal with urgent cases. A report of the proceedings of that Committee stated that it had held five meetings. It had considered the case of a member of the Association, against whom an action had been brought by a farmer for having sold to him a certain sheep dipping composition, which it was alleged had caused the death of several of his sheep and serious injury to others. The solicitor had expressed as his opinion that the case appeared to raise a question between the two parties themselves, not affecting the trade generally; he considered that the defendant had grounds for defence, but that the Association would not be warranted in undertaking it. The Sub-Committee had consequently decided not to defend. The Sub-Committee had considered the case of a member of the Association against whom proceedings had been taken by the Inspector of Weights and Measures, he having had in his possession certain weights which were found to be below the standard. The defendant stated that the last occasion on which he had received notice to have his weights examined was some two years previous, when he sent them for adjustment; he was quite sure he had not since that time received any notice from the inspector to have his weights examined; had he received such a notice, he would have sent them as usual. It was customary in the locality in which he resided for the inspectors to give notice of their intention to examine weights. The Sub-Committee decided that a grant of a guinea should be made to meet the law costs of the case, in preference to expending a larger sum in ordering their solicitor to watch the case for the Association. The Sub-Committee had considered the case of a member of the Association, who was threatened with an action for damages for having unskilfully and improperly treated the finger of a child in June last, and decided that the solicitor should see the plaintiff's solicitors, make further inquiries in the matter and report to them in due course.

Mr. Paterson said that with reference to the case under the Weights and Measures Act, he thought chemists should see that their weights were examined; he did not think the inspector was bound to see that chemists sent their weights to be examined.

Mr. Barclay said that the inspector had previously given the member notice that on a certain day he, the inspector, would examine the weights of traders residing in the district. He thought it was economical as well as politic on the part of the Sub-Committee to vote a guinea to meet the member's defence, because had it not done so it would have instructed the solicitor to attend the hearing for the purpose of watching the case.

It was moved by Mr. Cross, seconded by Mr. Andrews, and unanimously resolved:—"That the report now read be received, adopted, and entered on the minutes."

The Executive then went into committee to consider the case of a member of the Association, against whom proceedings were threatened for having unskilfully treated the finger of a child who was brought to him with a cut finger. It was eventually resolved:—"That the solicitor be instructed to defend a member of the Association in the event of proceedings being commenced against him for the recovery of damages for having treated a child's finger."

The report of the Finance Committee was then read.

It was moved by Mr. Andrews, seconded by Mr. Davis, and unanimously resolved:—"That the report now read be received, adopted, and entered on the minutes."

The report of the London Committee was then read. The principal portion referred to a meeting of the trade which was held at the Inns of Court Hotel in December last, the proceedings at which have already been reported in this Journal.

It was moved by Mr. Harrison, seconded by Mr. Mason and unanimously resolved:—"That the report now read be received, adopted and entered on the minutes."

It was moved by Mr. Harrison, seconded by Mr. Arblaster and unanimously resolved:—"That the following members be appointed Local Secretaries of the Association for the towns in which they reside, viz., H. Allenby (St. Albans, Herts), W. F. Chave (Hereford), J. C. Cossey (Ipswich), and A. T. Watson (Jarrow).

On the motion of Mr. Barclay, seconded by Mr. Andrews, it was unanimously resolved:—"That Mr. Alfred Wright be appointed Assistant-Secretary to the Association, *vice* Mr. G. R. Templeman."

The Draft Pharmacy Bill.

The Executive then proceeded to consider the Pharmacy Act Amendment Bill, 1883.

On the suggestion of the President it was decided to consider the Bill clause by clause.

In reply to a question from Mr. Paterson, the Secretary said the Bill made a clear distinction between scheduled poisons of the existing Pharmacy Act and certain poisonous articles to be scheduled under the amended Act.

The preamble was read and agreed to.

Clause 1 was then read.

The Solicitor said he thought it required enlarging.

The President said he thought the members should consider the principle rather than the phraseology of the Bill, which had been drafted by a very eminent authority.

Clause 1 was then agreed to.

Clause 2 was read.

Mr. Harrison said the clause just read provided an entirely new schedule of poisons, or, in the words of the Bill, "poisonous articles;" it also provided for the sale of such articles by persons not registered as chemists and druggists. It was therefore his intention to propose an amendment, because he believed that the principle enunciated by this clause was diametrically opposed to that laid down in the existing Pharmacy Acts. It had been urged in certain quarters that the sale of these so-called poisonous articles should not be restricted to chemists and druggists, because they were articles of daily use and sold in large quantities, but he thought that a poison was none the less poisonous or dangerous to the public because it was sold in considerable quantities. It would appear that a chemist might introduce a poisonous article into commerce and so long as the sale was small the trade alone would be allowed to sell it; but if the sale increased and it became of commercial importance, and consequently of some value to the trade to have the sale restricted to them, then it ceased to be a poison, and became a "poisonous article" and could be sold by anyone. Again it had been urged as a reason for the Pharmaceutical Council proposing to introduce a schedule for so-called "poisonous articles," that if they had not done so the Government would. Now if the Government had made such a proposal he would submit to it; but he would be no party to informing the Government that it might simply allow such poisons to be sold by unqualified persons on being placed in a schedule of so-called poisonous articles. The distinction which the Bill proposed to set up between "poisons" and "poisonous articles" was altogether misleading. Oxalic acid was to be treated as a poison, and could be sold by qualified persons only. Sulphuric acid, which was a stronger poison, was to be treated as a "poisonous article," and might be sold by unqualified persons. He therefore moved:—"That in the opinion of this Committee the principle laid down in clause 2 of the Pharmacy Acts Amendment Bill is so entirely contrary to the principle recited in the preamble of the Pharmacy Act, 1868, of which this Bill claims to be an amendment, that it recommends the Council of the Pharmaceutical Society to expunge the clause and schedule relating thereto from the draft copy proposed to be submitted to the Privy Council."

Mr. Cross, in seconding the amendment, said that he thought the introduction of the third schedule of so-called "poisonous articles," which might be sold by unqualified persons, would be decidedly disadvantageous to the safety of the public and the interests of the trade.

Mr. Barclay proposed as a further amendment:—"That the articles in the special schedule, referred to in clause 2, be added to part 2 of schedule A to the Pharmacy Act, 1868."

Mr. Harrison said he would, with the permission of his seconder, readily accept Mr. Barclay's suggestion, adding words to his own amendment.

Mr. Cross consented to this arrangement.

Mr. Andrews said that some time ago the Pharmaceutical Council asked the Privy Council to add the articles contained in the special schedule under consideration to the poison schedule in the existing Act, and that it positively refused to do so.

Mr. Paterson said he thought the Pharmaceutical Council should give the trade some notice of its intention to approach the Privy Council, so that chemists might, if they thought proper, object to the proposal about to be made by the Pharmaceutical Council.

Mr. Churchill said he considered it would have been more satisfactory to the trade if the strong acids, etc., under discussion could be placed in the schedule to the existing Act. That course, however, as Mr. Andrews had stated, had been suggested to the Privy Council some months since, but the Privy Council declined to do anything of the kind, and he did not think the House of Commons would be likely to take a contrary view of the matter.

The President said that having had an opportunity of considering the matter under discussion from various points of view, he thought it desirable to support the clause, although it appeared to be an infraction of a just principle as laid down in the Pharmacy Act of 1868. It must be remembered that that Act was but a compromise: there was a flaw in every Act of Parliament, and he thought it would be to the interest of both the public and the trade to accept clause 2 of the proposed Bill as a compromise in the present position. He did not think there was any chance whatever of either Parliament or the Privy Council adopting the proposal contained in the amendment.

Mr. Arblaster moved as a further amendment:—"That clause 2 and the schedule referred to therein be expunged from the Bill."

This amendment was not seconded.

The following amendment was then put to the meeting by the President:—"That in the opinion of this Committee the principle laid down in clause 2 of the Pharmacy Acts Amendment Bill is so entirely contrary to the principle recited in the preamble of the Pharmacy Act, 1868, of which this Bill claims to be an amendment, that it recommends the Council of the Pharmaceutical Society to expunge the clause and schedule relating thereto from the draft copy proposed to be submitted to the Privy Council, and that the articles in the special schedule, referred to in clause 2, be added to part 2 of schedule A to the Pharmacy Act."

Seven voted for and 5 against the amendment. It was then put as a substantive resolution and carried.

Clause 3 was then read and agreed to.

Clause 4 was then read.

Mr. Harrison moved as an amendment:—"That the word 'and' should be inserted after the word 'contained' in the 28th line, and the words 'the name of the poison contained therein' after the word 'medicine' in the 31st line."

Mr. Mason seconded the amendment.

Mr. Paterson moved as a further amendment:—"That on and after January 1, 1885, every person manufacturing a patent medicine shall lodge with the distributor of stamps in the town or district where such patent medicine is manufactured, the name, or names, and addresses of the proprietors or of such person as shall have acquired the proprietary right in the medicine and shall cause the same to be printed on the label or wrapper of the medicine, and such persons shall be held to be liable directly and immediately for any fine that may be exigible for any infringement of the Pharmacy Acts. And in the case of foreign patent medicines it shall not be lawful to sell them until an agent shall be appointed who will accept responsibility and whose name is printed on the label in case of any infringement of the Pharmacy Act."

Mr. Laird, in seconding the amendment, said that if clause 4 of the Bill were accepted, it would involve the principle of selling poisons under the guise of patent medicines. He would accept no responsibility whatever in respect to the patent medicine question.

Mr. Paterson's amendment was then put to the meeting and lost; 2 voting for, and 8 against it.

Mr. Harrison's amendment was then put and carried.

Clauses 5, 6, and 7, were read and agreed to.

Clause 8 was then read.

Mr. Paterson moved—"That this clause be deleted." He said the Aberdeen chemists objected to being compelled to have qualified assistants, unless they were to be made responsible for the conduct of the business. It was going too far, unless the qualified man was made responsible for his own mistakes and the master relieved of responsibility.

The President said the proprietors were always the responsible persons.

The amendment was not seconded. The clause was then agree to.

Clause 9 was then read, upon which the following amendment was moved by Mr. Barclay, seconded by Mr. Harrison and carried:—"That the following words be inserted at end of the clause, viz.:—'Notwithstanding the provisions of section 16 of the Pharmacy Act, 1868, or of this Act, it shall not be lawful for any executors, administrators or trustees of a deceased pharmaceutical chemist or chemist and druggist to continue the business of such pharmaceutical chemist or chemist and druggist for a longer period than three years, unless by permission of the Council of the Pharmaceutical Society of Great Britain.'"

Clauses 10 and 11 were then read and agreed to.

Clause 12 was then read.

Mr. Paterson said it was desirable that an opportunity should be given to students and apprentices to pass their examinations as near their residences as possible. Considering that the Privy Council gave grants in aid of technical education, an effort should be made to induce them to give similar grants for special pharmaceutical education. Where schools were established and examinations held, the Pharmaceutical Society should accept the first-class certificates as sufficient evidence of the proficiency of such candidates in the branch of education for which they had obtained the certificate. The Pharmaceutical Society ought, he maintained, to examine in pharmacy and dispensing once a year at the various centres throughout the country where technical schools were established, providing a sufficient number of persons came forward for examination. He therefore moved:—"That this clause be erased from the Bill."

The amendment was seconded by Mr. Laird, and on being put to the meeting, 2 voted for and 8 against it. The clause was consequently agreed to.

Clause 13 was then read.

Mr. Paterson said that although he thought that there were few chemists who took apprentices who were not capable of passing the Preliminary examination, yet he thought it was very undesirable that they should be compelled, under the penalty of a fine, not to take an apprentice unless he has passed. He moved:—"That clause 13 be deleted from the Bill."

The amendment was seconded by Mr. Davis, and on being put to the meeting, 3 voted for and 8 against it.

The clause was consequently agreed to.

Clauses 14 and 15 were read, and amendments moved by Mr. Paterson to both, which not being seconded, the clauses were agreed to.

Clauses 16, 17, 18, 19, 20, 21, 22 and 23, were then read and agreed to.

It was moved by Mr. Harrison, seconded by Mr. Jones, and resolved, that a clause to the following effect be inserted in the Bill:—"Every person registered, or who shall be registered under the provisions of the Pharmacy Act, 1852, or of the Pharmacy Act, 1868, as a chemist and druggist, and who shall be in business on his own account, shall be exempt from serving on all juries and inquests whatsoever."

It was moved by Mr. Andrews, seconded by Mr. Mason, and resolved:—"That the officers of the Association, together with Messrs. Barclay, Jones, Mason and Paterson, be appointed a Committee to take such steps as they may deem desirable to carry out the wishes of the Executive in amending the Pharmacy Acts Amendment Bill, 1883."

It was moved by the President, seconded by Mr. Jervis, and unanimously resolved:—"That the seventh annual general meeting of the members of the Association be held in London, on Tuesday, May 22 next, and that the arrangements for the same be left in the hands of the London Committee."

It was decided to report to the Pharmaceutical Council particulars of several cases of illegal trading in which the Assistant-Secretary of the Association had collected evidence of infringements of the 15th section of the Pharmacy Act, the Association not having power to sue under that section.

THE PHARMACY ACT AMENDMENT BILL. MEETING OF CHEMISTS AND DRUGGISTS IN EDINBURGH.

A meeting of the chemists and druggists of Edinburgh and neighbourhood was held on Thursday evening, February 22, to consider the Pharmacy Act Amendment Bill. There was a large attendance. Mr. J. R. Young was requested to preside and Mr. P. MacEwan to act as clerk of the meeting.

Mr. Young, having taken the chair, explained the steps which the Council of the Pharmaceutical Society had taken in promoting legislation for the trade. The Council, he remarked, had long been of opinion that the Pharmacy Act, 1868, had not came up to the expectations which had been formed respecting it, and two years ago it had made an endeavour to amend that Act, but owing to the condition of parliamentary affairs at that time, the Council had been unable to get the last draft Bill introduced into the House of Commons. Latterly, however, circumstances favourable to immediate legislation had arisen, and in the drafting of the new Bill the Society had been largely indebted to the efficient Committee of the Council and to the energy of the President of the Society. Regarding the sale of the "poisonous articles" contained in the schedule to this Bill, he remarked, that the Council had endeavoured to get these articles added to Schedule A, Part 2, of the Pharmacy Act, 1868; but the Privy Council was of opinion that this procedure would impose an unnecessary restriction on certain dealers. He thought that the new proposal was the best one that could be made in the circumstances, and he commended it to the favourable consideration of the meeting. He would ask the clerk to read each clause separately, so that an expression of opinion might be had on each principle involved,

On the reading of the preamble, Mr. Young explained, in reply to Mr. Noble and others, that the word "poisonous" was used to distinguish the articles contained in the schedule from "poisons" so called in the Pharmacy Act, 1868; it was not implied, however, that the ordinary poison label could not be used for "poisonous articles."

Clause 1 was read and agreed to without any discussion.

On clause 2 a long discussion took place, in which Messrs. Gilmour, Leitch Mackenzie, Napier, Nesbit, Noble and others took part. Objections to the principle of the clause were freely made; but after explanations had been made by Mr. Young, the clause was agreed to with the reservation, proposed by Mr. Laird and seconded by Mr. Buchanan, "That advertisements mentioned in the clause be inserted in the *Edinburgh* as well as the *London Gazette*."

On clause 3 being read, Mr. Pinkerton asked the Chairman if the record to be kept would require to correspond with that required in sales by retail. Wholesale houses, he remarked, generally had at least three records, namely, the written order of the purchaser, the entry in the day-book and that in the ledger. Either of these might be held to be sufficient evidence of the sale, and he thought that the keeping of a sale of poisons book by wholesale houses would be an unnecessary hardship.

Mr. Raimes, jun., having made similar comment, Mr. Young stated in reply that all that would be required was such a record as would enable the authorities to trace the sale in any criminal case. This would not alter the customs of wholesale houses, further than it would ensure that cash sales by wholesale should be properly recorded. The clause was agreed to.

Considerable discussion took place on clause 4, particularly regarding the size of the type in which the word "poison" should be printed. No amendment was, however, proposed, and the clause with the one following it were agreed to.

When clause 6 was read, Mr. Mackenzie said that he entirely disagreed with it, because it would impose a great hardship on the retailer, involving him in undesirable litigation. He, therefore, moved as an amendment "That the party to be prosecuted be the maker and not the retailer of the patent medicine."

Mr. Billing seconded the amendment.

Mr. Nesbit moved and Mr. McLaren seconded that the clause be agreed to. After a long discussion a vote was taken, when it was found that Mr. Nesbit's motion was carried.

Clauses 7 and 8 were agreed to, and on clauses 9 and 10 being read, Mr. Mackenzie moved, "That medical practitioners should not be allowed to keep open shop unless they passed the qualifying examination of the Pharmaceutical Society." The motion not being seconded the clauses were agreed to, as were also the two clauses following.

Clauses 13 and 14 having been read, Mr. Young said that clause 13 would ensure that persons entering the trade had a proper education, while the three years' pupilage necessary for the qualifying examination would thus require to be served subsequent to registration as apprentice or student.

Mr. Mackenzie objected to the principle of the clause and held that it was inapplicable to Scotland and unjust to employers. He therefore moved "That clause 13 should stop short of the penalty provision." Mr. Leitch seconded.

Mr. Stephenson argued strongly for the insertion of the clause, which he said was framed entirely in the interests of apprentices, and would not at all militate against the interests of employers. He felt that the framers of the Bill were conferring a benefit on the trade by ensuring that persons entering it had a proper elementary education. He accordingly moved "That the support of the meeting be given to the clause." Mr. McLaren seconded.

On being put to the vote it was found that Mr. Stephenson's motion was carried by a very large majority.

The remaining clauses of the Bill were afterwards discussed and unanimously agreed to.

Subsequently a long discussion took place regarding exemption of chemists and druggists from service on juries and after the sense of the meeting had been determined, the following resolution was moved by Mr

Stephenson and unanimously agreed to:—"Resolved that this meeting give its cordial support to the Pharmacy Acts Amendment Bill as approved by the Council of the Pharmaceutical Society, but suggests to that Council that the advertisements referred to in clause 2 o e Bill should be inserted in the *Edinburgh* a well n the *London Gazette*."

Mr. Napier then opened a discussion on the exemption of chemists and druggists from jury service, and after many of those present had spoken on the subject, it appeared that the opinion was unanimous in favour of the extension of the present exemption to all persons qualified under the Pharmacy Acts and who are carrying on business.

Mr. Buchanan then moved a vote of thanks to Mr. Young for presiding and for so ably explaining the several points which had been under discussion. The motion being heartily responded to, the meeting separated.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The annual supper of this Association was held in the Alexandra Hotel, 148, Bath Street, on Wednesday evening, January 24, when about seventy gentlemen sat down to supper. Mr. Robert McAdam, of the Glasgow Apothecaries' Company, occupied the chair.

Mr. J. R. Young, in giving the toast of the evening, "The Glasgow Chemists and Druggists' Association," said that the duty could hardly have fallen into more incompetent hands, for he was altogether ignorant of the history of the Society. He had, it was true, received from the Secretary a copy of the constitution, but that document was without date, and he was left to infer that the institution might date back to the time of Melchisedec, and might be intended to last for all time. From that constitution he found that one of the objects of the Society was to promote, by lectures, essays and debates, the attainment of the abridgment of the hours of labour. If that was meant to be a continuous process, he supposed that by-and-by the profession of a druggist would mean all play and no work. Speaking without the book, however, and drawing on his own personal knowledge, he knew their society was doing a great deal of good, and its efficiency was due in no small measure to the many excellent men who had, within the last thirty or forty years, filled the President's chair. It was quite right and proper that a society such as this should exist in a city like Glasgow, and there was plenty of work for it to do. They had most exceptional facilities here for the acquirement of a knowledge of chemistry, and he had often been struck by the number of young men he had met hailing from the West of Scotland, who, though they had no connection with pharmacy, had still a very useful knowledge of the science of chemistry. Such an acquaintance was of the utmost service to any young man, for it developed in him a healthy curiosity to know as much as he could about most things, and he had no doubt that such attainment had contributed in no small degree to the accumulation of the great wealth which was in Glasgow. Mr. Young then gave a few words of advice to the younger members of the Association, and asked the company to drink the toast with all the honours, coupling it with the name of Mr. Alexander Kinninmont.

The toast was most enthusiastically pledged.

Mr. Kinninmont, in replying, gave a most interesting historical sketch of the Association and the good work it had done, and pointed out that it had still much to do. He earnestly appealed to those present to join together in keeping the Association in a thorough state of organization.

Mr. John Currie (Eglinton Street) proposed "The Medical Profession" in a felicitous speech, and coupled the toast with the name of Dr. A. M. Robertson, who replied, thanking the company for the manner in which the toast had been received.

Mr. John Walker (Glasgow Apothecaries' Company) proposed "The Pharmaceutical Society," to which toast Mr. Alexander Napier, President of the North British Branch, replied.

Mr. David Lees gave "The Edinburgh Chemists' Assistants' Association," coupling it with the name of Mr. Boa.

Mr. J. L. Hatrick, in proposing "The Visitors," gave them a hearty welcome in name of the Association, and coupled the toast with the name of Mr. Borland, of Kilmarnock, who, in reply, likewise expressed the pleasure he had in being present on such an occasion.

Mr. A. Paterson, in a few remarks, proposed "The Chairman," whose health was drunk with acclamation.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The usual monthly meeting of this Association was held at the Mechanics' Institute, on Tuesday, February 20, the President, Mr. R. Fitzhugh, F.C.S., in the chair. There was a good attendance.

Mr. F. H. Spenser was the lecturer for the evening and gave an interesting lecture upon the "Sun and Earth." He commenced by giving a brief description of the Ptolemaic theory, pointing out that although Pythagoras and other Greek philosophers had expounded more correct notions, it was not until the teaching of Copernicus in the 15th century that the present system was thoroughly recognized. The Copernican system was explained and the planets briefly described. The enormous size of the sun, the source of our light and heat, rendered him a suitable centre of the system, his weight being 750 times that of all the planets together, his diameter one hundred times greater than the diameter of the earth, and a train running at the rate of forty miles an hour would take seven years to perform a journey round him. Supposing a ball six feet in diameter were taken to represent the sun, a pea would suitably represent the earth. He rotated on his axis in about twenty-five and a quarter of our days. The spots on the disc found in bands on either side of his equator were mentioned and the probable eleven-yearly changes pointed out. Bode's and Kepler's laws were explained, and the lecturer showed how the investigation of the latter led to the discovery of most important scientific truths by Sir I. Newton. A brief, but clear account of the Newtonian theory and the nebular hypothesis was given, showing their strong points and failings. The excentricity of the earth's orbit, the change extending over a period of 25,868 years, was mentioned. How celestial distances could be measured was explained and the methods by which the sun's distance had been determined shown. In conclusion, the lecturer remarked that our solar system does but form one star in the host of heaven, and that the universe is governed by laws so far-seeing and perfect that we must admit with the Psalmist "the heavens declare the glory of God and the firmament showeth His handiwork."

A hearty vote of thanks was accorded to Mr. Spenser on the proposition of Mr. Fitzhugh, seconded by Mr. Wilford.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of this Association was held on Tuesday, February 6, the President, Mr. W. A. Wrenn, in the chair. A paper was read by Mr. W. Temple Cooper, jun., entitled "Practical Hints on the Examination of Urine."

The author began by alluding to the importance of the subject which formed the title of his paper, and gave it as an example of the uses to which the work of a student, when preparing for examination, could, in after life, be applied. Reference was made to urine in its normal state, its appearance, colour, sp. gr. and composition per thousand parts, and the fermentation it undergoes with the production of ammoniacal compounds when allowed to stand. The chief normal constituents, organic and inorganic, were mentioned and described, amongst which were urea, uric acid, hippuric acid, creatine, creatinine, phosphates, chlorides, etc., in combination with magnesium, calcium and sodium, etc., and specimens were shown of the organic portion.

Methods for estimating urea by Dr. Russell and Mr. West, by Dupré, and others, were cited, the two former being practically demonstrated before the audience. The apparatus for the first method was kindly lent by Messrs. Cetti, Brook Street, Holborn.

Of abnormal constituents the author mentioned albumen and its tests; special reference being made to nitric acid, metaphosphoric acid and ferrocyanide of potassium in conjunction with acetic or citric acids (this forming a very delicate test).

Sugar and its qualitative and quantitative tests were described; of the former, potassic hydrate (Moore's), molybdate of ammonium with nitric acid, nitrate of silver and the fermentation process were spoken of; and of the latter Fehling's method, as recommended by Dr. Pavy, which was specially dealt with, and specimens of the reagents, both before and after the addition of the saccharine urine, were shown. The method consists in the use of the following solution:—The usual quantities of cupric sulphate, Rochelle salt and sodic hydrate per litre are taken, and of the above Fehling's solution 120 c.c. are added to—

Strong solution of ammonia (sp. gr. ·880) .	300 c.c.
Solution of sodic hydrate (sp. gr. 1·14) . .	400 c.c.
Distilled water	to 1 litre.

100 c.c. of this solution = ·05 glucose.

The ammonia prevents the precipitation of the well-known red-coloured cuprous oxide, the mixture being kept at a boiling temperature, while the urine is gradually run in until the blue colour disappears.

Amongst the precautions to be observed in the application of this test are—

(1). To use right proportions of the test reagents.

(2). To use a correctly standardized copper solution.

(3). To operate quickly; as the blue colour returns when oxygen is absorbed.

(4) To maintain ebullition from beginning to end of experiment.

(5) And performing the experiment in a flask having a cork with two glass tubes, one to emit steam and ammonia, and the other connected with the burette containing the urine to be examined by means of india-rubber tubing, dilution of urine, 1 in 10, rendering reaction more delicate.

A gravimetric method was also described, which consists of solution of the cuprous oxide in hydrochloric acid, addition of solution of ammonia in excess, and precipitation of metallic silver on addition of nitrate of silver, which is estimated as metal, 509·6 grams of which have been proved by experiment to be equivalent to 100 grams of glucose.

For the examination of bile, another abnormal constituent, the author recommended a modification of the one given in the B.P. for oleum morrhuæ.

For blood in urine, the special characters of urine thus contaminated were described, the methods adopted being microscopic and Day's tests.

The cause of urinary sediments was described, and methods given for the examination of them chemically and microscopically. A chart was shown, on which were drawn the commoner kinds of sediments, illustrating their microscopic shape and character.

In conclusion, the author alluded to such substances as rhubarb, gamboge, logwood, etc., the colouring matters of which were imparted to urine when patients were taking these medicines.

A lively discussion followed, in which the President, Messrs. Alcock, Dangerfield, Park, Parkinson, Roper, Woods and Millhouse took part.

A vote of thanks, proposed by Mr. Parkinson and seconded by Mr. Townsend, was accorded the author for his valuable paper.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Draft Pharmacy Act Amendment Bill.

Sir,—Salvation by Act of Parliament has a limited value, though it may be one difficult to define. I had almost made up my mind to shirk the somewhat hazardous task of expressing an opinion upon the probable benefits of a prospective law; but several friends have suggested that the action of the Council would be strengthened by the expressions of approbation from men of various shades of colour. I am ready to admit that my colour is a very shady one in the eyes of those who look to Acts of Parliament to help them out of pecuniary troubles. It may be that my approbation will attach to itself just that value which commonly belongs to the praise of a fool. If so, my friends are to be thanked.

I do not look for any other object in Government than the general weal; that individual is to suffer for the class, and the class for the community; that poison regulations and Pharmacy Acts should be, and must be, constructed upon such plans as facilitate the public getting their wants supplied with the least cost, the least inconvenience, and the least danger. Happy is the man who has learned that his interests lie in meeting the public requirements, and has learned how to meet those requirements in a way that is advantageous to himself at the same time. The law may compel him to learn the first of these two lessons; his own necessities and his ingenuity must teach the second. If we could clear from our minds the craving for somebody to do something for us, I think we should see that the Bill under consideration is fairly planned for its legitimate work.

It endeavours to provide that dangerous articles should be sold under such regulations as diminish the danger of their sale, and when the restriction is not carried to the point of attaining the greatest possible safety it is because the additional safety would be purchased at the cost of disproportionate inconvenience or pecuniary outlay.

I should rather have seen the dealing in "poisonous" materials limited to the hands of the educated tradesman, who would know the effects of a dose of the poisonous matter he might be selling, and the appropriate remedy to use in case of an accident; but my experience would not allow of my strongly urging this point, seeing that I have been nearly forty years behind the counter and cannot call to mind more than two or three cases when this kind of knowledge has been called into request. So insignificant a protection as my knowledge has in these cases afforded will not weigh with the public against paying 10 per cent. more for their soldering solutions or sheep dip, and when the pharmacist or other educated man does not allow his knowledge to stand in the way of his doing business in fair commercial competition with other tradesmen, the probability is that the "poisonous" goods will as effectually fall into his hands as if Parliament had decreed that no other class of traders should be allowed the privilege of such sales.

In some other points I think the Bill falls short of providing, it may be at the expense of the trader, some points of protection which I think the public might reasonably demand.

Take clause 8, which provides if a man has a branch shop he shall have a qualified assistant there. If a pharmacist in Holborn opens branch shops at Bayswater, Islington and Mile End, how many branches has he? If he has three and keeps a qualified assistant at each, he may be so much taken up with looking after the branches that his root becomes a source of danger, and it may become necessary for the botanical examiner to prove that a root is a branch also, and that a pharmacist who opens three branch shops has four branches. The clause would be improved by striking out the word "branch" before the word "shop" in the sixth line.

In the fourth clause the requirement that a nostrum containing a poison shall be labelled with the name of the patent medicine and the word poison will afford some protection against the careless use of such medicines, but does not afford information on one important point which might in public interest have been reasonably required. That is, that it should bear the name of the poison which it contains, so that in event of an overdose having been taken the medical attendant might know with what poison he had to deal. It is true that most of the poisoning cases occurring through the use of patent medicines have been caused by the presence of opiates of some description, but it is not improbable that the acknowledgment of the presence of the opium or other articles on the poison schedule would be a reasonable requirement.

I think the clauses attempting to fix upon the true proprietors of businesses the responsibilities which rightly belong to them are good in principle and probably advantageous in their results, as much upon the pharmacists as upon the public. They would tend to facilitate the spotting of a transgressor. I see no reason why the President of the Pharmaceutical Society should blush to see his name in print upon his labels, or painted over his shop door in letters as large as "Dinneford." I say this with some feeling and full knowledge of the great amount of inertia that would have to be overcome before we could educate ourselves up to this point, for, however well my name may be known to readers of the *Pharmaceutical Journal*, I am best known in my own town as W. Proctor and Son.

Now, having spoken my approbation of some clauses and my partial approbation of others, I have only to add my hope that the trade may have unity enough to sink little differences and support any measure which moves them one step in advance.

11, *Grey Street, Newcastle.* BARNARD S. PROCTOR.

Sir,—Actively engaged as I was with my fellow members of Council in framing the Pharmacy Act of 1868, and promoting its passage through Parliament, you will not be surprised at my watching with much interest the proceedings of each succeeding Council, more especially as to future legislation, and you will, I am sure, grant me space for some remarks on the proposed Pharmacy Bill adopted recently by the Council, and published in the Journal of February 10.

You say that this Bill is the outcome of six years' deliberation. During the earlier portion of that period I sat on the various committees in which the subject was discussed, and remember well the arguments produced for and against certain propositions as they arose.

While I recognize much in the Bill calculated to increase the public safety, and rejoice in the evident desire of my successors in the Council to advance the education and qualification of future pharmacists, I regret to say that I think the means proposed quite inadequate for the former purpose. The public safety is the only plea on which we can go to Parliament with any hope of a favourable response. Now we all know that the trial of Lamson brought vividly before the public the lamentable case with which a man being, or even pretending to be, a medical man could obtain the most deadly poisons, and created a demand for greater restriction on such sales. Clause 3 of the new Bill is evidently intended as an answer to that demand; but how far, I would ask, would it effect the object? It might possibly help in some rare cases to convict a murderer; but it would not prevent murder. I take prevention in this case to be the object demanded, and justly demanded, by the public. Surely Parliament would never be satisfied with so inefficient a provision! Much greater safety may be attained by more precise restrictions, and that without inconvenience to anybody—except would-be murderers! At present a stranger applies to a chemist for (say) aconitine. He writes a prescription in due form—perhaps points to the name of "Dash Blank" on the Medical Register, and says it is his name. The chemist does not know that he is "Dash Blank," or even a medical man at all, still does not like to express a doubt.

I think it would be an advantage to the chemist to have some authoritative reason for refusing the supply. Certainly it would be an advantage to the public. Let it be at once enacted that in all such sales there must be personal knowledge of the applicant, or that he must be introduced to the seller by some person known to both parties. Record of sale and signature to be kept as provided in the present Pharmacy Act. Mind, I am not speaking of the ordinary supply of such articles in the proper course of wholesale dealing, nor would I have on the special list of prohibitions any but the most intense poisons which science has of late eliminated. The prohibition would only extend to what may be called casual cases. I believe I may, in support of my opinion, say that such a proposition has been approved by the College of Physicians.

One other point I must mention on behalf of the public. Clause 8 provides that persons keeping more than one open shop shall employ a qualified assistant in "each branch shop." I think it should be in each shop, leaving no question as to "branch" or principal.

We want to encourage young men to pass our examinations; it would be wise therefore to give them every opportunity of profiting by having done so.

So much for the public. Now I must direct the attention of my brethren in the trade to a most unjust and unnecessary hardship which this Bill will inflict on us. Clause 4 throws the penalty for insufficient labelling of poisonous patent medicines on the retailer. It is very well known that the retailer has no knowledge or power in this matter. He can only sell a patent medicine wrapped up as he buys it; if he open the package he renders it unsaleable. How then can he say whether the bottle is marked "poison"? If it be not, he is liable to a fine of £5 for a first offence, or £10 for a second. It is true that Clause 6 gives him power of recovery from his wholesale dealer, but it is ten to one he will never get it; he may have great difficulty in proving that the particular article on which he was fined was supplied to him by a particular wholesale house. Even if he obtain reimbursement of the money penalty, he will still labour under the stigma of the prosecution. This recovery clause is framed evidently for the multiplication of law-suits; five or six may be carried through before the real offender is reached.

The first action should lie against the proprietor of the medicine, and this would be easy enough.

Again, I will suppose a case in which a retailer is fined £5 for a first offence in selling a bottle of Hunter's Chloral. He offends a second time by selling a bottle of Bunter's Nervine, and is fined £10. Can he recover the £10 from Bunter, who was in no way implicated in the first offence?

Piccadilly. GEORGE W. SANDFORD.

Sir,—At a meeting of our local Association, rather more than two years ago, I read a short paper, giving my opinion as to the direction in which the Pharmacy Act should be amended, and as the amended Bill now before us coincides in many points with the views then expressed, I feel bound to give my tribute of approval to the Council for the care it has taken to bring forward a measure at once reasonable and practicable.

Whatever may be thought of the effect of the Pharmacy Act, 1868, in elevating the status of the druggist, there can be no doubt that the safety of the public is now much better ensured than was the case before it became law, and the amendments proposed, being calculated to assure that safety in still greater degree, should meet with a favourable reception from the public and the Legislature.

It would occupy too much space to comment on every section of the Bill proposed, but perhaps the following brief remarks may be worthy of attention.

Section 2 grapples successfully with a serious difficulty, and as no claim to the exclusive sale of the articles specified is put forward, no charge of attempted monopoly can be made, whilst the danger of accidental poisoning is lessened, as far as is possible, by the use of the "poisonous" label being made imperative.

Section 3 provides for such cases as that of Dr. Lamson, and will ensure the registration of cash sales by wholesale houses.

With respect to section 4 and others concerning patent medicines, I have held that section 17 of the Act of 1868 was applicable to them. As no decision, however, has been given on this point, it is as well to settle the question definitely, as is now done.

The regulation as to branch shops is necessary, and will not infringe on the just rights of anyone, whilst the powers asked for under section 10 will render it easier to find out the real proprietor of a shop, which is at present a matter of some difficulty.

Section 12 and following relate more to the internal constitution of the Society and seem calculated to strengthen it and increase its usefulness.

In conclusion, I consider that the Council has acted wisely in asking for amendments which are really measures conducive to increasing the safety of the public, and in avoiding everything which might have the appearance of grasping at a monopoly.

Let us hope that its efforts will be crowned with success.

Glasgow. ALEX. KINNINMONT.

Sir,—This Bill defines the undefined, and where it departs from the original position taken up by the Pharmaceutical Society I fail to see.

Sharp tools which leave their mark need little legislation, and knives, razors, oil of vitriol, muriatic and nitric acid, chloride of antimony, carbolic acid and pistols belong to the same category. It is far different with the occult poisons scientific resarch has lately given, and will continue to give us, which require skill in their use, discretion to prevent abuse, and registration to detect misuse. Parliament, in the interests of the State, cannot guard these too vigorously; careful thought marks this, the cardinal point of the Bill. Poison and its distribution will be placed in the hands of responsible skilled persons. This done the necessity for legislation ceases; all the other clauses are subsidiary, regulating the machinery in the best possible manner for the time being.

Few of us would care to give the great and sustained attention our Council has given to this matter to steer the pharmaceutical barque safely between the Scylla of trades unionism and the Charybdis of vested interests. I therefore ask my fellow members and chemists generally to look back on the last twenty or thirty years with unprejudiced eye to our business and its prospects in their youth, and see, if they can, the step ladder of progress, for every step is a firm footing. We have not finished, but let us with a firm will and glad hope take this one with confidence, for the future is bright for us; but let each of us remember that the strength of a chain is that of its weakest link, and that of a society to some extent of its weakest member. We must not move too quickly nor ask for too much.

GEORGE MEE.

Sir,—Having carefully watched the progress of pharmaceutical legislation for many years, I cannot, at this point, refrain from raising a jubilant note in praise of the last effort made by the Council to provide something as nearly like a perfect Pharmacy Act as the times and circumstances will permit. I am not so childish as to believe the Act will satisfy all men, but I believe it will be received with approval by a large majority, and that it will go far to meet more than one evil left untouched by the Act now in force.

That the present Act is imperfect everybody admits. It supposes that no life may be endangered except by the most potent poisons, and throws open the right to dispense medicines to the most ignorant so long as those medicines are not included in the existing poison schedule. The new Act, in providing that all persons who dispense prescriptions shall show that they are able and fit to do so, makes a wise provision which will be appreciated by all but the incompetent and unreasonable. If skill is required in the dispensing of a medicine which kills with a dose of 20 minims, precisely the same skill and knowledge are requisite for the dispensing of one which is left untouched by the schedules because it reserves its potency for a larger dose. The dispenser should be responsible, no matter what the medicine may be. In any case his concern with human health and life is equally strict.

I would fain omit allusion to the vexed question of patent medicines, but it is evident enough that the only difference between dispensing a prescription and selling a patent medicine lies in the fact that the dispenser is in one case preparing a medicine of which he, the prescriber, and probably the patient, have an accurate knowledge, while in the other all parties, excepting the proprietor of the patent, are in utter darkness, and may be running their barque on the frowning rocks of death without a warning. Surely a man who dispenses poisons, the strength of which is wrapped in the impenetrable gloom of a private formula, should be one who is responsible in the strongest sense of the word, and it appears to me that the only man who can be so responsible is he who is registered as possessing qualifications for the work he undertakes. Unfortunately, even then, he takes the responsibility without the knowledge the physician imparts on his slip of paper; that, however, he must risk. He is at least one to whom the public may refer to deliver them from the many uncertainties belonging to proprietary physic.

Heaven forbid that I should appear to come between the desolate widow and the means for her subsistence provided by her inheriting the business her husband leaves behind. I think her true interests lie not in trying to carry on a business (even with the aid of a qualified assistant), which in actual practice has so seldom proved a success in the hands of a widow. I take it to be a cruel kindness to encourage it. How many a sad story could I relate of women left stranded by a receding business, which, if disposed of when necessity came, would have made a decent provision for them. Nor must we forget that the Pharmacy Act will be sufficiently like the Medical Act to make it as absurd for an irresponsible widow to carry on the responsibilities of a pharmacy, as for the widow of a surgeon to run the risks and hazards of a medical practice. But this is my opinion only, and I am quite prepared to follow in the steps of the Council by conceding this point in favour of those who hold a different opinion. The wisdom of the Council is shown in straining a point, where no great interests are involved, and where many diverse opinions have to be conciliated.

It is a step in the right direction to put a stumbling block before those who would carry on business at several places under different names. The honest man is provided for, if he please to open a dozen shops, so long as he takes care a qualified man stands behind each counter. The public is protected and the pharmacist obtains his hardly-earned profits. But where it is needed to show who is the responsible man, so that, dispensing physic being a matter of life and death, there shall be no doubt about it, then the Act will provide that this shall be settled once for all, without resort to practices which make it as difficult to identify the owner of a business as to discover that arch-conspirator, "No. 1."

For the education clauses I thank the Council. The system of education should either be entirely "as you like it," or it should be as complete as it can be made without being positively irksome.

The late Jacob Bell, were he to revisit earth, would see in this Bill the realization of more than one of his dearest hopes, and I cannot but think that it affords many a despairing pharmacist a sight of a clear and straight way out of difficulties, which now are a source of danger and discontent.

Liverpool. JOSEPH HALLAWELL.

Sir,—The long-expected Pharmacy Amendment Bill as proposed by the Council of the Pharmaceutical Society has now appeared. Naturally, much criticism of its provisions will reach you. Our immediate private interests colour our views respecting it, but I hope that we shall be able to take an "all-round" view and recognize facts, whether they be pleasant or otherwise. Compromise seems a necessary characteristic of legislation. There as elsewhere, not being able to get all we would like to have, we take what we can get, and concede as little to the other side as we can help without exciting doubts of our own good intentions.

Now, I take it that the Government, and influential persons and associations, were determined upon two things, viz., that dangerous articles should not be sold without the purchaser being informed of their potent nature for evil as well as for all the good that their makers claimed for them. The fact that we sell so many preparations that may produce, and have produced, fatal results, yet called by the most innocent names, is certainly an anomaly in our business, where accuracy of definition and practice is matter of something like boast amongst us. Imagine our calling paragoric elixir "balsam of aniseed," or chlorodyne "concentrated cordial peppermint." Hence the need for clause 4.

With regard to the proposed schedule of "poisonous articles," we know that a monopoly of their retail sale has been decidedly refused to us, and I daresay most of us do not wish to have it. Then surely the next best thing is to compel all sellers of these to adopt precautions similar to those that we use ourselves and comply with the requirements of clause 2.

Although in the strictly logical use of words "poisonous" may be better than "poison," yet as everybody is familiar with the latter in the practice of labelling, I should prefer that the word "poison" should serve all round. We know the difficulty of making and teaching such nice distinctions. Is this one worth the trouble even of the extra specified labels? As there are already two grades of "poisons" recognized, why not have a third? I throw out this idea with all deference, for I feel that the result of so much deliberation amongst the picked men of our body is not to be lightly esteemed.

Concerning clause 8, I fear that there are vested interests, which have been to some extent overlooked. Whilst we have been prepared for a time when none might own a business unless upon the Register, I think it would be a terrible surprise to some good business men to find that unless they pass their examination by January 1, next year, they must leave their present employment where they are giving satisfaction to their employers.

On the whole the Bill is one that I think the trade might receive with favour. It has reasonable claims and reasonable concessions, and provides, wisely, I think, for the educational needs of the future. If there seems to any to be room for cynical criticism and suggestions of unfairly interested motives, let them show "a more excellent way."

221, *West Derby Road, Liverpool.* B. DICKINS.

Sir,—The mountain in labour, after much commotion, brought forth a mouse. The Council of the Society, after six years of Herculean effort, has produced some patent fetters, not of a velvety character, but real golden manacles, in the shape of £5 and £10 penalties, and exults as much over its achievement, judging by its self-adulation at the last meeting, as a hen after depositing an addled egg. The members of the Society have never claimed to be a mutual admiration society, but rather a combination in defence of trade rights and interests.

It is expected, now that the "memorable epoch in pharmacy" has arrived, that individual members should express their very grateful thanks to the Committee for the great boon bestowed upon them, unless there are some who, like myself, fail to see any important advantages in the Bill, and not being able to comprehend, respectfully ask, What benefit of any consequence will the passing of this Act be to the trade? Without wishing to depreciate the "gigantic labour" of our much-esteemed and energetic President and those who aided him in the work, it appears to me that their labour has been entirely on behalf of the public, and of very little service to the chemist.

If the Council has been deputed by the Lord President of the Privy Council to act as a sub-committee for that department of Government which protects the people from harm arising from the slovenly sale of oil of vitriol, etc., then has it performed its duties admirably to the best of its judgment; but why the trade in the "north" or any other quarter is likely to receive the Bill with "acclamation" is beyond my understanding. In my opinion it will be regarded with indifference and general apathy, if the contemptuous comparison is not suggested. as a "much ado about nothing."

The Bill is divided into three subjects, trade, education, and the improvement in the funds of the Society. I scarcely believe our members will be much interested in others, not registered chemists, being compelled to label half a dozen acids "Poisonous." Neither do I believe that placing a poison label on all proprietary articles containing any portion of the scheduled drugs will be a wise act or a safeguard, but, on the contrary, it will increase the evil it is intended to prevent.

In most cases of injury or death from patent medicines, negligence on the part of the public, in failing to observe the printed directions and dose, are the causes of the evil, and fifty poison labels would not engage their attention, or be the safety it is assumed. Accidents will happen, in spite of every precaution the chemist may take, if the public will not look after itself. Not long since, I dispensed a cough mixture and a gargle for a gentleman of education and good position. Different shaped bottles were used and a coloured label, headed, "Not to be taken," placed on the bottle containing the gargle, and yet this intellectual person poured out his gargle and swallowed it instead of his medicine; fortunately, without any serious effects. In such cases, what is the use of a label? Negligence and failing to find relief from the dose ordered, people wilfully take more than the directions permit. Then who is to blame? The same danger attends the ordinary medicines, especially drops, prescribed daily by the physician, and carefully dispensed by the pharmacist, but on which a poison label is not allowed. If the public will not take care of itself then no Act of Parliament of this nature will succour it. How often is it the case that medicine bottles are returned without having had the demy wrapper removed, the tops only torn off to permit of the removal of the corks, the label never having been disclosed or uncovered. Many will exclaim daily it is so. People who are now unaware that certain proprietary medicines contain poison in excess doses, will by the required label have an instrument brought neatly to their hands, to carry out any nefarious act they may contemplate, whereas before and now they are entirely ignorant that such an innocent article, in one sense, can be rendered so dangerous in another.

A very important question, never yet satisfactorily defined, is, What constitutes a poison? A man may have a good proprietary article, which for half a century has been sold without a single accident arising therefrom, containing a harmless dose of nux vomica, opium, or some other narcotic, which, in itself, is not only innocuous, but highly beneficial, and therefore not a poison, but only made a poison by larger doses being taken than directed. Why not compel the licensed victualler to label every bottle of spirit he sells over his counter "Poison?" A glass of brandy or whisky many people think nutritious, but the contents of a bottle, if taken, would make a human being dead drunk. Where is the difference? Why should the minor dose of nux vomica be considered and proclaimed a poison to the injury of the proprietors of an old-established property by shaking the faith and shaking the nerves of many constant purchasers?

If man or woman be intent upon committing murder, or suicide, no label will prevent it. But the proposed increase in the number of poisonous articles to be brought before the public will add to the mischief already deplored. The Council may well leave the Government to look after the public interest, whilst they study chemists' wants, and if Government will not place these articles in the hands of men competent to distribute them, it is no fault of ours.

Phosphorus paste has for some time past been employed to destroy life. Why is not that scheduled?

Mr. Hampson gives a reason why we should support this Bill. If the Society does not introduce a clause to regulate the sale of acids, Government will. But when the educational drift is considered, I cannot see what the future pharmacist will care, any more than those of the present day, who it is that regulates the acids scheduled "poisonous."

The branch shop clause need not excite the chemists. So long as co-operative stores and corporate bodies are permitted to carry on dispensing and chemists' retail business by engaging men on the register, I see no reason why orthodox pharmacists, having capital to invest, should not embark in that they most understand, especially as they are now to be held responsible for the sins of their managers.

The most important clause affecting the future existence of the Society is undoubtedly No. 17. This arrangement I persistently advocated at the time of the incorporation, which, if then carried, would by this time have made the Society a representative institution of the whole body of chemists instead of the fragmentary part now belonging to it. To become effectual, the bye-law requiring a two guinea entrance fee for registration will have to be repealed, or the proposal will meet with few acceptances by the future pharmacist. This short-sighted policy, when insisted upon, has prevented the Society from becoming the grand institution it ought to be.

I confess myself disappointed with the Bill. Not because I have Quixotic notions, or expected any endeavour to secure a monopoly, for that cannot be; but because I see no particular good in it for the trade, and I am quite unable to understand why "nine tenths of the Council" are so unanimous and enthusiastic over it.

I had looked forward with much interest to its publication, fully expecting, with the incessant cry for education, curriculum, higher and stiffer examinations, "no cram," that some attempt would have been made to bring a more refined business to the chemist of the future, as well as to place us of to-day on more favourable terms with the medical profession, and instead of wasting time over acids and colourmen, that our Council had endeavoured to bring dispensing to the counter of its pupils. Then might we have had reason for receiving the Bill with "acclamation." Then we might have argued, with Mr. Young, that it is one of the "best Bills which had been passed by the Council," but as it is, I cannot see how it "deals practically with all those matters which were the peculiarly crying evils of the present time." Unless the Council make some effort to provide pharmacy proper as the work for the future chemist, it is only a mockery to entice educated youths to pass through high class examinations, and a delusion to bring them to the classes, without providing for them at its close an employment suitable to their attainments.

I expected some endeavour would have been made in any new Bill to legally divide prescribing and dispensing, so that each branch of medicine should have recognized duties. For the regular trade of the chemist having hopelessly departed to the grocery and other stores, there is nothing left for the chemist but to relieve the medical men of dispensing. His only hope in the future is pure pharmacy.

This should be the aim of our examining body and Council to enable the qualified man to enter an employment befitting his past preparations, instead of launching him forth into a general dealer's, to employ his talents and highly paid for education in the sale of pennyworths of hair oil and poisonous acids.

174, *Warwick Street, Pimlico, S.W.* JOHN WADE.

Sir,—Though the "Amended Pharmacy Act" may be, and I believe is, thoroughly sound and wise in its general object and conception, yet it contains that which cannot fail to provoke adverse criticism and dissent. I allude particularly to clause No. 16, which provides that after a given date, the "Major" shall be practically "abolished." This appears to me most unwarrantable and unfair as well as unnecessary. Mr. Hampson evidently had some misgivings on this point, since he anticipates that this proposal will raise opposition on the part of some pharmaceutical chemists, and Mr. Gostling is not unconscious that "some pharmacists may feel aggrieved." My own impression is that the vast majority will feel very indignant and greatly aggrieved. Just imagine the "Royal College of Surgeons" seeking to abolish their Fellowship, simply because not one in a dozen of its members proceed to the higher diploma, and yet such a course is contemplated in the Bill just produced. Because the majority of chemists have seen fit, for their own reasons, or more probably for the want of them, to remain outside the paternal care of the Society, they must needs be promoted to the title of "pharmaceutical chemist," just when the distinction is at last beginning to be appreciated by a slowly discerning public. The qualification is to be shorn of its value by being literally thrust upon a class of druggists who never earned it, and who content themselves with the easiest attainable ingress into the trade that the law permits.

Surely this is a singular manner in which to reward apathy and unreasoning discontent! If those that were bidden persistently decline the pharmaceutic feast, it is no part for the Council to hunt up the halt and the lame. If it is really necessary for the existence of the Society that its membership should be increased, why not adopt the system that obtains in the various medical licensing bodies, increase the examination fee by such a sum as would confer life membership upon the candidate passing? This would augment our numbers; numerical augmentation, however, by no means implies increased interest. It is worthy of note that indifference and apathy are characteristic features inside as well as outside the Society. Very few, comparatively, attend the annual meetings; very few indeed appear to take any interest in the proceedings at Bloomsbury Square; and at the last election of Council, not more than a third of the members even took the trouble to fill in their voting papers. The fact is, causes quite beyond the control of the Council are operating to decrease and weaken our ranks. Competition is taking from us a variety of trade that never really pertained to our calling. A process of natural selection is going on; some of us will inevitably fall victims to the law "Survival of the fittest." It is no use blinking the fact, though it is far from delectable. One chemist will find it difficult to exist where two flourished before (Proctor). I utterly fail to see how the wholesale manufacture of pharmaceutical chemists can in any way mitigate the troubles that so unfortunately beset the business, whilst such procedure would inflict gross injustice on those who, though deriving no apparent benefit therefrom, have obtained the qualification in a proper and legitimate way.

Warrington. J. RYMER YOUNG.

Sir,—That the intended new Pharmacy Act should meet with such unanimous support in the Council augurs well; that it should meet with no criticism (friendly or otherwise) from the trade at large would indicate a supineness on the part of those for whom it is intended that might dishearten the boldest of those who for the past twelve months have laboured so earnestly and with such a splendid result to bring this Bill into shape. It is therefore with this idea that I presume upon your courtesy to allow me to lay before your readers a few friendly remarks.

In the first place, clause No. 2 seems to me the weakest part of the Bill, and were it not evident that it is a compromise between the Privy Council and our Council, I should say "leave it out altogether," since I think it is very apparent that it may create confusion and do more harm than good. For the future (if this clause pass) those of us who have been in the habit of putting a bold red poison label on carbolic acid, for instance, must label it "poisonous,"* and the public will naturally come to the conclusion that after all it cannot be so very dangerous, for whilst oxalic acid is labelled "poison," this is only poisonous, and will gradually come to treat the whole system of poison labelling with contempt. Would it not be much better to stick to the old definition of poison?

Clause 4 seems also to require a slight addition or alteration. Would it not be better to leave out the reference to the outer wrapper, and make it imperative that the inner label should indicate poison; of course, it would be much safer that both should say "poison," but if only one, then most decidedly the inner one. In many cases the outer wrapper is torn off without being looked at, whilst the inner one must remain an indication of danger (and labelled "poison"), so long as the bottle, etc., lasts. Clause 17 will no doubt meet with considerable criticism by "Minor men," who will fear being thus debarred after 1886 from qualifying as Majors. But no injustice can accrue under this clause, for whilst those who wish to become Major men can present themselves for the Minor up to July, 1886, and then pass the Major in December, 1886, those who are anxious to be enrolled under the new Act have simply to defer this examination until the first one in 1887. Those of my Major brethren who feel their dignity and title touched by this clause, I would urge to read it in conjunction with clause 12, and to rest assured the present Board will not lower the standard; therefore, let us swallow our pride and present an united front on this question, having this consolation that if we suffer, or fancy we suffer, an injury ourselves, the "future of pharmacy" will have a brighter look out. And let us recollect that the men who propose this are the very men whose names give honour to our title and who have most to lose, if any loss there can be. But in pharmaceutical politics where a Carteighe, a Hills, a Williams, a Symes, or a Schacht lead, not a shadow of discredit can fall on those who follow.

131, *Embden Street, Manchester.* J. HART.

Sir,—Mr. Schacht's objection to the second clause is intelligible and relevant. He thinks it marks a new departure, for we not only give up the privilege of being the exclusive vendors of poisons, but what is apparently a more serious concession, we recognize the right of

* The obligation upon general traders to use the label "poisonous" would not in any way interfere with the use of the "poison" label, as at present.—ED. PH. J.

outsiders to sell them. It is discouraging that after all our efforts to raise ourselves, we should be obliged to follow what appears to be a retrogressive policy, and to ask the Legislature to distinguish between "poison" and "poisonous"—between a noun and an adjective, or as some might say, between tweedledum and tweedledee.

As a question of abstract principle, Mr. Schacht's view is the correct one, and if we had more legislators, as thoughtful and pharmaceutical as that gentleman, his opinions would be in the ascendant.

But unfortunately, what is right in the abstract is not always expedient, and now that the principles of free trade are so firmly imbedded in our legislation it is hopeless to pass any measure having even the appearance of exclusive dealing. I, therefore, think that the Council in inserting that clause has, however reluctantly, been obliged to yield to the remorseless logic of facts. At the same time the boon is of questionable value to the grocer and drysalter, clogged as it is by the irksome condition of labelling those "poisonous substances" which are to be elevated to the dignity of legislative recognition. Perhaps these "poisonous substances" will burn their fingers in more senses than one.

Sydney Smith once said that railway travelling never would be safe until a bishop was crushed in a collision; perhaps we too may say our true position will never be clearly defined until a dyspeptic Cabinet Minister takes a wrong dose.

A great noise is made when an unlucky mistake occurs in dispensing; but if a record could be obtained of the number of lives and the amount of suffering saved by the watchfulness and skill of the dispenser, the public might then appreciate our services, and generously second our attempts to improve our condition. In my time I have seen prescriptions ordering 7 drachms of prussic acid in a 3 ounce mixture instead of 72 minims; tinct. opii instead of tinct. camph. c. opio; aq. ammon. instead of aq. ammon. acetat., and many such like, which, if literally dispensed would have been mischievous, if not fatal. I am sure thousands could adduce similar testimony to the anxious supervision we all must and do exercise.

I do not see much force in Mr. Schacht's objection to clause 8. It is a just concession to qualified assistants, which I doubt not they will appreciate.

The Bill on the whole I would support with the exception of the 13th clause, compelling the Preliminary examination antecedent to apprenticeship. If the intention be to limit the number of apprentices, it will succeed; but it may put those in country districts and provincial towns to great inconvenience. I think a discretionary power on that point should have been left to us. I believe a large proportion of our best assistants come from those districts, and if they are not so apt to run to brains as town apprentices, they are thoroughly trained in all the manipulative parts of the business. If many, or the most of such are legislated out of existence, I suspect the larger towns will be the losers.

Montrose. GEO. BURRELL.

Sir,—It seems to me that the distinction, in the new draft of a Pharmacy Bill, between substances that are "poisons" and "poisonous," is too fine for Parliament or the public to appreciate. That which has poisonous properties is popularly regarded as a "poison." Should the proposed Bill become law, chemists would continue to label oil of vitriol, for example, "poison," while the huckster would label it "poisonous," and the whole affair would look like a distinction without a difference. If "dangerous" is too general a term, which might be applied to gunpowder, benzoline, and acids alike, they might be severally labelled "explosive!" "highly inflammable!" and "powerfully corrosive!" which would sufficiently warn the public, while the terms "poison" and "poisonous" were reserved for such commodities as are included in the schedules. Some amendment in this direction is desirable.

Ryde. HENRY H. POLLARD.

Sir,—I should feel obliged to be allowed a small space in your pages to express my gratitude to our worthy President and the members of the Council who have devoted so much time and consideration to the Draft Bill, recently presented to us in the *Pharmaceutical Journal.* I feel sure that the same feeling of gratitude will find an echo in the breasts of the majority of country chemists, and it cannot fail to produce an almost unanimous wish that the Bill will be successfully carried through Parliament during the present year. But while I feel grateful for the Bill as at present, I cannot help sympathizing with Mr. Schacht as to clause 2. Those fortunate enough to be situated in towns where medical men do not dispense can scarcely feel on this matter like the chemist whose lot is cast in less pleasant places, and who gets comparatively very little dispensing, but has to contend against drysalters and herbalists, who, in many instances, carry on, to all intents and purposes, a chemist's business, with the exception of the sale of the present scheduled poisons. I feel strongly on this point, because of late we have had many instances in this town where patent medicines have been retailed by the above tradesmen with serious results.

I beg to enclose you a report of a case which came before our magistrates lately, in which a herbalist of this town supplied belladonna root among other things, the result proving almost a fatal one. One of the magistrates himself, in this case, told me shortly after the trial, that the sale of such powerful medicines by incompetent persons must be discouraged.

In another case, a customer of mine assures me that another herbalist in the town "nearly did for his wife a short time ago."

These are doubtless only a few of thousands of cases which occur, and which point to the necessity for more stringent regulations regarding not only "poisonous" articles, but other powerful medicines of the Pharmacopœia. In fact I should wish myself to see the sale of all B.P. preparations reserved to the chemist; but unfortunately chemists cannot always have what they like, and we should feel thankful if we succeed in passing th present proposed amendments.

21, *High Street, Hanley.* EDMUND JONES.

Sir,—I venture to remark on the Bill, printed on pp. 644–646 of the *Pharmaceutical Journal.* Paragraph 4 contains the words "unles sthe box, bottle, package or vessel in which the same is contained, the wrapper, if there be only one, or the outermost wrapper, if there be more than one, be labelled," etc.

Now, I presume that one object sought is to have introduced a higher degree of safety than now obtains, by the addition of the word "poison" to the "vessel," etc., containing such poison so long as any of the poison remains in it. This will not be effected if the immediately containing vessel be not also labelled "poison," as outermost wrappers are commonly destroyed.

The remedy: *after* "is contained" *insert* "and."

Paragraph 2 contains an annoying alteration of terms in use by the introduction of the term "poisonous." Most of us are provided with labels for the five drugs named, *e.g.*, "Nitric Acid, Poison." Why compel us to procure a fresh stock of labels, which are only too seldom used by small men like myself?* And why compel me to label a belladonna plaster "poison" (affixing name and address, that I may be found in case some cuddie's sweetheart be driven by hunger to eat shoeleather), yet oblige me to use the diminutive "poisonous" to the deadly carbolic acid?

Lastly, I should like to see introduced the compulsory prosecution of the unqualified men who sell poisons and poisonous preparations without hindrance under the labels of registered men, with their own labels (and more frequently), with a false one, or none at all.

Farnworth, Bolton. D. OGILVIE EVANS.

Sir,—I wish briefly to mention a few considerations on clause 8, to which I fancy the Council have not given sufficient weight.

Branch businesses, whether defensible or not, abound in some towns, notably here in Liverpool, where there are to my knowledge sixty-seven.

It may be taken for granted, I think, that in a large majority of cases, unqualified men (using the term in a legal sense) have charge of them. Some of these are of middle age, and some married. If this clause comes into force on January 1, 1884, I can foresee that it will produce quite a revolution of the trade here as well as in some other towns.

First. There could hardly be the requisite number of

* See the footnote on p. 733.

"qualified" men ready by that time to take charge of those numerous businesses; and secondly a large number of men would be thrown out of employ, and to some, I fear, it would mean actual ruin, *e.g.*, married men, for the latter would not be required in businesses under the principal.

For my part, I wish branch businesses were not legal; but, seeing that the evil exists, I must go with the majority in the Council in believing that they ought to be regulated. But I differ with them as to the date from which such a great change should commence.

For the sake of the men employed and for the sake of the public, who might be seriously inconvenienced by the sudden closing of some businesses useful to the community, I should advise that another year at least should elapse before that clause is allowed to operate.

Walton, Liverpool. JOHN J. SMITH.

Sir,—The promotion of a new Pharmacy Bill by the Pharmaceutical Society, which is intended to be the consummation of the policy of the last forty years, is an occasion which calls above everything for the loyalty of the pharmaceutical body. No doubt this will be generally felt, but pharmacists will be asking themselves to whom or to what is their loyalty due; and as a looker-on is proverbially best able to see the points of the game, I beg your permission to propose an answer.

The loyalty in question must not be claimed for the Society by reason of anything it has done in the past, though that is the best reason for trusting (or mis-trusting as the case may be) its present action, nor for the memory of those honoured men who guided it through its earlier difficulties, nor for those who preside over it now, except in so far as their administration can be shown to be contributory to the permanent advancement of pharmacy. Sentiment which relates exclusively backward is out of place. Forty years' experience should have taught us something, and may have untaught us some pardonable preconceptions in which it would be culpable to persevere. But whatever has come down to us unaltered through that long array of years brings with it the impress of permanence, and should not be lightly cast aside. It is in behalf of the future interests and permanent credit of pharmacy that the loyalty of pharmacists must be appealed to, to put an end to a vicious anomaly hostile to the welfare and dignity of pharmacy, and to place it in a position as favourable as that which pharmacy has long occupied in other countries which are not more advanced in the arts and resources of civilization than our own. It may be that some surrender of distinctions, laudably earned and honestly prized, must be the cost of this great gain. Happily that sacrifice will be claimed of those from whom the greatest liberality of sentiment and the clearest foresight may be expected, who will not too critically weigh an individual privilege against a collective advantage, and who will respond with the same alacrity as they did on a former occasion to a similar appeal when the equivalent was less attractive.

Has this Bill the sanction of a long and unbroken approval? Is it any better than those that have gone before? These questions involve a review of the past history of pharmacy, and as there is no such history outside the annals of the Pharmaceutical Society, we must be content to go to that source for our facts.

In 1841, preliminary to the formation of the Pharmaceutical Society, the following resolution was adopted by a representative committee of chemists and druggists, viz.:—"That the objects of the Society be (1) to benefit the public, and (2) elevate the profession of pharmacy by furnishing the means of proper instruction; (3) to protect the collective and individual interests and privileges of its members in the event of any hostile attack in Parliament or otherwise; (4) to establish a club for the relief of decayed or distressed members." The Society was founded upon this basis in the same year, and received its first recognition in the form of a Royal Charter of Incorporation in 1843.

The Charter defined its constitution and objects strictly in accordance with the resolution just quoted. In 1852, the Society obtained its first Act of Parliament, which, besides confirming the Charter generally, created a privileged class of registered pharmaceutical chemists who were declared in the preamble to be needful for the safety of the public, but were not endowed with any exclusive rights beyond that of using the name and title of pharmaceutical chemists, so that, as Professor Attfield well said in his address to the Pharmaceutical Conference, the Act of Parliament declared it to be necessary that pharmacists should be qualified, but did not prohibit unqualified persons from acting as pharmacists. Although this Act was passed on the petition of the Pharmaceutical Society, it did not express the views of its promoters. They had submitted a Bill to restrict the practice of pharmacy to duly qualified men; but Parliament could not then be induced to accept such a radical reform, and the Society wisely took what they could get, well knowing how ineffectual it must prove, but knowing also that it carried with it the important element of legislative recognition which gave the Society a *locus standi* for future operations.

The Society promoted another Bill in 1865, in which it was again proposed (this time in pursuance with a suggestion made to the Government by the Medical Council) to restrict the compounding of the prescriptions of duly qualified medical practitioners to registered pharmacists; but that proposition proved fatal to the Bill.

The next and last Pharmacy Act was passed in 1868;* it created a second grade of pharmacists, to be registered as chemists and druggists, and prohibited all other persons than those registered under the Act from using that title. But its really operative clauses are mere regulations for restricting the sale, etc., of certain poisons scheduled to the Act, clauses which reflect the views of the Government of the day rather than those of the pharmaceutical body. It was important as restricting the selling, retailing, dispensing or compounding of these poisons to the persons registered under the Act, which restriction practically, though not expressly, limited the practice of pharmacy to those persons. The provisions are, however, too incomplete to be satisfactory and are not a sufficient security against interloping, the worst of all forms of competition.

The essential feature of the present Bill is the express restriction of "retailing, dispensing and compounding medical prescriptions," that is to say of the practice of pharmacy, to qualified pharmacists. This is a distinctive characteristic of professional status. The Bill also provides for the ultimate extinction of the secondary grade of registered chemists and druggists, and the consolidation of all who practise pharmacy into one class of "registered pharmaceutical chemists," who alone will be authorized in future to carry on the business of pharmacy. These provisions must have the effect of raising the standard of pharmacy, and the status and estimation of those who practise it.

There are other provisions relating to the sale of "poisonous articles" as distinguished from the "poisons" provided for by the Act of 1868. These provisions are more a matter of police than of pharmaceutical politics. There are also provisions for placing the sale of patent medicines under the operation of the poisons law, and certain needful powers for the readjustment of examinations. These clauses do not raise important issues, and those which relate to "poisonous articles" have rather been thrust upon than sought by the promoters of the Bill.

Finally, by comparing these historic events with the manifesto of the embryo Society—its promises and its performances—we shall see how far the quality of permanence attaches to the principles so early propounded.

(1). "The benefit to the public," which occupied the post of honour in the resolution, has continued to appear in slightly modified phrase in the preamble of both Acts and in that of the proposed Bill, viz.:—"Whereas it is expedient for the safety of the public." It is important to bear in mind that the public benefit is the only motive that will induce Parliament to legislate in the affairs of any corporation.

(2). "The elevation of the profession of pharmacy by furnishing the means of proper instruction" has been steadily kept in view. A school and lectures were established as speedily as practicable and have been maintained in full efficiency from 1844 to the present time, not without occasional protest by malcontent members. The

* The amending Act of 1869 is a mere supplement to this Act, too unimportant to be enumerated separately.

Society's laboratory has the proud distinction of being the earliest public laboratory for chemical instruction in this country. Examinations were organized and have been expressly sanctioned by the Charter, and by the Acts of 1852 and 1868, and it is intended to make them still more effectual by further provisions inserted in the present Bill. The way in which the Society has fulfilled its pledge to provide suitable pharmaceutical education and has by various facilities encouraged scientific pharmacy is the chief means by which it has established its claim to public respect and confidence, and has acquired an authority which enables it to exercise a beneficial influence upon legislation.

(3). "The protection of the collective and individual interests and privileges of its members in the event of hostile attacks in Parliament or otherwise" has been fulfilled by the prevention of hasty and impractical legislation, and by the defence of individual chemists oppressed by unjust and vexatious prosecutions. This intervention has not been confined to the protection of its own members, but has been exercised in a catholic spirit on behalf of chemists who do not belong to the Society or contribute to its funds. In addition to this, whatever privileges or exemptions pharmacists enjoy (what they enjoyed when the resolution was formulated it would be hard to say, except the privilege of being let alone) have been secured to them by the vigilance of the Society. Nor will it escape observation that the new Bill aims a more direct blow at unlicensed competition than it has hitherto been possible to deliver.

(4). "The establishment of a club for the relief of decayed or distressed members" has been more than realized by the foundation and consolidation of the Benevolent Fund, which distributes its charity over a wider area than was originally contemplated, under powers introduced into the Act of 1868.

It seems, therefore, that nothing remains to be done of the objects proposed by the founders of the Society, nor so far as I know anything else which has ever been generally accepted by the pharmaceutical body, with the one serious exception of restricting the practice of pharmacy to those whom the law has required to qualify themselves for it. Powers to this effect were sought for in the first application to Parliament in 1852. The application was renewed in 1865, it was unwillingly abandoned after much deliberation in 1868, as being then impracticable, and it now forms the salient feature of the Bill of 1883. Nor has the Society voluntarily introduced new objects which are not fairly accessory to the old,—the poisons clauses, as already stated, having been originated in a quarter too powerful to be resisted.

I submit that the restriction of the practice of pharmacy to qualified pharmacists is a principle which comprehends the whole *raison d'être* of the Pharmaceutical Society, that it is the kernel of the policy which its founders and their successors have been labouring to consolidate for the last forty years, and that, in virtue of these qualities, it demands and deserves the loyal support of all classes of the pharmaceutical body, whether associated with the Society or not. If they give that support cordially and unanimously it is my hope and belief that the present effort will be successful; but if there is a large amount of schism amongst those whom a common interest should unite, it is to be feared that the present favourable opportunity will be lost and that the "elevation of the profession of pharmacy" in England to its rightful position will again be indefinitely postponed.

EX-PHARMACIST.

John Laurie, W. T. Hicks, Associate, Minor Associate in Business and Excelsior.—We believe that in the event of the Bill passing into law it is intended by the Council to propose a bye-law admitting "Minors" to the examination enforced after 1887 under the same regulations as are now in force, and in that way all ground for the objections you raise would be removed.

Henry Long.—We appreciate your remarks on the mischief produced by want of union in the pharmaceutical body on previous occasions, and think you cannot do better than act in the spirit of your remarks by giving the Council credit for having taken into consideration the various points you refer to.

R. Martin.—We do not think that in the present day there is any ground for hoping that the Legislature would entertain proposals for creating an exclusive monopoly, even in the trade in drugs, or that it would consider such a measure desirable for protecting the interests of the public.

One who loves the work but not the pay.—It does not appear to be feasible to attempt to prohibit the establishment of branch shops, though it is eminently necessary to establish regulations as to the mode in which they are carried on.

Local Secretary.—Lozenges and other medicines must contain a deadly dose of poison to bring them within the provisions as to labelling.

Hospital Dispenser.—The class that you refer to is outside the limits of pharmaceutical legislation.

Asinus post prand.—The proposed Pharmacy Bill would not give grocers and others any right other than they now possess of selling the articles you mention; but it provides that they shall not continue to do so without observing certain formalities deemed to be necessary in the interests of the public.

J. Thompson.—With regard to your first two questions, we can only suggest that it has been deemed desirable in the interests of the body to adopt the provisions referred to. With regard to the other point we do not think there is any probability of the Legislature entertaining a proposal to prohibit the sale of patent medicines by tradesmen who are not pharmacists.

E. E. c. R. R.—If you refer to the Bill you will see that it does propose to restrict dispensing in the way you think desirable.

W. T. Hicks.—We fail to perceive any such inconsistency as you suggest. The sale of one article you mention by a grocer or an oilman is illegal, the sale of the other is not, and the provisions of the Bill with regard to the sale of the latter are simply a limitation of existing rights.

J. C. Meacher, Devoniensis and J. D.—These three correspondents, who write to point out the hardships that would be inflicted upon unqualified managers of branch shops, if clause 8 of the Pharmacy Bill were to become law, are reminded that such persons ought to have no great difficulty in acquiring a right to registration by passing the Modified examination, unless they have ignored the provision made in their behalf in the Pharmacy Act, 1868.

A. P. S. (Eng.).—Thanks for your letter, and the information it contains, which we will take care shall be brought under the notice of those whose conduct you approve.

A. B. C.—(1) Syrupus violæ, P.L.: Fresh petals of *Viola odorata*, ℥ix.; boiling distilled water, Oj.; macerate for twelve hours, express and strain. Let the dregs subside and dissolve in the clear liquor by the aid of a gentle heat twice its weight of sugar; when the syrup has cooled add f℥ss. of rectified spirit to each f℥j. of syrup. (2) See papers on pill coating in vol. iv., p. 953, vol. viii., p. 461, and many other places.

T. H. North.—The formula for the preparation mentioned has not been published.

A Student.—Tomes's 'System of Dental Surgery,' published by J. and A. Churchill.

J. H. D.—*Liquor Potassæ Brandishii*: American pearl ashes, lb. vj.; wood ashes (from ash wood), lb. ij.; quicklime, lb. ij.; boiling water, cong. vj. Add first the lime, then the pearl ashes, and afterwards the wood ashes to the boiling water; mix together; let the mixture stand for twenty-four hours, and then decant the clear liquor. (Gray's Supplement).

Gulielmus.—For information as to "starch glaze preparations," see before, p. 439, and vol. xii., p. 318.

T. C. J. Mathews.—The subject has been already discussed in the Journal. See vol. xi., pp. 148, 168, 208, 248.

Quærens.—Mr. B. Squire's "Glycerole of Bismuth" is a solution of nitrate of bismuth in glycerine. See *Pharm. Journ.*, [3,], vol. vii., pp. 389, 470, etc.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Turnbull, North, Ferguson, Hay, Newsholme, Millhouse, Herbert, J. R.

URANIUM OLEATE.*

BY WALTER GIBBONS.

The oleates of the alkalies and those of many other metals are well known to us, but, as far as I have been able to search, an oleate of uranium has not as yet been prepared, nor have I been able to find any mention or suggestion of the same in Watts's Dictionary or similar standard works.

As oleic acid has a great tendency to attach itself to bases, one might expect that it would form a compound with uranium, and I bring this subject before you more with the object of explaining how I have been able to make it in a pure state (by a most simple method) than to claim any particular merit for having been the first to point out, by experiment, that it can be prepared.

The common method of preparing such a compound, would be to make pure barium oleate, add to this the sulphate of the metal, and purify by crystallization from alcohol. This process I found inapplicable in the case of uranium, and therefore tried the following method, with a successful result:—

I prepared pure oleic acid, and to this added in excess uranic oxide (about twice the quantity). This formed a semi-liquid, which, after standing in an atmosphere of hydrogen for twelve hours, solidified. The solid mass, after standing six days, was dissolved in ether and decanted from excess of uranic oxide. The resulting oleate was crystallized from alcohol and dried *in vacuo.*

By this plan a pure oleate was obtained which probably is, like other uranic compounds, an oleate of uranyl (UO_2); thus—

$$UO_2.2C_{18}H_{33}O_2$$

This formula appears to be the correct one from the following figures obtained by combustion:—

	Took of substance.	CO_2 obtained.
(A).	·2046	·385
(B).	·3101	·586
(C).	·3253	·6131

giving an average of ·428 of carbon, the calculated quantity being ·432 for the preceding formula.

The residues from the above three combustions, properly estimated for uranium (see Fresenius's first process), gave respectively the following numbers for uranium:—

Uranium (calculated from oxide obtained)—

(A). ·0582.
(B). ·0885.
(C). ·0931.

Here, again, we have an average of 238, whereas the calculated quantity of uranium is 240.

Taking these two numbers, I think we shall be quite justified in accepting the formula given.

The sp. gr. when freshly prepared is 1·13, but this soon changes owing to the rapid alteration of the compound, which is most unstable. I found that almost immediately on having free access to the air change commenced; therefore it was absolutely necessary for me to keep the compound in an atmosphere of hydrogen. It softens at about 85° C., passing gradually to a liquid of the consistence of treacle, so remaining until a temperature be reached at which it is decomposed.

As yet I know of no medicinal use to which it can be applied; but if in future it be required for outward use, I can recommend it to be prepared by mixing calculated quantities of uranic oxide and oleic acid (using slight excess of the former), and heating on a water-bath for about half to one hour. This will produce a moderately good preparation which should be mixed with some preparation like vaseline or ozokerine to exclude it from oxidizing influences.

[*The discussion on this paper is printed at p.* 752.]

* Read at an Evening Meeting of the Pharmaceutical Society, March 7, 1883.

LIQUID EXTRACT OF CINCHONA,*

WITH DATA ILLUSTRATING THE RESULTS OBTAINED IN ITS PREPARATION BY THE PROCESS OF THE B.P.

BY B. H. PAUL, PH.D.

Some months ago I had occasion to examine a sample of the British Pharmacopœia liquid extract of cinchona and was particularly struck by the fact that it contained only a very small amount of quinine. Provided the liquid extract fully represents the medicinal properties of the bark, as it has had the credit of doing, 35 grains of quinine to the fluid ounce is the proportion that should be present in this preparation when made from bark satisfying the requirements of the Pharmacopœia in regard to percentage of quinine. Instead of this amount, however, I found that in the sample I examined there was less than 2 grains of quinine in the fluid ounce. So great a deviation from what might have been expected in this respect seemed to merit further inquiry, for notwithstanding the fact that the medicinal efficacy of this preparation is not considered to depend exclusively upon the quinine it contains, still quinine is so important a constituent of cinchona bark that it may reasonably be assumed any pharmaceutical preparation claiming to represent this drug ought to contain the quinine as well as the other constituents of the bark from which it is made. I therefore examined several other samples of liquid extract, collected from different sources, and finding that they all agreed in containing but very small proportions of quinine, varying from mere traces up to 2 grains per fluid ounce, I determined to make some further experiments with the object of ascertaining the cause of the deficiency in the amount of quinine. Among the circumstances possibly giving rise to this deficiency there were two which might be anticipated at the outset. First, the well known deterioration in the quality of the "flat calisaya" oryellow bark ordered to be used for the purpose of making liquid extract of cinchona bark by the Pharmacopœia, which has been so great within the last few years that it is now very unusual to meet with a sample of that kind of bark containing anything like the amount of quinine indicated in the Pharmacopœia. Secondly, it has been frequently stated that the process of manufacture ordered in the Pharmacopœia is itself defective, inasmuch as it fails to yield a liquid extract fully representing the medicinal properties of the bark operated upon.

Upon reference to papers in which this subject had been treated of I did not find any precise evidence of the grounds upon which the process of the Pharmacopœia was objected to, beyond general statements of the result of experience, and I therefore determined to put the matter to the test by preparing liquid extract according to the directions of the Pharmacopœia, from bark of known composition, analysing the product obtained as well as

* Read at an Evening Meeting of the Pharmaceutical Society, March 7, 1883.

the residual bark. For this purpose two kinds of bark were operated upon, one an ordinary sample of "flat calisaya," such as is now commonly met with, the other a sample of bark from the Government plantations in India. The following tabular statement of the results thus obtained shows first the amount of alkaloid contained in the bark operated upon, then the calculated proportions of alkaloid which a fluid ounce of the liquid extract made from it ought to contain in order to represent the whole of the medicinal properties of the bark, and lastly, the quantities of alkaloid actually present in the fluid ounce of the product obtained:—

CALISAYA BARK.

1 *lb. containing*—

Quinine	5·50 grains.
Cinchonidine	19·50 „
Cinchonine	101·50 „
Amorphous	21·75 „
	148·25 grains.

Liquid Extract prepared from the above according to the B.P.

	Should contain grains per fl. oz.:—	Found grains per fl. oz.:—
Quinine, Cinchonidine, Cinchonine, Amorphous	37·0	8·6
Quinic and cinchotannic acids, etc.		169·6
Total solid contents (Over 10 per cent. of the bark		178·2

Although the bark here referred to cannot be said to have corresponded with the requirements of the Pharmacopœia, either in the amount of quinine it contained or in being true yellow bark, still the amount of total alkaloid present was quite equal to that indicated in the Pharmacopœia as the proper amount of quinine. But the liquid extract made from it did not contain much more than one-fourth as much total alkaloids as it should have contained if the alkaloids had been perfectly extracted from the bark, and it must therefore be concluded that the deficiency is to a considerable extent due to some defect in the process of preparation as well as to the present inferior character of calisaya bark.

In the case of the Indian bark operated upon in the other experiment, the amount of quinine was nearly as great as the Pharmacopœia requires, while the total alkaloids present amounted to nearly three times as much; but still it will be seen from the following table that even in the liquid extract made from this bark, the proportion of total alkaloids, as well as that of quinine, fell far short of what should have been present if the preparation was to represent the whole of the medicinal properties of the bark, for while a fluid ounce of the liquid extract contained only one-eighth as much quinine as it should do, the total alkaloid did not even equal the half of that quantity, and actually amounted to only one-seventh part of the alkaloid present in the bark used in preparing the extract:—

INDIAN BARK.

1 *lb. containing*—

Quinine	135 grains.
Cinchonidine	134 „
Cinchonine	84 „
Amorphous	44 „
	397 „

Liquid Extract prepared from the above according to the B.P.

	Should contain grains per fl. oz.:—		Found grains per fl. oz.:—	
Quinine	35·75		4·39	
Cinchonidine	33·50		3·50	
Cinchonine	21·00		2·62	
Amorphous	11·00		3·81	
Total alkaloids		99·25		14·32
Quinic acid				46·58
Cinchotannic acid, etc.				134·85
Total solid contents (Nearly 12 per cent. of the bark)				195·75
Deposit after adding spirit				39·70

In order to check these results the residual extracted bark used in the two experiments was examined, and in both cases it was found to contain a large amount of alkaloids, not quite equal, however, to the difference between that in the original bark and that in the liquid extract, the reason for this being that the deposit formed during the concentration of the large volume of liquid percolate was also found to contain a considerable quantity of quinine and other alkaloids, the general result being, as shown below, in the case of the Indian bark.

	Quinine.	Cinchonidine.	Cinchonine.	Amorphous.
Present in 1 fl. oz. liquid extract	4·39	3·50	2·62	3·81
Present in deposit	1·32	1·68	0·91	0·27
Residual bark contained	28·04	28·32	17·47	6·92
Total in 4 ozs. bark	33·75	33·50	21·00	11·00

These results show conclusively that if quinine and the other alkaloids of cinchona bark are to be regarded as constituting an essential factor of the medicinal properties of this drug, the process ordered by the British Pharmacopœia for the preparation of liquid extract fails in a very important particular to furnish a product that can be relied upon as fully representing those properties.

It would seem that the same failure obtains in the case of liquid extract made by other processes, if such there be, for on examining a number of samples obtained from different makers it was found that they all agreed in containing but little quinine or other cinchona alkaloids, as will be seen from the following tabular statement of the results of analysis:—

Grains per fluid ounce.

No.	Dry extract.	Quinine.	Cinchonidine.	Cinchonine.	Amorphous.
1	330	2·81	1·93	1·76	1·49
2	221	1·37	1·71	0·68	4·27
3	192	1·93	1 67	0·35	4·14
4	133	2·73	0·53	0·26	2·11
5	188	0·27	0·44	2·55	6·68
6	236	1·05	0·70	0·53	1·85
7	179	1·90	2·20	1·02	3·66
8	171	0·63	0·18	0·18	0·79
9	48	0·59	0·14	0·29	1·32

It is now nearly half a century since it was laid down as a desideratum in regard to the pharmaceutical treatment of certain drugs, of which cinchona bark was one, that while their medicinal constituents were left unchanged in their natural state of combination, they should be as far as possible separated and removed from every part not possessing remedial virtue. More recently this has been expressed in regard to cinchona bark as the production of some preparation which might justly be regarded as "bark minus woody fibre;" but it is evident from the results above stated that treatment with cold water for extraction, as directed in the preparation of liquid extract, is quite inadequate to attain the object in view, so far as one very important part of the medicinal virtue of cinchona bark is concerned. From a chemical point of view, moreover, it is at the present day easy to perceive why this should be the the case, since there is good reason for believing that only small fractions of the alkaloids in cinchona bark exist in such a state of combination with quinic acid that by reason of the free solubility of the quinates of the alkaloids they can be extracted on treating the bark with cold water. By far the greater part of the alkaloids, probably at least four-fifths, is combined with the cinchotannic acid of the bark, forming salts that are but very sparingly soluble in water, even with the aid of heat.

If, therefore, it be desirable from a medical point of view to unite in a concentrated form—such as the liquid extract purports to be—the several medicinal constituents of cinchona bark, alkaloids as well as others, recourse must be had to improved chemical knowledge of bark for the purpose of devising a method by which this pharmaceutical desideratum may be made practicable.

In order to furnish some basis for a comparative estimate of the merits of the liquid extract and other Pharmacopœia preparations of cinchona bark, it will, perhaps, be useful to show what relation they bear to each other from a chemical point of view. For this purpose an infusion and a decoction were prepared according to the directions of the Pharmacopœia from the Indian bark above referred to.

One pint of infusion (made from 1 ounce of bark containing 25 grains total alkaloids) was found to yield, on evaporation, dry residue amounting to 74·5 grains, and containing 4 grains of total alkaloids, or rather more than one-sixth part of the alkaloids in the bark used.

One pint of decoction (made from 1·25 ounces of bark containing 31·17 grains total alkaloids) was found to yield, on evaporation, dry residue amounting to 174 grains, and containing 7·70 grains of total alkaloids, or nearly one-fourth part of the alkaloids in the bark used.

These results are of such a nature as to justify the conclusion that both the infusion and the decoction are, pharmaceutically, better preparations than the liquid extract, which, as shown above, renders available only one-seventh part of the alkaloids in cinchona bark, and, as usually met with, contains only a very small proportion of quinine or other alkaloid.

[*The discussion on this paper is printed at p.* 753.]

MICROCHEMICAL REACTION METHODS.*

BY A. TSCHIRCH.

The author describes the great advantages of the microscope in technical chemistry, especially in the examination of food, and expresses regret that many chemists consider their laboratories complete without such an instrument: he enumerates many examples of its usefulness, such as starches, textile materials, etc.; even in the domain of pure chemistry, its application is necessary in the hæmatin reaction for the detection of blood stains, the composition of urinary deposits, the search for strychnine, atropine, etc.

These advantages led to its more extensive employment in pure chemistry, and the name of microchemistry was given to it by Döbereiner. The author thinks that microchemistry must always be distinguished by a series of colour reactions; that in the same manner as the changes of colour, etc., in experiments on the large scale are examined in the test tube, so must they be similarly observed on the slide of the microscope. The actual process is simple. The objects to be examined must be either in thin sections, fine powder, or as fibres; a drop of the reagent is placed on a slide and allowed to flow slowly towards the object, the operator observing through the instrument. Many physical as well as chemical changes may thus be detected: expansion or contraction, refractive changes, commencement of coloration, evolution of gas bubbles, solution, etc. The iodine starch reaction of Stromeyer was the first to be employed with the microscope; from it is learned the topography and division of starch in plants, the way it is stored up, and the process of its conversion; this reaction has also taught the difference between pure cellulose and woody fibre and the nature of intercellular substance. The reactions with zinc chloride and iodine, and with sulphuric acid and iodine, are also striking instances of the value of microchemistry, affording an easy method of distinguishing vegetable from animal fibres, the first colouring pure cellulose violet, and the second dissolving it with an intensely blue colour, the lignin encrusting the fibres having been previously removed by maceration in nitric acid, alkalies, or Schultze's maceration fluid. Thus sulphuric acid and iodine stain cork dark-yellow, thereby affording a trustworthy test for all membranes or sections containing suberin. The solubility of pure cellulose in "cuoxam" discovered by Schweitzer is also credited to microchemistry; the reagent may be prepared by digesting copper turnings in concentrated ammonia, or by decomposing a concentrated solution of copper sulphate with ammonia until the precipitated hydroxide is redissolved.

The maceration process of Schultze is a valuable aid to operations in microchemistry; the substance is treated with nitric acid and potassium chlorate either in the cold, or in cases of obstinate samples, is boiled for a short time, when the cells are isolated by the solution of the intermediate lamellæ. Amongst the instances given of its utility in food analysis is the separation of those peculiar cells of radiating branchial form which exist in the tea leaf, and are not found in other leaves used for its adulteration (they are, however, found in some of the camellia family).

This treatment has also the advantage of dissolving the coloured incrustations of cinnamon, roasted coffee, etc., and leaving the substances ready for further examination. Potash plays an important part in microchemistry, as it renders many objects transparent which are not made so by other reagents; it was by successive treatment with potash solution, acetic acid, and iodine that Böhm was able to perceive in chlorophyll the small particles of starch which had hitherto escaped observation. The most striking success in the science is that of Sachs with Trommer's sugar test which, with slight modifications, enables the microscopist to identify, and even estimate quantitatively, cane- and grape-sugar, dextrin, gums, and albuminous substances in single cells.

The author alludes to the tinctorial methods which are employed in the examination of microbes, but which do not come under the strict domain of chemistry; he urges more extensive use of the microscope, together with the micropolariscope and spectroscope, and the study of botany and physics amongst chemists.

* From the *Arch. Pharm.* [3.], xx., 801. Reprinted from the *Journal of the Chemical Society.*

The Pharmaceutical Journal.

SATURDAY, MARCH 10, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE PHARMACY ACTS AMENDMENT BILL.

ALTHOUGH we were unable in the previous article to do more than refer to certain general considerations respecting the Pharmacy Acts Amendment Bill, it must not be inferred that there were not other features of the Bill which would admit of being recommended to the favourable consideration of our readers. But we do not consider that the work which has been the result of long and laborious deliberation on the part of the Council is really in any need of such recommendation to the favourable consideration of thinking members of the trade. We still continue to receive evidence in support of this view, and though the demands upon our available space this week do not admit of our inserting more than one of the letters we have received on the subject, endorsing the work that the Council has done, that one comes from a source that will generally be admitted to be so deserving of respect,—and, we may say obedience to its dictates,—that we have considerable confidence in referring to it as a guide by which intending critics of the Bill may do well to gauge the desirability of their indulgence in adverse comments.

So far we may, without much danger of refutation, assume that the expressions of opinion upon the Bill are decidedly in its favour. The objections that have been raised are either based upon misconception, or upon a too ardent desire to have things as it may be contended they should be rather than in accordance with what can be at the present time. If the letter of Mr. WADE be taken, as we think it fairly may be, to represent the extreme of opposition to the Bill, we fail to perceive in it any adequate ground for the position he takes. In the first place he objects to the result of the Council's labours, because they appear to him to have been entirely on behalf of the public. On what other base, we might ask Mr. WADE, does he believe an amendment of the Pharmacy Act could be reasonably sought for? So far from such a motive and recommendation being decried, is it not to be regarded as the only feasible consideration under which a claim for legislative consideration can be urged by pharmacists? We have already said enough upon the circumstances which have led to the drafting of the Bill to make it evident that this feature of it cannot be ignored. Whether members of the Society will be materially interested or not by an enactment which would compel others not being registered chemists to label half a dozen articles "poisonous" is not the question; but it will be important, in the event of the Bill becoming law, to know that the Society has contributed to bring into operation outside the drug trade an observance of such regulations and precautions in the dealing with dangerous articles as chemists observe themselves and consider to be essential. In regard to patent medicines again, will not the use of poison labels in necessary cases contribute to relieve the registered chemist of responsibilities that are sometimes cast upon him now without reason? Absolute prevention of fatal accidents from negligence cannot perhaps be secured by any systematic observance of precautionary measures, but much of the personal inconvenience arising from incidental connection with such accidents may be thus avoided.

Mr. WADE's objection to the clause relating to branch shops involves the erroneous assumption that co-operative stores and other corporate bodies would be at liberty to carry on dispensing and chemists' retail business by engaging men on the register to conduct their business, and on that ground alone it fails to have any validity. But what is more to the point, Mr. WADE seems to forget that so long as a chemist's branch business can be carried on by an unregistered assistant there is no ground for objecting to the kind of business he deprecates. If it be made compulsory for the continuance of a branch business that it shall be under the control of a legally qualified assistant, the state of the case, so far as the public are concerned, would be no different from that which would obtain if that legally qualified assistant were in business on his own account, while at the same time there would be the further guarantee of public safety that the actual proprietor of the business was himself a qualified and competent man, who in his own interest would take care that the business was properly conducted.

Lastly, Mr. WADE's objection to the Bill because it does not provide for a legal division of prescribing and dispensing is one that indicates such a flagrant disregard of legislative possibilities as scarcely to merit serious comment. Such a division of labour between medical practitioners and pharmacists may indeed be wished for, but not by any sensible man otherwise than as a dream of the future for the ultimate achievement of which much yet remains to be done.

In satisfactory contrast to Mr. WADE's objection, are the communications addressed to the Council by the Committee of the Liverpool Registered Chemists' Trade Association and by the North

British Branch of the Society, which may be referred to as manifesting a more reasonable view of the measure intended to be presented to Parliament for the amendment of the Pharmacy Acts, and, as we believe, a better appreciation of what can be done for the advancement of pharmacy. We trust that the disposition to support the Council thus shown will be still more generally expressed, and that on the present occasion there may not again be reason to lament a want of unity, such as led to the partial failure of former efforts.

TELEPHONES.

In the second of the series of lectures on the applications of electricity, organized by the Institution of Civil Engineers, Sir Frederick Bramwell gave a most interesting account of the invention and development of the telephone and allied instruments. Prior to the invention of the telephone it was known that by making and breaking circuit at a transmitting station sounds, such as the striking of bells, could be produced at a receiving station; but these effects were independent of any corresponding sound at the transmitting station, and were analogous to those now utilized in audible telegraphy. It was also known that in a similar way the note given forth by a musical instrument could be transmitted; but it was only the note corresponding to the number of vibrations making and breaking contact within a certain time that was heard at the receiving station, and the sound was the same whether the note was derived from a tuning fork, a violin string or a clarionette. In 1862, Mr. Reiss succeeded in reproducing tones, and it is said even words, and in 1874 Mr. Barlow exhibited to the Royal Society his "logograph," by means of which he was able to depict upon a travelling band of paper the motions derived from the vibrations of a membrane under the influence of speech, but, unfortunately, the vibrations for the same syllable were found to vary with the speaker and circumstances.

The goal came in view when Professor Graham Bell, having demonstrated that the variations in the electric current, either direct or reversed, caused by break and make, are too abrupt for the reproduction of articulate speech, proposed to attain his object by keeping the circuit closed, and causing rises and falls, or reversals, as the case might be, of electricity, which should be made gradually, instead of abruptly. In one of the earlier forms of the "Bell transmitter," this was effected by placing in the neighbourhood of a permanent magnet, surrounded by a coil of insulated wire, an iron or steel diaphragm, which upon being set in vibration by the voice should induce in the coil reversed currents of electricity that could travel along a wire connecting it with the coil of a similar instrument at the receiving station, and by varying the power of the magnet there set up similar vibrations in the corresponding metal disk, which being communicated to the air should reproduce a *fac simile* of the original sound. Other modes were also devised by Professor Bell, such as the use of a battery in the line wire, and the use of two local batteries to send the current to a primary coil round a core, the line wire being connected with secondary coils acting by induced electricity. But as transmitters these instruments were necessarily somewhat feeble, since the operative electricity was dependent upon the microscopic movements of the disk set up by the sound waves produced by the speaker. The instrument most in use at the present day is the carbon transmitter devised by Mr. Edison, in which the vibrations of the disk—not necessarily metallic—are caused to operate upon a small block of carbon introduced into the circuit of a battery. The almost inappreciable variation in pressure due to the vibration of the disk is sufficient to alter the conducting power of the carbon and to cause varying currents to be transmitted along the wire to "Bell receiver" at the opposite end. Mr. Edison has also invented a "chalk receiver," in which he utilizes the fact that the friction produced by rotating a cylinder of chalk, adjusted so that its periphery presses against the edge of a stem attached to the centre of the disk, varies with the electric current passing through the cylinder. As in this case power is derived, not from the electricity, but from the hand of the operator turning the cylinder, considerable loudness is obtained. Other instruments referred to by the lecturer were Professor Hughes's "microphone," by which the most minute sounds are rendered audible; Mr. Edison's "phonograph," which records the vibrations produced in a disk under the influence of speech on tinfoil, in such a way that they can be reproduced at pleasure; and Professor Bell's "photophone," in which the variations produced in the conductivity of a selenium cell through vibrations set up in a beam of light by sounds received on a disk in connection with a mirror allow of the sounds being reproduced without the intervention of any wire between the transmitter and the receiver.

In the United States the telephone is used more freely than in this country, the city of Washington, with 120,000 white inhabitants, having 800 telephones. In England the spread of the telephone has been retarded to some extent by legal disputes, but it is now making considerable progress. On the 28th of February, 1881, there were, independently of private lines, 845 subscribers to the London Exchange of the United Telephones Company; on the same day in 1882 this number had increased to 1505, and in the present year to 2541. The use of the telephone by each subscriber has also augmented, until it now averages 7½ calls per subscriber daily, which for a subscription of £20 per year represents a cost of 2*d.* per call, usually involving a message each way.

On Thursday evening Lord Carlingford introduced into the House of Lords a "Bill for the Consolidation and Amendment of the Law relating to Medical Practitioners," which was read a first time and ordered to be printed. The second reading is fixed for Thursday next, but up to the time of going to press the Bill had not been issued.

* * *

Recently allusion was made to the omission from the Partnerships Bill of the clauses in which last year it was proposed to deal with the Registration of Firms. These have now been introduced separately as a "Bill for the Registration of Firms and of Persons carrying on Business under Names or Styles other than their own." It contains a provision that "every firm carrying on business or having any place of business in the United Kingdom, under a firm name which does not consist of the full or the usual names of all the partners or all the acting partners without any addition" shall effect registration under the Act, and among the particulars to be supplied to the Registrar are "the full name, usual residence, and other occupation, if any, of the person or persons carrying on the business."

* * *

A similar course has been taken with respect to the provisions for the establishment of limited partnerships, which have now been brought in as a separate Bill. The limited partnership proposed would necessarily contain one or more persons, called "general partners," who would be jointly liable for all the debts and obligations of the firm, and one or more persons to be called "limited partners," who would only be liable to a certain specified extent. Under these conditions it is satisfactory to find that the Bill would render compulsory the registration of such firms with the names, residences, and usual occupations of all the partners, both "general" and "limited."

* * *

By the courtesy of the Registrar we have received a copy of the Calendar of the Pharmaceutical Society of Ireland for 1883, and we regret to observe that although the number of Pharmaceutical Chemists in Ireland is 219, or 18 in excess of that of last year, the number of members of the Irish Society is only 81, showing a decrease of 11. Of these 81, 18 were named in the Act, 2 are Life Members, and 61 are Subscribing Members.

* * *

According to some statistics published in the *Journal de Pharmacie*, 200 first class students in the Superior School of Pharmacy, Paris, went up at the conclusion of last term for the final examination at the end of their studies; of these 161 passed, and 39, or 19·5 per cent., failed. There were also 204 second class candidates, of whom 93, or 45·4 per cent., were rejected.

* * *

The Committee which has been nominated to report upon the Bill for the amendment of the law regulating the practice of pharmacy in France, recently introduced into the Legislative Assembly by M. Faure, consists of two medical men, two pharmacists, one druggist, a literary professor, and five lawyers.

* * *

According to the *Lancet*, a recently issued 'Additamentum ad Pharmakopœam Hungaricam' includes carbolized catgut, carbolized silk, salicylic gauze, salicylic wool, and carbolized drainage tubes.

* * *

In bringing the subject of the new United States Pharmacopœia before the Boston Society for Medical Observation, at a recent meeting, Dr. B. F. Davenport made some pertinent remarks upon the practice of prescribing proprietary preparations, for which he said physicians in the United States had now no excuse. "What encouragement," he asked, "is there to pharmacists to become skilful and expert if the physicians make no demand upon them, but oblige them to send to a distance for preparations which they could make as well or better themselves? Any apprentice could pass over the counter and take pay for ready-made preparations. The pharmacist thus defrauded of his proper functions . . . . is degraded to the vocation of a mere shopkeeper."

* * *

Dr. Davenport further referred to the injury resulting to medical practitioners themselves through their thus promoting the keeping in stock of the very medicines they are accustomed to prescribe, done up in convenient packages, accompanied with full particulars as to the diseases they are supposed to cure, the doses, and method of administration. He pointed out that the druggist has the opportunity of becoming just as familiar with such medicines as the physician, since both get all their information from the printed wrappers, and he asked why a patient should go to a physician when a druggist can show him his own physician's printed certificate that the contents of a certain bottle are the best cure for the disease from which he is suffering.

* * *

An Evening Meeting of the North British Branch will be held in the Society's Rooms, 119A, George Street, Edinburgh, on Wednesday next, the 14th inst. The papers announced are a "Descriptive Note of a New Form of Hot Air Chamber, suitable for Pharmaceutical Purposes," by Mr. Thomas Maber; and "An Examination into the Acetic Ether of Commerce, with Suggestions for the Improved Manufacture thereof," by Dr. Inglis Clark.

* * *

The Anniversary Meeting of the Chemical Society is to be held on Friday, the 30th inst., at 8.30 p.m. At the ordinary meeting on Thursday next a paper will be read on "Some Condensation Products of Aldehydes with Acetoacetic Ether and Substituted Acetoacetic Derivatives," by Mr. F. E. Matthews.

* * *

The next meeting of the Chemists' Assistants' Association will be held on Wednesday, the 14th inst., when a paper on "Porcelain, its Manufacture and Composition," will be read by Mr. Herbert Cracknell.

* * *

At a preliminary meeting held on Monday last, the students attending the School of Pharmacy decided to attempt the formation of a Cricket Club. With this object an adjourned meeting will be held in the Society's house on Tuesday next, at 8.30 p.m., at which students and assistants desirous of joining the club are invited to attend.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, March 7, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, Hills, Radley, Richardson, Robbins, Savage, Schacht, Squire, Symes, Williams, Woolley and Young.

The minutes of the previous meeting were read and confirmed.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Ball, Henry.
Dangerfield, William Henry.
Deeks, William Thomas.
Prosser, Frank Henry.
Wilson, Joseph.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Cherrington, Geo. Widdowson...Newark-on-Trent.
Dangerfield, William Henry ...London.
Nicholson, Richard ....Darlington.
Prosser, Frank Henry ....Coleshill.

Chemist and Druggist.

The following registered chemist and druggist, who was in business on his own account before August 1, 1868, having tendered his subscription for the current year, was elected a "Member" of the Society:—
Paterson, James ....Aberdeen.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Adams, Benjamin..................Mansfield.
Bainbridge, Arthur ....Acton.
Beall, Samuel Smart ....Cambridge.
Bostock, Samuel Pass ....Hyde.
Clarke, Ethelbert...................Forest Hill.
Davies, John Myrddin ....Swansea.
Fletcher, Ellis ....Atherton.
Freeman, John Henry............Lower Tooting.
Gardner, Charles Edward ....Colesberg.
Hill, Francis.........................Macclesfield.
Moore, Frank Philip ....Dumfries.
Morgan, Alfred William.........Chatham.
Pritchard, Lewis T. Richard ...Aberavon.
Wood, William Arlington ......Bradford.

Modified.

Garrett, Thomas Philip ....Newport (Mon.).
Steeper, Samuel ....Swineshead.

ASSOCIATES.

The following, having passed the Minor examination and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Barlow, Arthur.......................Hull.
Boyd, Alexander ....Glasgow.
Caffyn, Ernest John...............Crawley.
Clague, Thomas Maltby ....Douglas.
Corder, Edward ....Norwich.
Doo, James Emile ....Atherstone.
Hadfield, James Havelock ......Manchester.
Heyes, Thomas Harry ....Bolton.
Houfe, Robert William ....York.
Jenkins, Thomas ....Swansea.
Lockyer, Joseph Ernest ....Deptford.
Mason, Hubert Huxley ....Clevedon.
Mitten, Flora ....Hurstpierpoint.
Neve, Annie ....London.
Ranken, Charles ....Sunderland.
Rees, David ....Newcastle Emlyn.
Sewell, Edward Ernest ....Whitby.
Smith, William Thomas ....Bath.
Stacey, Frederick Charles ......London.
Thompson, Charles Letchford...London.
Thompson, Frederic...............Scarborough.
Turner, Alexander ....Dumfries.
Woolliscroft, Henry...............Wrexham.
Young, Robert John ....Bideford.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Abbott, Herbert Edw. Tripp ...Lowestoft.
Arthur, John.........................Chesterfield.
Atherton, Albert George.........Tunbridge Wells.
Badcock, Henry Southgate R...South Petherton.
Barrett, Arthur Albert ....London.
Benjamin, John Blake............Brecon.
Bishop, Cecil.........................Brading.
Chattaway, William...............Leicester.
Cuff, Joshua Harcombe ....London.
Davis, Francis M. ....Leominster.
Deck, Arthur Albert ....London.
Dorning, Herbert Rigby ....Chorley.
Fletcher, Francis Round.........Netherton.
Hacon, Elizabeth Constance ...London.
Hayton, William Pattinson......Wigton.
Henderson, John George.........Middlesboro'.
Jackson, Albert Ernest ....Ipswich.
Jones, James ....Newcastle Emlyn.
Jones, Richard Alan ....Holyhead.
Kingston, William Richard .. London.
Lane, Henry ....Wednesfield.
Livesey, William Forrest ......Preston.
May, Samuel Augustus ....Jersey.
Owen, David James...............Swansea.
Parkinson, Joseph, jun. ....Preston.
Payne, William ....Wendover.
Perkins, Frank ....Newcastle-under-Lyme.
Price, Charles Cleaver............Bristol.
Riddiough, Fred. .. ..Leeds.
Rutter, William ....Masham.
Smith, Edwin ....Pendleton.
Somerville, Wm. Alexander ...Chorley.
Spyer, George Nathan............London.
Stevenson, Geo. S. Cartwright...Portobello.
Steward, Josiah William.........Bridgnorth.
Wallbridge, John George ......Liverpool.
Widgery, John ....South Molton.
Wokes, Thomas Siminson ......Hull.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Restorations to the Register.

The following persons having severally made the required declarations and paid a fine of one guinea, their names were restored to the Register of Chemists and Druggists:—

David Lindsay Macfarland, 503, Lawnmarket, Edinburgh.
William Rangeley Radford, 4, Enfield Road, South Kingsland, London, E.

ADDITIONS TO THE REGISTER.

The Registrar reported that—
William Adams, 19, Dudley Road, Birmingham; and
Edward W. Lane, Dameagnes Street, Nottingham;
having made statutory declarations that they were in business before the passing of the Pharmacy Act, 1868, and these declarations having been duly supported by qualified persons, their names had been placed on the Register.

LOCAL SECRETARY.

Mr. Garrad Baker was appointed Local Secretary at Chelmsford, in place of Mr. C. P. Baker, deceased.

AUDITOR'S REPORT.

The Secretary laid on the table the Auditor's Report for the financial year ending, December 31, 1882.

Several remarks were made upon the figures, the Council going into committee for the purpose.

REPORTS OF COMMITTEES.

FINANCE.

The report of this Committee recommended the payment of several accounts; that £800 be invested in Consols on account of the Benevolent Fund; and that £3000 New Two and a Half per Cent. Stock be purchased on account of the General Fund. It also stated that the Committee had considered the desirability of changing the mode of investment of the Society's funds, and recommended that a portion, not exceeding three-fourths of the invested capital of the Society, be re-invested as occasion might offer in freehold ground rents or freehold land, and that the President, Vice-President and Treasurer for the time being should be constituted a committee to watch such opportunities as may appear to them desirable to secure investments for the Society either in freehold ground rents or freehold land.

The PRESIDENT explained that the Committee had thought it desirable to purchase New 2½ per Cent. stock, instead of Consols or New 3 per Cents., because while the return per cent. was only 1*s.* 3*d.* less there was a probability of this Stock rising in the market, and it was considered likely by financiers that the Three per Cents might be paid off at par at no distant date, and this would entail a loss. The main point, however, in the report was that which recommended the investment of a portion of the funds in ground rents or suitable freehold land. The Society was authorized by the Charter to invest in such securities, though not in debentures, and the high price of Consols and New Three per Cents had led the Committee to think that it would be desirable to invest some of the Society's property in freehold ground rents, which would yield an interest approximate to that which was now received, with a possibility and probability of getting a greatly increased income at a future time. The question had been discussed on several previous occasions, but Government Stocks had then always been at a much lower price than now, and the advantage attending investments in them of being realizable at any moment had hitherto led the Council not to entertain the proposal. But now that the property of the Society was considerable, about £20,000 on the General Fund Account, and a similar amount on that of the Benevolent Fund, the question whether some portion of it could not be so dealt with as to give a prospect of greatly increased benefit in the future was of considerable importance. Freehold ground rents were not unfrequently in the market; they paid in some cases 3 per cent. only, in others as much as 4 per cent., the rate varying according to the time at which the reversion would fall in. The Committee was of opinion that, with regard to the General Fund, if an investment could be obtained which would return even only 3 per cent. it would be wise to take it, looking to the probability of a much larger return in future. Freehold ground rents were generally secured by property of an annual value of at least five times the amount of the ground rent. By purchasing ground rents which had fifty or sixty years to run the Council would be investing in a way which need not diminish the present income, and at the same time would be providing increased means for carrying on the Society by its successors in future years. With regard to the General Fund, as it was not absolutely necessary that the whole of the interest now received should be maintained, it was suggested that the endeavour should be to select for investment ground rents which would fall in at an early date rather than to obtain the highest rate of interest; but with regard to the Benevolent Fund, it would be desirable to buy ground rents having a long term to run, in order to obtain as large a present income as possible. Nearly all the Consols now standing in the name of the Society had been purchased at about 90, so that at the present price a considerable profit would be obtained on the sale, for re-investment. As to the purchase of land, it was not intended to buy large pieces of land, and cut it up in building lots, or to speculate in land in any way; but if it happened to come to the knowledge of the Committee that there was a field on the outskirts of town, on which there was a moral certainty that buildings must be erected sooner or later, the land might be purchased and let for building purposes. It could not be expected that such opportunities of investment would be found every day, and, therefore, the Council was asked to authorize the immediate investment of cash in hand as stated in the report, and that the President, Vice-President and Treasurer should have power to look out for opportunities for re-investment in ground rents or land to the extent of not more than three-fourths of the total amount of invested capital. By this means it was hoped that the present income for benevolent purposes would be secured, and that in thirty or forty years' time the Society would be placed in a much better financial position than anyone could now contemplate.

The Council went into committee to discuss this matter. On resuming, it was moved by Mr. GREENISH and seconded by Mr. SYMES—

"That the report and recommendations of the Finance Committee be received and adopted."

An amendment was moved by Mr. WILLIAMS—

"That the report and recommendations of the Finance Committee be received and adopted, with the exception of that portion which recommends the re-investment of part of the Society's funded capital."

Mr. RICHARDSON seconded the amendment, which was put to the vote with the following result:—

For the Amendment.—Messrs. Bottle, Richardson and Williams.

Against:—Messrs. Andrews, Atkins, Borland, Butt, Carteighe, Churchill, Gostling, Greenish, Hampson, Hills, Radley, Robbins, Savage, Schacht, Squire, Symes, Woolley and Young.

Mr. HAMPSON then moved another amendment, which was seconded by Mr. RADLEY—

"That the report and recommendations of the Finance Committee be received and adopted, with the exception of the recommendation to re-invest a part of the Society's funded capital in freehold land."

The Council divided, with the following result—

For the Amendment:—Messrs. Atkins, Borland, Bottle, Gostling, Hampson, Radley, Savage and Squire.

Against:—Messrs. Andrews, Butt, Carteighe, Churchill, Greenish, Hills, Robbins, Schacht, Symes, Woolley and Young.

Mr. Williams and Mr. Richardson were present, but did not vote.

The original motion was then put and carried.

EDUCATION AND EXAMINATION.

The following report was presented:—

Report of a Committee consisting of the President, Vice-President, Messrs. Bottle, Greenish, Hills, Schacht and Symes, appointed by the Council in July, 1882, (*Pharm. Journ., July* 8, 1882, *p.* 35), *for the purpose of considering the best method of giving effect to the resolutions of the Council of April* 5 (*Pharm. Journ., April* 15, 1882, *p.* 845), *upon the report of the Special Committee appointed to inquire into the relation to each other of Pharmaceutical Education and the Pharmaceutical Examinations,—and of reporting thereon to the Council; together with any suggestions it may desire to advance as the result of its deliberations.*

The Committee considers it unnecessary to recapitulate the various steps by which the subject of its report has reached its present position. It has nevertheless endeavoured to weigh with due care every fact and consideration that has arisen throughout the investigation; and it now desires to present a series of recommendations, which to some extent modify and amplify those previously presented to the Council.

Recommendations.

The Committee recommends the following as the course to be required of every candidate for qualification to practise pharmacy.

1st. The candidate must pass the Preliminary examination of the Pharmaceutical Society, or one of the examinations the certificates of which are accepted in lieu thereof, and be registered as a Pharmaceutical Student.

2nd. The pharmaceutical student must then enter the pharmacy of a pharmaceutical chemist, or a registered chemist and druggist who keeps an open shop, as apprentice or pupil, or in some other capacity as a learner; and be so employed for three years.

Note.—During these three years he may or may not, at discretion, attend one or more of the courses of lectures that form part of the "curriculum" approved by the Council in April, 1882 (*Pharm. Journ.*, April 15, 1882, p. 846).

3rd. After the expiration of the three years shop experience, the pharmaceutical student is eligible to offer himself for the *first portion* of the qualifying examination on production of evidence of registration as a pharmaceutical student and of having been employed for three years subsequent to such registration in the shop of a pharmaceutical chemist or a registered chemist and druggist.

This *first portion* of the qualifying examination to be a written one and to include the following subjects:—Prescriptions, Pharmacy and Theoretical Chemistry.

This *first portion* of the qualifying examination to be conducted in London, Edinburgh, and such a number of centres in the provinces as will allow the superintendence of each examination by a member of the Board of Examiners.

4th. An interval of not less than *one year* must elapse between the date of passing the *first portion* of the qualifying examination and the date of entering for the *second portion* of that examination. During that interval the above-named "curriculum" *must be completed.*

5th. On entering for the *second and final portion* of the qualifying examination, the pharmaceutical student must produce evidence of being twenty-one years of age and of having fulfilled the conditions mentioned in the previous paragraph.

This *second and final portion* of the qualifying examination to be practical and "*vivâ voce*," and to include the following subjects:—Practical Dispensing, Botany, Materia Medica, and Chemistry.

This *second and final portion* of the qualifying examination to be conducted in London and Edinburgh only.

With respect to the "Curriculum" of study already approved by the Council (*Pharm. Journ.*, April 15, 1882, p. 846), the Committee recommends that in the announcement with respect to the time to be occupied in the suggested course of Practical Chemistry the following modification be made.

Instead of—

"*Time*: 5 months, 3 hours daily,
or
3 months, 5 hours daily,"

Read—

"*Time*: 10 months, 2 hours daily,
5 months, 3 hours daily,
or
3 months, 5 hours daily."

And in the foot-note that accompanies the above notice

Instead of—

"A modification of the time to be occupied in this course would be accepted provided such modified course extend over a period of not less than three months, and that not more than five hours in any single day are occupied in its work."

Read—

"A modification of the time to be occupied in this course will be accepted provided such modified course extend over a period of not less than three months, and not more than twelve months, and that not more than five hours in any single day be devoted to practical work."

The Committee further recommends that these recommendations and those previously adopted by the Council be incorporated into the bye-laws, according to existing regulation, and that they be announced to come into force on and after December 31st, 1887.

NOTE.—The effect of this will be that all candidates who shall pass the Preliminary examination AFTER December 31, 1883, will NOT be eligible to present themselves for the first portion of the qualifying examination until the expiration of a period of three years from the date of their having been registered as having passed the said Preliminary examination. During these three years they must be engaged in acquiring shop experience. They will also be required to produce certificates of having passed through the curriculum of study already adopted by the Council before presenting themselves for the final portion of the qualifying examination.

Candidates who shall have been registered as having passed the Preliminary examination BEFORE December 31, 1883, will be eligible to present themselves for the Minor examination, under the regulations now in force, during and up to the end of the year 1887.

———

Mr. SCHACHT moved:—

"That the report and recommendations of the Education and Examination Committee be received and adopted."

He said he should not trouble the Council with any remarks, the report having been in the hands of the members for nearly a month, and he hoped that it had received thorough attention. It would be recollected that at the date named in the preamble a series of resolutions was adopted by the Council. On that occasion he found himself, with some other gentlemen, in a minority on certain points, but they thought it was possible that further consideration might alter the opinions of some of the Council, and it was fair to state that some of the recommendations contained in their report did refer to some of those points about which there was then a difference of opinion. The considerations which then led the minority to certain conclusions had been amplified and extended in certain directions, by which he ventured to hope that the matter being broadened over they might find themselves on more common ground. Those points referred to what was called clause 4 in the old recommendations; he would simply say that in the recommendations now presented, the whole process by which the student should accomplish his qualification was tabulated in a manner which was thought to be the most easy way of suggesting improvements for the future. With reference to the differences between these recommendations and those adopted by the Council last April, there was the division of the final technical examination into two portions, one of which was to be as it were preliminary, and the other final. The Committee thought that the first portion might fairly be conducted in the provinces, notwithstanding there would be many who would be tempted to dissent from that if it were the final and qualifying examination, but as it was simply preliminary to the final, the Committee thought the objections were not such as to over-ride the advantages which would attend such a division. In addition to that it was thought that the ease with which the whole business of the examination could be conducted was such as would justify its adoption; the comfort to the candidate, and the absolute certainty with which it could be conducted would overbalance any disadvantages. It would also be noticed that the final portion was distinctly declared only to be capable of being conducted in London and Edinburgh at present. The further alteration was that the time to be occupied in one portion of the curriculum, that which applied to practical pharmacy, should be capable of extension to a longer period, the purpose being to permit those who had the opportunity of taking up their practical chemistry during the time of pupilage to do so, so that they might devote more time afterwards to other portions of their work. He must say with regard to this ideal scheme of training, that on considering it very carefully, he had failed to detect any spot in it. It seemed to him to be the most exactly correct process by which it could be hoped to train the future pharmacist which his mind could conceive. It might, perhaps, present certain difficulties, but the whole result would be so great a gain on the system which at present existed, that he most sincerely hoped that his colleagues would see their way to its adoption.

Mr. Symes seconded the motion.

Mr. Hampson said he wished to move an amendment, but it must not be supposed that because he did so he had an antagonistic feeling towards any sound educational scheme. He believed in education all round, and, therefore, it was with considerable diffidence that he took exception to certain parts of the report. He did, however, take exception to the third, fourth and fifth recommendations and would move as an amendment that those be omitted. About twelve months ago he felt it necessary to retire from the Committee, when the first report was presented to the Council, and a vote taken with the result that the fourth recommendation was eliminated. He still held the same views as he did then, and he would briefly state his reasons for so doing. He must first go back to the time when this educational inquiry took place, and if he went far enough it would be found that the inquiry merely sprang out of the astute brain of one of their professors. No doubt he represented a certain amount of professorial opinion; he represented the impression that there was a great deal of cramming going on and this was really a sort of anti-cram inquiry. So far so good, and he admitted that inquiry was perhaps necessary, and it resulted in the proposal of a curriculum. With that he agreed most heartily, because he believed it was to the interest of the student, and it had a special charm to him, because it would have the effect, if brought into operation, of establishing sound educational centres, which would be the backbone of any educational system. But he hesitated to go further; he believed the imposition of the curriculum was a sufficient guarantee for sound education. The fact that a number of candidates were regularly rejected was a security that only capable men were admitted to practise pharmacy. But if all these arbitrary conditions were instituted, the possibility of cramming would still continue. If there were a regular course of education provided it would remove any obstacle which arose from imperfect education. He might be old fashioned, nevertheless his impression was that the training of pharmacists in the present day was quite equal to the demands of the public. There had been no outside demand made by the public, and the Government officials who attended the examinations had not represented that they were insufficient or ineffective. He heartily agreed with the plan of insisting on the apprentice passing the Preliminary examination before he was articled, and also in insisting upon apprenticeship, and that there should be a curriculum, but he objected to imposing other conditions beyond that, which he thought objectionable and entirely unnecessary. Then the question arose, whether the Council had power to introduce these changes. He believed the Act of Parliament had been unduly stretched already, in imposing the condition that a candidate should be twenty-one, which was distinctly illegal in his opinion, and the division of the examination into two parts, as now proposed, he believed was utterly beyond the powers the Society now possessed. It would appear from the report that even according to the present state of the law an endeavour was to be made to stretch the Act of Parliament still further. What would be the effect of this scheme on the country? It would be a very long time before it could possibly come into operation, for certain educational centres would have to be established, and he would recommend the Council rather to defer the discussion than to come to a hasty conclusion upon it. He objected to dividing the examination into two parts and making the candidate wait twelve months between. It was all very well to style the first examination a preliminary part, but it was nothing of the sort, it was a distinct examination. It would be really establishing two examinations. That might be a good thing, though he did not believe it was, but it was illegal. The tendency would be if this scheme came into operation for the two distinct examinations to become stricter and stricter, as all examinations did. He wished the state of pharmacy were such that such a scheme could be justly established, but it was not so. If chemists had real pharmaceutical work to do in their various businesses the whole thing would be a bagatelle; everyone would take an interest in the movement and education would become more perfect. But he maintained that the men who passed already, the average men, were, as a rule, quite equal to the demands of the occasion, and equal to the safety of the public. The man who passed his examination went back to his business and found that his learning was useless except as a mental exercise. If the Council accepted the curriculum and left out the other portions it would meet all the necessities of the case. He would move—

"That the report and recommendations of the Education Committee be received, with the exception of the recommendations numbered 3, 4 and 5."

Mr. Williams seconded the amendment and said he should have been prepared to go even further. He should like to speak at some length on this question, but was not well enough to do so. He agreed with what Mr. Hampson had said, and, of course, he agreed that an apprentice or pupil should pass the Preliminary examination before entering the trade, and also that he should pass a certain time in the actual practice of the business, as an apprentice or student, because that was the real mode of education. He was quite aware that in practice it was often very deficient, because in many cases there was not the means for apprentices to acquire a knowledge of their business properly, but at any rate the shop experience he looked upon as an essential point. There was no doubt a curriculum of some sort was also essential to the education of the chemists of the present day. They had to occupy a somewhat scientific position before the public, and he believed they had in the past lost a good deal of what would have been a legitimate source of profit through want of the scientific acquirements they ought to possess, and which he trusted the curriculum would tend to give them. But to draw a hard and fast line and to say exactly what the curriculum should be, and to leave no elasticity in these regulations, was in his opinion a mistake. It seemed to him an arbitrary condition to say that there must be twelve months between the two portions of the examination, and he should be sorry to accept it, especially as he understood the whole of the curriculum must be gone through in that year.

The PRESIDENT said what was intended was that a man might begin his curriculum during the period of his apprenticeship; but if after passing the first examination he had not completed the curriculum, then he must complete it before passing the second portion.

Mr. WILLIAMS said the objection remained, as Mr. Hampson had stated, that the examination was divided into two, and he believed that to be objectionable and illegal. Probably certain clauses had been put into the new draft Bill which had been submitted for the approval of the Council at their last meeeting with the view of enabling the Council to alter the examinations in the way here indicated, but at present he was quite clear the Council had no legal power to do so, and on that ground alone he should feel bound to vote against those recommendations. The curriculum, as here laid down, was simply a copy of the ordinary curriculum of the Pharmaceutical Society's School, which some thought had not proved in practice as satisfactory as could have been desired. It might possess many merits, but he did think it would be wiser to leave the new curriculum more elastic. Another point he had remarked was the recommendation that this scheme should come into operation on and after December 31, 1887, and it seemed to him an absurdity to give a date to a thing which the Council had no legal power to carry out.

Mr. WOOLLEY was much disappointed to find Mr. Hampson opposing this scheme, which he considered a distinct advance in the educational progress of the Society. Mr. Hampson's last objection was that the position of pharmacy was not what it ought to be; in fact, he brought forward the old objection, which they were getting rather tried of in the country, that the game was not worth the candle. As long as men were found who would take up that position, the game never would be worth the candle, because they were not the proper men to play the game. Then he went on to say that the pharmacists of the present day were equal to the demands of the occasion, and no doubt there were a great many men who were equal to the occasion; but taking the whole body of pharmacists throughout the country, he thought they were not equal to the occasion. Only the other day a meeting of pharmacists was summoned in Manchester to consider the Pharmacy Bill, but only six persons were present; that showed that the men were not equal to the occasion. It would be a great advantage to every young man about to engage in pharmacy, to have his whole career before him and to know what he would have to do, which up to the present time had not been the case. There were many cases of disaster, men presenting themselves several times for examination and being rejected; all that would be done away with in future to the benefit of every one. Mr. Hampson doubted the examinations being inefficient; but it had been shown repeatedly that the results had not been what they might be, and the only way of overcoming the difficulty was to have a certain curriculum which the young men must follow, and be able to show that they had given a certain amount of solid study to their profession. Mr. Hampson deprecated coming to a hasty decision, but how long was it necessary to consider this. Had they not all had time to make up their minds? Dividing the examination into two parts was to his mind the greatest boon; he should have been only too glad if his examination had been divided into two parts, and he could have gone through the theoretical portion of it in the country and come up to London afterwards to complete his qualification.

Mr. HAMPSON wished to explain that his reference to the efficacy of the education and examination was simply this, that there was no proof of any complaint on the part of the Government assessors that the examination was inefficient. Unqualified men had been turned back invariably and efficient men had passed.

The VICE-PRESIDENT said that all he had to say had been said before. There were certain propositions of Mr. Hampson he did not for a moment dispute, but he could not agree with his last remark, because it was not a question of the efficacy of examinations but of education; it was there where the deficiency lay. Notwithstanding the supineness of Manchester, which might be taken as typical of the state of feeling in the country generally, he was disposed to go largely with him, that, taking the average of the men passed through the mill and receiving the stamp of authority, they were men fairly up to the mark; but the special object of promoting this educational measure was to promote the benefit of the students. He had been deeply impressed with the fact during the twelve months he had been in the examination room, that many men came up unprepared. He had letters in his possession bearing out the conclusion that there had been in early days scarcely any advantages in the country for education, and many of these men had trusted to get up what was required by three, four or five months' study, and he had even known of a man coming up for only a fortnight's training and expecting to pass. They all agreed as to the advisability of a curriculum, and with regard to the division of the examination he agreed with Mr. Woolley that it would be an immense advantage to the student. The theoretical portion he could acquire from books in the country and his mind would then be relieved of a large amount of anxiety when he came up to London. With a limited area for investigation, he would be able to concentrate his attention on that, and would consequently be in much better form for passing the test which was required. He was convinced that the written portion of the examination might be conducted with perfect integrity in the country. In the main he agreed with the statements of Mr. Schacht that this scheme had a great many merits, that there were very few spots about it, and he hoped it would be carried by a large majority, and go forth to be tested by experience, because he was satisfied it was in the interests of the students, the masters and the public.

Mr. BORLAND said, according to the opinion expressed by Mr. Hampson, the attempt to impose a curriculum under the existing Act was illegal; but he had always been of opinion that the endeavour to enforce this curriculum would be carried out in conjunction with the proposed Act of Parliament. The discussion had hitherto failed to a considerable extent to take into consideration some of the practical results which would follow from this proposed curriculum. In the discussion last year he remembered bringing forward an objection to the botanical part, and he was then asked to ascertain the conditions which prevailed in Scotland. He had done so, and he had found that in the three Universities in Scotland the time devoted to botany was only three months, and the curriculum here imposed a term of five months, so that students, if that were insisted upon, would have to devote two years to botany, unless special arrangements were made for their benefit. Otherwise they would have to study at inferior schools, where the very system of cramming, which was so much objected to, might very likely be carried out. He did not say there were not schools in Scotland capable of teaching that science; at the same time it would be greatly to the benefit of young men coming into their ranks if they were induced to attend the Universities. With regard to the fourth clause, providing for an interval of not less than one year between the two portions of the examination, he should have preferred it to be six months, because he thought a young man who had passed his college curriculum, if he were willing to present himself, should be allowed to do so, providing he were twenty-one years of age. As he could complete his curriculum in five months if he chose, there did not seem to be any necessity for forcing him to take an interval of seven months. It had been stated over and over again that when a boy left school he should present himself for the Preliminary, and, on the same grounds, when a man left the University he ought to be able to present himself for the final examination. He also agreed with Mr. Williams that the clause fixing a time for the scheme to come into operation should be omitted.

Mr. Symes said the most potent objection to this scheme was that it was beyond the powers of the Council to carry out; but the members of the Council were not solicitors and were not going to discuss the power they had under the Act. When the motion came before the Council on a previous occasion, and a large portion of the recommendations were adopted, this question was not raised, and the sole question before them was whether these changes were desirable. He should rather see the whole of the recommendations rejected than that the scheme should be adopted piecemeal. This was not done in the interest of the Council, but principally in the interest of students, though perhaps they would be the last persons to think they were considered. They might think there was some little hardship upon them, but he was satisfied that anyone who would carefully go into the matter would conclude that it was in their interest, without being against the interest of anyone else, that this was proposed. Mr. Hampson asked for evidence that this improvement was necessary, and he had made a note at the time that most of the evidence was of a negative character; pharmacists had not that social position that they would have if they were, as a whole, educated up to the point they ought to be for the requirements of their class. But Mr. Hampson himself supplied a much better answer later on to the effect that the business was in a most unsatisfactory condition. That, in itself, was evidence that improvement was necessary. It was an old remark, that so long as men grumbled at their position and objected to do anything for the advancement of pharmacy, so long would it be where it was now. Mr. Williams had referred to the curriculum in force at the Society's school, which he said had not answered very well; but he must say he had been in the laboratory a short time that morning and he was pleased to find it so full and working so satisfactorily. Mr. Hampson had not ventured on one statement which he had pressed strongly on a previous occasion, and that was the objection he made to having any portion of the examination conducted in the provinces. He had thought a great deal over that objection when put forward originally, and came to the conclusion that it was entirely groundless. He was quite satisfied that if in a centre like Liverpool there were twelve candidates, who, if they had to come to London, would have to expend some £30 or £40, the whole thing could be done by the Society quite as efficiently for as many shillings. If these young men paid their fees they were entitled to be examined at the expense of the Society and not at an increased expense to themselves. It was a different thing to the final examination which gave them their qualification, and the Committee had been very particular in stating that this first portion of the examination is not to entitle the candidate to any kind of document whatever; his name would simply be recorded as having passed and that would entitle him to come up for the final and qualifying examination. He did not believe in any scheme being perfect, but this having anticipated almost every objection which could be raised to it he hoped it would receive the unanimous support of the Council.

Mr. Savage said there was a feeling in the country that the present educational arrangements were more than sufficient to qualify a man for the position which he afterwards occupied. The evidence brought forward was the large number who failed to get through the examination, but it seemed to him that that led to the directly opposite conclusion. Only last week he had a communication from a gentleman, formerly a member of the Council, objecting to the curriculum on the ground that it would entail greater expense on the candidate; but he felt convinced that the curriculum was necessary, for the large number of failures indicated that the Preliminary examination had not been sufficient.

Mr. Greenish agreed in the main with the report of the Committee, and being a member of it perhaps some apology was necessary for repeating his objection on the present occasion. It could not be said that he was an opponent of systematic education, for long before the curriculum became a pass-word he had published one or two papers in the Journal advocating a course of study similar to that required in North and South Germany, or as near to it as could be attained in this country. He could not go quite so far as Mr. Hampson's amendment; but he still held the same objections to the scheme which he mentioned twelve months ago, and he had remained on the Committee when he thought he ought perhaps to have retired, with a view of having his errors pointed out and acquiring some information which might enable him to change his opinion. At the last moment, however, he was obliged to say that he was not convinced on one point, and that was the very important point of the division of the examination, which involved one portion being a written one. Mr. Symes had just stated that the first portion was not a part of the qualifying examination; but seeing that it included prescriptions, pharmacy and theoretical chemistry, he (Mr. Greenish) could not agree to that, and he also took it that as a man could not enter for the second portion until he had passed the first, that first part must form a part of the qualifying examination. He also objected to the division. The three technical subjects of the present examination were reading prescriptions, pharmacy, and dispensing, and they formed the real portion of the examination on which the safety of the public mainly depended. After a candidate had passed the examination room his botany might get rusty, and even his materia medica, and also his chemistry, and in seven cases out of ten they did; but if he were to be a pharmacist at all, and if the safety of the public were at all considered, accurate dispensing, correct reading of prescriptions, and pharmacy must remain to him. Whether it was conducted in town or country he must express his conscientious conviction that an examination in prescriptions and pharmacy could not be so well conducted by written examinations as personally when the examiners sat by the side of the student. It seemed to him that the three technical subjects on which the safety of the public mainly depended were in this arrangement completely frittered away.

Mr. Young agreed very much with what Mr. Greenish had said with regard to the division, and should have preferred subjects which an apprentice could learn during his three years' term, such as practical dispensing, being included rather than theoretical chemistry; but he could not throw away the scheme because this change had been made. At one time he believed that no curriculum or anything else was necessary, and that if a man had knowledge sufficient to enable him to pass the examinations it was enough; but after some years' consideration he had come to the conclusion that a curriculum would really be advantageous to the student, and therefore in his interest he should vote for this scheme. He knew nothing about the legality of the movement, but did not see that there could be much difficulty about it. It was much easier for a student to come up prepared with three subjects than to come up stuffed with half a dozen, and he had, again and again, in his own neighbourhood, pressed the propriety of doing something to get rid of this concentration which seemed required at a particular time. He rather approved of the interval of twelve months between the two portions of the examination. Under the present system, when a young man passed the Minor he rushed into business at once, before he had gained much experience; but under the new system he would have to wait twelve months and probably most men would take longer, and it would be good for them in the end to do so.

Mr. RADLEY asked if it was intended to do away with what was called the Minor and constitute this the one examination.

The PRESIDENT said that was rather a question of the new Bill. That would be the effect if that Bill passed.

Mr. RADLEY said he was favourable to one examination rather than to two.

Mr. BOTTLE, as a member of the Committee, should have preferred to have given a silent vote and simply endorsed the views of the majority; but as several other members of the Committee had already spoken, he might say a word with regard to his own views. As he had remarked before, he looked upon all legislation as a compromise, and he regarded this scheme in the same light. He regretted that Mr. Hampson had not moved to reject the entire scheme, because if the third, fourth and fifth recommendations were taken out there would be nothing worth having left. With regard to the division of the examinations, one portion was as much qualifying as the other, and he considered it advantageous in this way, that many men at present did not attempt to take up the theoretical portion of their studies during their apprenticeship, thinking that they could get it up in a few weeks afterwards. Under this system a young man might, if he liked to be a little studious during his apprenticeship, get up enough of these three subjects to pass in at a centre convenient to himself. To some extent he shared Mr. Young's regret that practical dispensing was not a portion of the first examination; but that could not be dealt with by a written examination, and, therefore, it was deferred to the final portion.

Mr. HILLS did not think Mr. Bottle's remarks entirely explained the reason for this division of subjects. If the dispensing formed part of the first portion of the examination, he suspected that a cry would be raised that it would be quite sufficient for the needs of the public if a man were fairly up in prescriptions, pharmacy, and practical dispensing. It had been one of the objects of the Committee to impress on the pharmaceutical student that he should be working up some of the scientific subjects quietly in the country while engaged in practical work, and that theoretical chemistry should not be something he could put off until he had passed the first portion—that in fact it should be the basis on which he was undertaking his daily duty. Mr. Borland seemed to think there would be some disadvantages to the student in having a year's interval between the first and second part, and that thus considerable time might be wasted; but the candidate might pass the first portion of his examination whilst still in a situation, and not commence certain parts of his curriculum for five or six months subsequently. There seemed to be a little difference of opinion between the mover and seconder of the amendment, for whilst Mr. Hampson said pharmacists at the present time were equal to the occasion, Mr. Williams said they had lost in times past many advantages that they might have had, because they were not up to the mark.

Mr. WILLIAMS said he did not see where the contradiction was.

Mr. HAMPSON asked if the opinion of the Solicitor had been obtained on the legal aspect of the proposal; and supposing the new Bill did not pass, was it contemplated to put this scheme into force.

The PRESIDENT said the opinion of the Committee was that, substantially, these recommendations could be carried out under the existing law; but if they could not in their integrity, it was desirable they should be as far as practicable.

Mr. HAMPSON wished to know whether the Solicitor's opinion had been obtained.

The PRESIDENT said the Solicitor had often expressed some doubts as to the expediency of dividing the examination; but the Committee believed that the Council had as much power to divide the Minor into two parts as it had to have the Preliminary separated from the other portion.

Mr. WILLIAMS said there were many minor points, such as conducting the examinations in the country, which, he thought involved legal questions, and he should like to know whether the Solicitor had been consulted or whether the Committee had acted simply on its own judgment.

The PRESIDENT said the Solicitor had only been consulted as to the division of the examination. As to conducting a part of it in the country that was a question of bye-law. The whole of these matters would have to be incorporated into bye-laws approved by the Council and by the Society at a special general meeting, and then approved by the Privy Council in the ordinary way.

Mr. WILLIAMS said bye-laws could only be made within the limits of the Act of Parliament. It must be obvious to everyone who read the Act of Parliament and the bye-laws that the Council had not power under the present Act to carry out this scheme.

Mr. SCHACHT, in reply, said it did not appear to him that the adoption of the report involved the question of the possibility of carrying it out under the present law or another law. The first thing to arrive at was the course which it was desirable to adopt, and that was the only subject at present before the Council.

Mr. HAMPSON took exception to that view. Part of the report mentioned a time when the scheme was to come into operation, and that was as much a portion of it as any other.

Mr. SCHACHT said he asked the approval of that recommendation. If it were approved, the Council would of course take the best means possible for carrying it out. He had his own opinions about the matter, but did not think it desirable to intrude them on the Council now. The present question was simply whether those were the right principles to adopt in the training of young men for the future, and on that he should have but few words to say in reply, for looking carefully into the objections raised they resolved themselves into a very few points. He did not wish to undervalue their importance, but now and then points had been touched upon which had been already decided in past times. He would therefore not enter into any consideration of the question whether it was desirable that the system of education should be reorganized. The question whether men came up fit or unfit had, in his opinion, been settled. The new points for consideration that day he had before referred to, and on those he would once more say a word, because they had been to some extent attacked. In the first place he would refer to the criticism that any division of the examination was to be estimated as a separation into two examinations. That seemed to him a point not of any great importance, but seeing that it was not so considered in many other cases it might be fairly taken in their own case as a portion of one examination. Many medical examinations consisted of two portions, and some of three. A man studying medicine had to pass two or three examinations, but he did not get the smallest advantage outside the effect on his own training by having passed the first or second; it was not until he passed the final portion that he was credited with being anything else than a student. The advantage of dividing the examination was not only that it cleared away a certain portion of the student's work, but it was calculated to be of the greatest importance in the student's own career it brought him up at intervals to the position that he was being looked after by a central body and was required from time to time to show he was doing some work, and work which would ultimately qualify him for a vocation in life. At a recent meeting in his own neighbourhood one very sagacious man suggested that it would be extremely useful if the Society could institute an annual examination for all pupils. He did not suggest that it was practicable, but that it would do an immense deal of good to the students. That might be an extreme view, but it was quite correct, and this intermediate or first portion of the examination would have the same effect. It put before a man a point that was not too far off which he had to reach, and then he went on again to a further point, and this would help to keep him systematically and carefully to his work. Supposing the division were admitted, there was an important objection made to the special division proposed, and it had been urged very strongly by Mr. Greenish that the practical subjects should form the first part and the three scientific subjects the last. To that he had always felt the gravest objection. In the first place, if the objection took place at all, the first portion must consist of those subjects in which a student could be examined by a written process, and a man could not be examined as to his capability in dispensing by any written process. A still more important reason in his opinion was, that when a man declared himself, or aspired to be a real dispenser he should not be able simply to put so much into a mortar and make a good pill of it, but that he should know how, from a knowledge of chemical principles, to manipulate properly the materials he was called upon to dispense. He did not think much of a man who was simply capable of mechanically fulfilling the instructions on a bit of paper and sending the result out either as pills or mixtures. If dispensing meant anything, it meant bringing to the compounding of medicine all the intelligence it was capable of, and he would, therefore, take that as the culminating point of the examination. If a man could dispense well, according to his interpretation he could do all the rest, and might pass with the best hall-mark that could be given him. The division he proposed was open to one serious objection, no doubt; they were obliged to include pharmacy. But it only meant a portion of pharmacy, because there were many points of pharmacy about which a candidate should be examined, which could not be well done by a written process, and those he hoped the examiners would see they could take under the heading of materia medica. A great deal, however, could be done in writing, and such portions could fairly be taken in the first part of the examination. The division was, after all, a sort of compromise, the endeavour being to get that portion which could be done by a written process in order that it might be conducted in the country. The scheme now suggested was one which guarded against any possibility of immorality; that was a strong word, but not too strong, for it would be most decidedly immoral to allow anything which could compromise in the slightest degree the absolute *bona fides* of any examination. It was proposed that a member of the Board of Examiners should be present at each examination, the number of centres being limited accordingly, and under that condition he did not see that there could be any objection. With regard to the point raised by Mr. Borland as to the course of five months for botany, that was a point which might be modified at any time. The great point was the security the Council must have that a full and complete system of botanical study should be undertaken by those who taught the students. If the peculiarity of any district, like Scotland, prevented it being carried out in a particular form, he saw no reason why the matter should not be met by special regulation. Again, with regard to the interval between the two portions of the examination, he should be quite willing that the interval should be six months if the model system of training could be secured in all cases, namely, that during the three years' training certain work should be carried on, and then six months should be devoted to practical work in the laboratory. That would be sufficient, and he should be glad to find that that was the course practically adopted in the future. But it must happen that in a great number of cases a small portion of the curriculum only could be fulfilled during the first three years of pupilage; many pupils would be in localities where they could not obtain the instruction required, and then it would be necessary for them to take the whole of their lecture teaching after they passed through their pupilage. In such cases it would be a great misfortune to say it could be done in six months, because it would be nothing less than recommending a system of cram of the worst order. It was from that point of view the Committee said the only escape was to make the interval longer. He regretted that there was not perfect unanimity on this point, and that Mr. Hampson had not continued on the Committee. What was aimed at was nothing but a more complete training of the pharmacist for the future, the difference of opinion being only a question of degree, and he was happy to think the degree was becoming more and more limited in scope.

Mr. Borland wished to explain with regard to the courses of botany in Scotland, that there were quite forty-eight lectures given, but they were given in three months instead of in five.

The President said it would be quite open to introduce a modification of the regulations to meet such cases at any future time.

The amendment was then put, with the following result:—

For—Messrs. Hampson and Williams.

Against—Messrs. Andrews, Atkins, Borland, Bottle, Butt, Carteighe, Churchill, Gostling, Hills, Radley, Richardson, Robbins, Savage, Schacht, Squire, Symes, and Young.

Mr. Greenish was present but did not vote.

Mr. Williams then moved a second amendment to the effect that the paragraph in the report fixing the time when the regulations should come into force should not be adopted.

The amendment not being seconded fell to the ground.

The original motion for the adoption of the report was then put and carried.

The Pharmacy Acts Amendment Bill.

The Secretary then read the following communications:—

From the Council of the North British Branch containing certain suggestions with regard to the draft Bill, to which it gave a general support.

From Edinburgh, enclosing a resolution passed at a meeting of chemists and druggists held in that city on February 22, to consider the Pharmacy Acts Amendment Bill, to the effect that that meeting gave its cordial support to the Bill. The meeting also recommended that the exemption from jury service should be extended to all persons qualified under the Pharmacy Act who were engaged in business.

From the Chemists and Druggists' Trade Association of Great Britain, dated Birmingham, February 28, enclosing a series of suggested amendments to the draft Pharmacy Bill which were adopted at a meeting of the Executive of that Association held on February 19. The principal recommendation was that the whole of clause 2 should be expunged and that the articles in the special schedule referred to in that clause be added to Part 2, Schedule A, of the Pharmacy Act, 1868. Another suggested amendment was the exemption from jury service of all registered chemists and druggists.

From the Committee of the Registered Chemists' Trade Association of Liverpool, expressing a general approval of the Bill. The Committee suggested that the new technical term "poisonous articles" was calculated to cause confusion and recommended that the articles comprised under it should be put in a third part of the poison schedule of the Act of 1868 or a "poison schedule" of this Act; also that the usual consideration of existing vested interests should be granted to assistants who have been acting as managers of branch shops for a term of not less than three years previous to the passing of the Act, or who may pass a Modified examination provided for them as "existing managers."

It was resolved that the communications now received respecting the new Pharmacy Bill be referred to the Law and Parliamentary Committee.

REPORTS OF COMMITTEES—*continued.*

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to a former member, aged 76.

£10 to the widow of a member who has had two previous grants.

£5 to the widow of an associate.

£10 to the widow of a registered chemist and druggist, who has had two previous grants.

£21 to be placed in the Secretary's hands to be expended at his discretion in getting an orphan into an asylum.

£10 to a fund being raised for the seven orphan children of a registered chemist and druggist.

The death of two of the annuitants was reported.

The report and recommendations were received and adopted.

Junior Pharmacy Ball.

The SECRETARY announced the receipt of twenty guineas for the Fund from the Committee of the Junior Pharmacy Ball.

LIBRARY, MUSEUM, LABORATORY, AND HOUSE.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
January	Day . . .	572	33	7	27
	Evening . .	157	20	3	7

	No. of Entries.		
Circulation of books.	Town.	Country.	Total.
January	184	137	321

Carriage paid, £1 14*s.* 10*d.*

The undermentioned Donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Papers relating to the administration of the Dentists' Act. From the BRITISH DENTAL ASSOCIATION.

Parey (A.), Workes, 1649. From Mr. W. V. RADLEY.

Plugge (P. C.), Über Andromedotoxin, den giftigen Bestandtheil der Andromeda Japonica, 1883.
From the AUTHOR.

The Committee recommended that the undermentioned work be purchased for six months:

Knowledge, conducted by Richard A. Proctor. 2*d.* weekly.

The Committee recommended that certain volumes and numbers of the *Pharmaceutical Journal*, to complete the set belonging to the Chicago College of Pharmacy, be presented to the College.

Curator's Report.

The Curator had reported the attendance in the Museum during January to have been:—

	Total.	Highest.	Lowest.	Average.
Morning .	445	34	3	17
Evening .	104	14	0	5

The following Donations to the Museum had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Leaves of *Eucalyptus globulus*, from the plant which yielded the oil previously presented
From Messrs. WARRICK BROTHERS.

Seeds of *Pterocarpus Guianensis.*
From Dr. H. E. CAUTY, Liverpool.

Roots of *Tephrosia macropoda*, *Sium Thunbergii*, *Chlorocodon Whitei*, Bark of Isibaha, and three bottles of Aloe Juice obtained from African species cultivated in the Botanic Gardens at Natal.
From the Curator, Mr. J. M. WOOD.

Specimens of Naphthaline and Naphthol.
From Messrs. DOMEIER and Co.

Specimens of *Casca amarga* Bark, and of the Barks of *Croton Pseudo-china*, and of an unnamed species of Croton. From Messrs. CURLING and Co.

Specimen of the Bark of *Vateria Indica.*
From Dr. ONDAATJE, Ceylon.

Herbarium Specimens of Damiana.
From Messrs. PARKE DAVIS and Co.

The following letter had been received:

"Botanical Department,
"Gordon Town, P.O.,
"Jamaica, 22 *January*, 1883.

"Sir,—In accordance with the request received from the Pharmaceutical Society of Great Britain for specimens of Cinchona under cultivation on the Government Plantations in Jamaica, I have pleasure in forwarding a set as described on the accompanying notes, which leave by this mail to the care of J. F. Obree and Co., Southampton.

"Messrs. Obree and Co. are instructed to forward the box containing the specimens addressed to the Curator of the Museum of the Pharmaceutical Society, together with a memorandum of expenses incurred in transit.

"I may mention that the specimens are presented to the Pharmaceutical Society by the Government of Jamaica, and they have been prepared and packed with great care. All the specimens of leaves, flowers, fruit and bark of each kind are taken from one tree, so that the sets are complete in themselves and thoroughly representative of the plants under cultivation in this Island.

"I have the honour to be, Sir,
"Your obedient servant,
(Signed) "D. MORRIS.
"Director, Public Gardens and Plantations.

"The Secretary,
"Pharmaceutical Society of Great Britain,
17, Bloomsbury Square, W.C."

The Curator had reported that the specimens referred to had arrived in excellent preservation, and were all that could be desired. Each species was represented by specimens of the root, trunk, branch, and twig bark taken from the same tree as the herbarium specimen. The latter showed the fruit and flower in each stage, and the whole formed a most valuable and instructive series.

The PRESIDENT had reported that on consultation with the Solicitor and several members of the Council, it appeared that in order to give the Council power to elect Corresponding Members of the Society the bye-laws would have to be amended; and it was recommended that a suitable bye-law should be drafted for the purpose at the earliest opportunity.

The Professors had attended and reported satisfactorily of their respective classes.

It was recommended that the front of the house be painted with one coat, and that the second-floor windows in Great Russell Street be made to correspond in appearance with those facing Bloomsbury Square.

The report and recommendations of the Committee were unanimously adopted.

THE CONVERSAZIONE.

This Committee reported that similar arrangements were being made to those of former years. The report was received and adopted.

SPURIOUS AND WORTHLESS DRUGS.

This Committee presented the following report:—

Report of the Committee on the Sale by Auction of Spurious and Worthless Drugs,

Consisting of the President, Vice-President, Messrs. Greenish, Hampson, Richardson, Symes, Williams, Woolley, Young (*Members of Council*), and Messrs. Fredk. Barron, Richd. B. Barron, T. Farries, G. Bult Francis, J. B. Herring, Wm. Hodgkinson, E. M. Holmes, Edw. Horner, C. Umney, F. Yates, Professor Bentley and Dr. Paul.

Your Committee has had several prolonged meetings and obtained much information on the subject from various sources. It has also received many suggestions from other members of the wholesale and export trade.

Your Committee begs to report the following general conclusions which have been arrived at after much careful consideration of the facts brought before them and mature deliberation thereon.

1. The importation and sale of adulterated as well as spurious and worthless drugs does not appear to be on the increase. This fact is probably in part due to the greater skill now possessed by wholesale dealers and pharmacists as a result of the advances made during recent years in the physical, chemical and microscopical examination of many drugs. Effectual means of detecting sophistication and distinguishing the genuine from the spurious have been thereby placed at the disposal of importers and wholesale and retail dealers of drugs.
2. That a few adulterated and spurious drugs, belonging to a small class not easily assayed or tested by chemical methods, occasionally find their way into commerce is undeniable; but occurrences of this kind do not appear to be so frequent as to require special powers to deal with them, beyond those already to be found in the existing law.
3. With a view of preventing as far as possible the importation and distribution of adulterated, sophisticated and spurious drugs, it seems desirable that the Council should annually appoint a standing committee, whose special duty it should be to receive information regarding such drugs, collect specimens and have them carefully examined. A report of the results of its labours should be published periodically in the pharmaceutical press.

The report was unanimously received and adopted.

Appointment of a Standing Committee.

The PRESIDENT moved that the Standing Committee referred to in the third paragraph consist of the present members of the Council acting on the Committee, and that at their first meeting they proceed to elect some members of the wholesale trade to act with them.

Mr. WILLIAMS thought it would be more satisfactory to the members of the wholesale trade if they were invited to assist the Committee in rotation, not limiting it to any one section, but appointing four or six members year by year.

The PRESIDENT said he thought the best way would be to move that the members of Council now on the Committee be reappointed a standing committee with power to add to their number. They would, no doubt, bear in mind what had been suggested.

This was agreed to.

GENERAL PURPOSES.

The report of this Committee mainly consisted of the Solicitor's report as to cases which had been placed in his hands. From this it appeared that—

Mr. Hustwit, 19 and 20, Market Street, Darwen;
R. Newman, jun., and Co., 13, Market St, Darwen;
E. C. Lewin, 7, Whimple Street, Plymouth; and
H. W. J. Ince and Co., Market Place, Dudley,
had severally paid £5 penalty and costs.

Several cases of alleged infringement of the Act had been considered by the Committee, and in some of them it was recommended that proceedings be taken.

The report and recommendations of the Committee were unanimously adopted.

REPORT OF EXAMINATIONS.

February, 1883.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major (21st)	3	2	1
„ (22nd)	4	1	3
„ (23rd)	4	2	2
	— 11	— 5	— 6
Minor (21st)	29	7	22
„ (22nd)	27	8	19
„ (23rd)	28	13	15
	— 84	—28	—56
	95	33	62

Preliminary Examination.

Nine certificates had been received in lieu of the Society's examination:—

1 College of Preceptors.
7 University of Cambridge.
1 „ Oxford.

THE ANNUAL REPORT.

It was resolved that the preparation of the Annual Report be referred to the Library, Museum and Laboratory Committee.

EVENING MEETING.

Wednesday, March 7, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

An Evening Meeting of the Pharmaceutical Society was held on Wednesday last, March 7. The chair was taken at half-past eight o'clock.

The minutes of the previous meeting having been read and confirmed, the President read a paper on—

OLEATE OF URANIUM.

BY WALTER GIBBONS.

The paper is printed on p. 737, and gave rise to the following discussion:—

The PRESIDENT said that although oleate of uranium was not a sufficiently stable compound to come into use to any great extent, still it was interesting to find that such compounds could be prepared; and it was gratifying to find that one of the members of the Society took sufficient interest in the subject to make a complete analysis of this body.

Mr. POSTANS said that if Mr. Gibbons could have produced a stable preparation there would have been some chance of its being tried for medical purposes. He believed that if the salts of uranium were brought into use, the nitrate of uranium would be the best and most easy of manipulation, and he had found it perfectly soluble in almost all proportions in glycerine. Probably the solution in glycerine would keep exceedingly well. It was opportune that Mr. Gibbons should have brought this subject before the Society at the present moment, there being a paper which seemed to run almost concurrently with his note, and which was published in the current number of the *Journal of the Chemical Society*. It contained investigations which Dr. Arthur Smithells had undertaken at the suggestion of Professor Roscoe. At present there was no medical evidence as to the usefulness of salts of uranium.

A vote of thanks was accorded to the author of the paper.

The next paper read was on—

Liquid Extract of Cinchona.

BY B. H. PAUL, PH.D.

Dr. Paul introduced the paper by remarking that the liquid extracts constitute a class of preparations which have found especial favour with medical men in America, and that the new edition of the United States Pharmacopœia contained formulæ for no less than seventy-seven liquid extracts, or nearly double the number that were contained in the previous edition. The advantages claimed for these preparations were, first, that they present the active constituents of drugs in that particular state of combination and association in which they occur naturally; secondly, that they ensure complete exhaustion of the active principles of drugs by the selection of menstrua suitable for holding them in permanent solution and presenting them in a concentrated form. Among the defects of these preparations, one of the principal, which they shared with other galenical preparations, was variation in strength, consequent upon the variability of the crude drugs used in making them, and though in British pharmacy they were less numerous than on the other side of the Atlantic, some of them would admit of being considered from this point of view.

The paper is printed on p. 737, and gave rise to the following discussion:—

The President said that the paper was essentially a practical one, and it had both a pharmaceutical and a medical aspect. Some advanced pharmacists and young medical practitioners thought that preparations of bark were a mistake, and that it was better to use the active principles in definite proportions. On the other hand there was, perhaps, a larger number of medical men who had to think of the best way of curing disease, and who did not set about it with any preconceived theory, but who looked to results. These men alleged that certain good results followed from the use of preparations of the crude drugs. Certainly when Mr. Battley introduced fluid extract of cinchona his intention was to place in the hands of medical men a preparation which should contain the active principles as they existed in the drug.

At the invitation of the President to address the meeting—

Dr. Duckworth said that he had been very much enlightened by the paper. He must at once acknowledge that he had always conceived the Pharmacopœia preparation to be a very good one, and he believed that it took the place of one that was once largely used, namely, the liquor cinchonæ, which he confessed he had not prescribed ten times in his life. But he was bound to say that he had not used the Pharmacopœia preparation as much as he had used two other preparations of bark, namely, tincture of yellow bark and the old compound tincture of bark. He always made use largely of decoction of cinchona. One came to know the tools with which he worked from day to day, although some persons scoffed at experience which was gained in that way. He did not decry the methods of investigation employed in the physiological laboratory, but he believed in the correct observations of the effects of what he was not ashamed to call empirical preparations. He was bound to say that he should, in future, think much less of the preparation to which the paper related than he had thought of it hitherto. His dear old master, Sir George Burrows, taught him to use this preparation in conjunction with quinine, and defined very clearly the cases in which one or other or both of these medicines should be employed. In certain cases of disease of the throat, Sir George Burrows held that a mixture of the two was more useful than either given alone. He was sure that the medical profession was very much indebted to Dr. Paul for enlightening them on the subject of the preparation in question. Medical men would be willing to attribute to quinine all the credit which belonged to it, and to allow that it would do work which no other preparation would accomplish; but yet in the preparations of bark there were virtues which they might suppose to be due to other substances which were present in those preparations in addition to quinine. He thought that it might be said that there were forms of pernicious malarial fever which even that grand alkaloid quinine was not of itself able to meet, and in which the preparations of bark would produce good results. He was sure that the profession would continue to use the preparation of the crude drugs, and would refuse to be tied up to the use of the pure alkaloids.

The President said that it would be fitting that he should ask Professor Redwood to give them his views of the *raison d'être* of the process given in the Pharmacopœia and to state how it came to pass that a preparation of the kind in question should have become official.

Professor Redwood stated that the introduction of fluid extract of bark into the Pharmacopœia did not originate with him, and he thought that he might fairly say that the preparation did not originate even with the pharmacists or the medical men of this country. Sixty years ago he was practically engaged in pharmacy, and he could remember a preparation of cinchona bark which was in use at that time, and which bore a very close resemblance to that which was under discussion. It was a preparation made in accordance with the French Codex. It was employed under the name of "essential salt of bark," and was prepared by making a cold infusion of bark and evaporating it, filtering towards the end of the process, and then spreading the filtrate out on plates of glass, upon which it scaled somewhat like ordinary scale preparations. It was perfectly soluble in water and was an approved article in medicine. Similar preparations had been introduced since. One was included in the London Pharmacopœia in 1851, and it passed from the London Pharmacopœia to the British Pharmacopœia. It was a preparation which was also recognized in the Pharmacopœia Germanica. It was obvious that there had been for a great length of time a belief in the efficacy of an aqueous extract of bark. It was true that extracts of bark in a concentrated form had varied in their nature from time to time, but all the authorities that he had referred to had ordered very concentrated preparations, the essential salt of bark being in the solid state. The exhaustion of the bark was effected by water, though in some cases, as in the process given in the British Pharmacopœia, a little spirit was added at the end of the process after concentration. He looked upon the communication which had been read by Dr. Paul as a very important and very valuable one, and having been brought forward by a gentleman so competent as Dr. Paul it necessarily called for a great deal of investigation; but still he must say that he was disappointed at the manner in which the author had treated the subject. The paper contained too many assumptions, some of which were obviously erroneous. This very much damaged the value which the paper would in other respects possess. The first assumption was that flat calisaya bark was ordered by the British Pharmacopœia in the preparation of the liquid extract. He would ask Dr. Paul where he found anything to that effect in the Pharmacopœia. At the time the Pharmacopœia was published, flat calisaya bark, which readily yielded 2 per cent. of quinine without other alkaloids, was an article of commerce which could be easily obtained. The Pharmacopœia in defining the yellow calisaya bark said that it was "in flat pieces, uncoated, rarely in coated quills." It was true that calisaya bark was ordered, but flat calisaya bark was not exclusively ordered; and he gathered from Dr. Paul that flat calisaya bark was an article rarely met with in commerce now. There was an article which resembled it, and which perhaps Mr. Holmes could hardly distinguish, but that was not the article of the Pharmacopœia. Dr. Paul stated, however, that quilled calisaya bark, which was equally the article ordered in the Pharmacopœia, could be obtained of good quality and in any quantity. The second assumption made by the author was that the efficiency of the process of the Pharmacopœia might be tested and judged of by referring to something which had been produced by materials such as were not ordered in the Pharmacopœia. The material used by Dr. Paul in making the extract in one set of experiments was a spurious bark which was obviously not calisaya bark at all, for it contained scarcely any quinine, and it contained an abundance of alkaloids which were not present in the true calisaya bark. The other set of experiments was made with a bark which the Pharmacopœia did not order, namely, Indian bark, which he believed differed from calisaya bark in an essential feature, namely, the proportion of cinchotannic acid which was present in it, and which rendered the quinine and the alkaloids in the bark less easily extracted, and less soluble in water than they would be otherwise. The third assumption of which he complained was that the preparation in question, and perhaps other preparations also, were intended fully to represent the medicinal properties of the drugs from which they were prepared. This was expressed or implied in different terms in different parts of the paper. He was quite prepared to hear that those who had written upon the subject—Mr. Battley, for instance—had said something to the effect that the preparation in question was bark, minus woody fibre, and that it might be looked upon as containing all the medicinal value of the bark. He asked what ground there was for assuming that the authors of the Pharmacopœia adopted any such view. Perhaps there would be no difficulty in showing that in scarcely any of the preparations of the Pharmacopœia were the drugs completely exhausted of their active principles, and perhaps in a great number of instances the very object was to take out only a small quantity of these principles. Taking, for instance, such a preparation as infusion of chamomile, who in his senses would think of objecting to that infusion because it did not fully represent all that was active and efficacious in the chamomile? In his opinion the objection that extract of bark did not fully represent the whole of the active matters contained in the bark was a very weak objection to urge against it. Twenty years ago he sat upon a Committee of the Society for the revision of the London Pharmacopœia, and at that time he made some experiments at the request of the Committee with reference to some of the preparations of bark, especially decoction. Dr. Paul stated in his paper that a decoction of Indian bark contained no more than one-fourth or one-fifth of the alkaloids of the drug. He (Professor Redwood) made his experiments, not with Indian bark, but with the bark ordered in the Pharmacopœia, namely, calisaya bark, and he found that a decoction made strictly as the Pharmacopœia indicated contained nearly one-half of the alkaloid. A pint of the decoction made from 1¼ ounces of the bark contained 6·25 grains of quinine, and in the residue of the bark 7·8 grains of quinine could be subsequently taken out. A ¼ of a grain of the quinine in the decoction deposited with the precipitate, which formed as the decoction cooled. This instance went to show the weakness of that mode of judging the efficacy of the Pharmacopœia preparations which was founded upon experiments with materials which were not ordered in the Pharmacopœia. Good calisaya bark was a quinine bark containing a certain quantity of cinchotannic acid, which rendered the quinine only slightly soluble, but it contained other substances, such as kinic acid, in combination with which quinine was soluble. It yielded by decoction or infusion a larger quantity of quinine than the Indian bark such as Dr. Paul had used. Although the Indian bark contained the same proportion of quinine, yet there was something present in it—probably a larger proportion of the astringent matter or cinchontannic acid—which rendered the quinine less soluble in that kind of solvent. In answer to the President, Professor Redwood added that he had not determined the amount of total alkaloids in the fluid extract. He was prepared to find that there was some deficiency as regarded the alkaloids, but he and the medical men with whom he had had the honour of acting in connection with the British Pharmacopœia considered that there was great efficacy in the extract independently of the alkaloids. Probably there were aromatic and resinous matters taken up and retained in the aqueous preparations.

Mr. Umney said that he had always looked upon the fluid extract of cinchona contained in the Pharmacopœia as a continuation of a preparation which was originally brought before the College of Physicians by Richard Battley, about the year 1830. In the London Pharmacopœia of 1851 there were preparations known as infusum cinchonæ spissatum, made from both loxa and calisaya barks; that from calisaya bark was continued in the British Pharmacopœias. He considered that the pharmacy of cinchona bark at the present day was in a great muddle. He was aware that quilled calisaya bark could be obtained, but it certainly did not come up to the standard of former years either in quality, as far as its quinine assay was concerned, or in quantity. Flat calisaya bark was offered weekly at public auctions which did not contain a trace of quinine. He did not know what would happen one day with respect to this substance when druggists found themselves face to face with the Sale of Food and Drugs Act. Every one knew calisaya bark was a very difficult thing to even partially exhaust with water. He generally employed a series of percolators, each of which contained a certain amount of bark, and he was in the habit of passing the percolate from one to the other. The Pharmacopœia was in fault with regard to the specific gravity of the preparation, which instead of being 1·100 was 1·120, provided the proportion of spirit directed was added to the evaporated extractive having a specific gravity of 1·200. The yield of fluid extract also was somewhat overrated in the Pharmacopœia. His own experience was that one could never get more than about 20 per cent. of completed fluid extract from flat calisaya bark or more than 22 per cent. from quilled calisaya bark. He had not used either flat or quilled calisaya bark for the Pharmacopœia preparation for years. He had used Indian *Cinchona officinalis*, containing probably 3 to 5 per cent. of quinine, and this bark would yield sometimes upwards of 40 per cent. of completed extract. A very good bark which came into commerce in enormous quantities was known as soft Columbian bark. Although it contained fully the quantity of quinine ordered in the Pharmacopœia, namely 2 per cent., still it contained no extractive matter at all, and was ill adapted for the preparation of liquid extract.

Mr. Ekin said that in a paper which he had read before the Pharmaceutical Conference some years ago, he went over somewhat the same ground as Dr. Paul. He took a bark sold as flat calisaya bark which contained about 2 per cent. of quinine and made the preparations with it. The bark was almost entirely exhausted by the tincture. The infusion was next richest, and then came the decoction, which so far as he could remember contained about half the total alkaloids contained in the bark. With regard to the inspissated infusion it was quite possible to follow the directions of the Pharmacopœia and yet not get more than 20 per cent. of fluid extract; but sometimes more was obtained, for if the bark was very rich in quinovic acid an infusion would be obtained which when concentrated would give a much larger yield, sometimes as much as 50 per cent. of a fluid extract having the required specific gravity and which of course would be to a corresponding extent poor in alkaloids; yet, in a case of this sort if it were attempted to concentrate the infusion from a pound of bark to 3 ounces as ordered by the Pharmacopœia, they would get an almost solid extract. Dr. Paul, in his paper, had omitted any mention of the way in which he estimated the alkaloids. It would be interesting if he would give the details of his method, as some present might like to repeat his experiments.

The PRESIDENT said that, with all respect to what Professor Redwood had said, it appeared to him that the object of the paper was to show the action of water upon such cinchona barks as were now commonly met with in commerce. It was no answer to the paper to say that if they took such barks as were obtained many years ago different results would be obtained. The paper showed the action of water upon two very well known specimens of bark, namely, flat calisaya bark so-called, which was rather poor in alkaloids, and Indian bark, which was rather rich. Pharmacists had imagined that they had a very potent preparation of cinchona bark in the fluid extract, and the paper seemed to him to prove that such was not the case.

Dr. PAUL, in reply, said that his object in appearing before them with the paper was not to speak as a pharmaceutical professor and ask them *ex cathedrâ* to accept assumptions of any kind, whether well or ill founded. The main object of the paper was to raise a question as to what was required in a preparation of bark such as the liquid extract, so that, having arrived at a knowledge of what was desired from a medical point of view, chemical and pharmaceutical skill might be applied in obtaining it. He had, however, been charged by Professor Redwood with venturing upon assumptions which were entirely erroneous, and he would, therefore, address himself to answering that charge. First he was said to be wrong in assuming that the bark known as "flat calisaya" was the bark of the Pharmacopœia. In reply to that, he would only refer to the description given in the Pharmacopœia in the following words:—"Characters: In flat pieces uncoated or deprived of the periderm, *rarely in coated quills.*" If that did not mean that the flat bark was essentially the bark to be used for pharmaceutical purposes, he did not understand the English language. As regarded the second alleged assumption, it was true that the experiments in the paper referred to bark which was not official, but in the one case he had operated upon such a bark as was obtainable under the name of "flat calisaya" at the present time, and in the other case upon one which contained the same amount of quinine as the official bark should do. He had shown that the process given in the Pharmacopœia failed to extract the alkaloids in both cases, and that was precisely the point which raised the question as to what was the object of the liquid extract. Was it to represent cinchona bark in reality, or was it to be merely an astringent preparation with the cinchona alkaloids left out? He had certainly adopted the view that this preparation ought to represent the whole of the medicinal properties of cinchona bark in a concentrated form, but was that an erroneous assumption, as Professor Redwood contended? In order to justify himself on this point, so far as pharmaceutical opinion was concerned, he would refer to the original paper read in the year 1838 before the College of Physicians by Mr. Battley, who said, "I have arrived at the conclusion that the desideratum in pharmaceutical chemistry is to leave unchanged the medicinal qualities of the substance acted upon, separating and removing therefrom, as far as may be possible, every matter not possessing remedial virtue." Then Mr. Battley went on further to say, with special reference to liquid extract of cinchona bark, that his process had the effect of separating and securing nearly the whole of the medicinal properties of the bark. There was, indeed, no doubt that was the object which Mr. Battley had in view, and according to the light of the chemistry of that day Mr. Battley supposed he had attained it. He (Dr. Paul) believed that he had shown conclusively that, whatever kind of bark was used, the result of operating upon it with cold water was that material, time and labour were wasted, and the result arrived at was a fiasco. The data given in the paper showed that the poorer the bark the better, proportionately, was the result. He found it to be a notorious reproach that the process given in the Pharmacopœia for making liquid extract of cinchona was utterly bad. He read in one place that the process was "exceedingly wasteful," and that the bark after being operated upon was as good for quinine making as it was before. Another writer said that there was "no efficient formula in existence" to represent cinchona bark, though that was a great desideratum, and that some means of arriving at a preparation which should be justly represented as "bark minus the woody fibre" had yet to be attained. He therefore thought that the meeting would absolve him from having been regardless of pharmaceutical authority and pharmaceutical considerations and admit that he had been guided at any rate by common sense, if not by such long experience as Professor Redwood was able to command. In regard to the results he had obtained in making the decoction and the infusion of cinchona, referred to incidentally for the purpose of comparison with the liquid extract, Professor Redwood's objection that they had been obtained by operating upon Indian bark did not hold good; for he had not only used for this purpose Indian bark, and such as was to be had under the designation of "flat calisaya" bark of the Pharmacopœia, but he had prepared the decoction and liquid extract from the quilled calisaya, which was the exceptional kind of the Pharmacopœia, and he found the results just the same as those obtained with other kinds of bark. The decoction contained about $\frac{1}{4}$, and the liquid extract $\frac{1}{7}$ of the alkaloid present in the bark. The exhaustion was only very partial. He did not think that it was possible to exhaust the bark thoroughly with cold water; and he regarded the indication afforded by the specific gravity of liquid extract, which was stated in the Pharmacopœia to be a guide as to the volume to which the extract was to be brought, as fallacious in so far as it was used to judge of the extent to which a liquid extract really represented the bark it was made from. Specific gravity was no indication of what was present in solution. That might be gum or starch, or cinchotannic acid or anything. What he considered to be required was a knowledge that the preparation contained a definite and uniform proportion of medicinal constituents. Mr. Ekin's reference to the paper he had read before the Pharmaceutical Conference led him (Dr. Paul) to say that he had not been able to confirm the results which Mr. Ekin obtained. Mr. Ekin represented that he obtained from a bark containing nearly 2 per cent. of quinine a tincture equivalent to 100 grains, which contained nearly $1\frac{9}{10}$ths of a grain. He had not been able to obtain such a degree of extraction in making tincture of Cinchona, but, on the contrary, had found that when he repeated the Pharmacopœia process on the same bark, he got a result nearly as good the second time as the first in regard to the proportion of alkaloids. With regard to the liquid extract he found a certain amount of agreement between Mr. Ekin's results and his own, but Mr. Ekin's results were somewhat less favourable to the liquid extract.

The PRESIDENT, in closing the discussion, said that the meeting would, he was sure, accord a hearty vote of thanks to Dr. Paul for his valuable paper.

A note by Mr. Morris on "The Cultivation of Cinchona in Jamaica" was submitted by Mr. Holmes. The paper, which will be printed in a future number, was accompanied by a considerable collection of illustrative specimens.

Mr. HOLMES called attention to some other specimens which were exhibited on the table. Among these were naphthaline and naphthol, new remedies recently introduced in the treatment of skin diseases. There was also a specimen of the very curious body known as paraldehyde, which had lately been described in the *British Medical Journal* (February 3, p. 215) as a new hypnotic, possessing the advantage over chloral of strengthening the action of the heart. The specimens of pure aldehyde, aldehyde ammonia and aldehyde resin had been sent at the same time by Mr. Williams to illustrate some remarks which he had intended to make, but he was unable to be present. In his absence, he might say that paraldehyde had the formula $C_6H_{12}O_3$, and might be regarded as three molecules of aldehyde grouped into one, the formula of aldehyde being C_2H_4O. The vapour density of paraldehyde was three times greater and the boiling point more than three times higher than that of aldehyde. It was very remarkable, therefore, that this body differed entirely in its chemical, physical and therapeutical properties from aldehyde. Thus aldehyde formed with ammoniacal gas the crystalline compound aldehyde ammonia, and when mixed with alcohol and heated with caustic potash formed aldehyde resin; but neither of these substances was formed by paraldehyde, nor had it the power of reducing nitrate of silver like aldehyde. Paraldehyde had an odour resembling that of acetal, and was soluble in about 8 parts of cold and less of hot water, while aldehyde possessed a very suffocating odour, and was freely miscible with water and alcohol in all proportions. Yet the same substances which cause the molecular changes by which paraldehyde is produced will, at a lower temperature, give rise to the very different crystalline body, metaldehyde. The difference in therapeutical properties caused by slight molecular changes must be a subject of great interest to medical men. The group of aldehydes also possessed a considerable importance from the point of view of botany and materia medica, since they were intimately connected, as recently shown by Messrs. Cross and Bevan, with the formation of vegetable products and with the changes that take place in the tissues of plants, which appear to be largely due to the facility with which aldehyde forms polymeric bodies, the ease with which they are decomposed and the readiness with which they form compounds with other bodies. There was also a specimen of the cayenne pepper pods from Natal, which produced the bright red cayenne pepper so much prized in commerce.

The PRESIDENT said that the specimens of cinchona from Jamaica were sent, in answer to an application made by the Society to the Colonial Office, by the director of public gardens and plantations in Jamaica.

After the conclusion of the business Mr. J. C. Shenstone exhibited a new arrangement for securing the stoppers of poison bottles.

The meeting was adjourned to Wednesday, April 4.

Errata.

Page 724, col. 1, line 32 from top,—

For Capper, Fred. William Noad,
Read Clark, Fred. William Noad.

In the Local List of Subscriptions to the Benevolent Fund, published in the Journal for February 24, the name of Mr. T. D. Walker, of Dresden, Staffordshire, should have been included under "Longton," instead of under "Stoke-on-Trent."

In the same List, on p. 715, under "Walton-on-Thames," *for* "Power, Edward, 5*s*.," *read* "Power, Edward, 10*s*."

Asinus post prand.—We hope that in reading the Bill carefully through you will be able to find an answer to your question.

F. A. Barritt.—We would suggest your further consideration of the clause referred to, and have no doubt you will then perceive that it gives no such permission as that you deprecate.

Cyrmo.—(1) The quinine is soluble in the quantity of dilute sulphuric acid ordered, and will not crystallize out. The solution being a clear one a "shake the bottle" label is not required. (2) Certainly, but the phosphate of iron must be recently precipitated and moist. (3) Dissolve the ammon. hydrochlor. in water to saturation, add a little mucilage, and then the tinct. guaiac. vol. so as to form an emulsion.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE DRAFT PHARMACY ACTS AMENDMENT BILL.

Sir,—*Post tenebras lux.* At last, the forced inaction which has been our lot in relation to pharmaceutical politics may be thrown off. Our leaders have sounded the note to prepare for an immediate advance, and we cannot too soon make up our minds to take a share in the work that has to be done.

But, is this work laudable? Personally, I can offer the most cordial approval to the new Pharmacy Bill, now sanctioned by the Council of the Pharmaceutical Society. If it has been laid down upon lines consistent with its greatest chance of "viability," and if it will ameliorate several of the anomalies of the existing Act, giving greater effect to the contract made by the State in 1868, so that unqualified persons shall not usurp the functions of those who have complied with the law, then, on all the principles by which prudent men regulate their actions, we shall give the new Bill a hearty support.

The "heckling" to which the Bill has been subjected should largely increase the confidence of its authors in its soundness. And it is a hopeful circumstance that the public criticism of the measure has been generally conceived in a friendly spirit. Any faults of the Bill are now known, and since the explanations which have been given of the "necessity which has no law," I believe that very little adverse criticism will be accepted as having hit the mark. There is wisdom in the proverb that "Bad wine makes good vinegar." Judging by the quality of the adverse critics' vinegar, I feel that they have not operated on bad wine in dealing with this Bill.

Some of the suggestions thrown out will undoubtedly prove useful contributions to the finished measure. I will venture to add one for what it may be worth, viz., that articles in clause 2 should be labelled either "poisonous" or "poison." As "the greater includes the less," the pharmacist would find it more convenient to fulfil his duty by using the label which at present covers the sale of scheduled "poisons."

Mr. Sandford's remarks upon clause 4, making the retailer of patent medicines responsible for proper labelling in case of their containing a legal poison, will be sure to receive careful attention. But, so far as the labelling of the outer wrapper is concerned, the retailer can be in no difficulty as to what he is selling, for the presence or absence of the poison label will be literally "patent" to his vision.

The Council have deserved our hearty support. Let them have it ungrudgingly.

Leeds. RICHARD REYNOLDS.

B.—The main decomposition results in the formation of iodide of ammonium, and if the iodine be in excess iodide of mercury is also formed.

O. M., Honiton.—The iodide of iron should be dry and the carbolic acid in crystals; crumb of bread will then do as an excipient.

T. Martin.—A dispenser may amend the excipient to retain in their integrity the remedial agents of the prescription. Cacao butter is a good excipient for permanganate of potash; if the mass be too crumbly, add a little vaseline to it.

Joseph.—It was correct to use the ol. junip. pyrolig., which is synonymous with "huile de cade." It is usually a dark empyreumatic oil, but samples may differ.

Pharmacien.—The difficulty in filtration sometimes arises from the rhubarb being powdered, instead of being sliced or bruised, as directed in the B.P.

F. W. W.—As the properties of the ingredients in the mixture are well known, there ought to be little difficulty in devising a scheme for separating them.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Kingzett, Allen, Forrest, Wilkinson, Wells, Southwell, Hocken, MacEwan, Hicks, Tanner, Fowler, Gibbons, Page, Newsholme, Lacy, Hannah, Coates, Lloyd, Devoniensis, Labiatæ.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 719.)

KRAMERIA, U.S.P.; RADIX RATANHIÆ P.G.—In the U.S.P. the root of *Krameria Tomentosa*, St. Hil., is now official, in addition to that of *K. triandra.* From the description of the latter given in the text, it would appear that *K. argentea* is intended, as the root is described as having a *dark* purplish brown bark, whereas that of Savanilla rhatany (*K. tomentosa*) is of a dull or *pale* purplish brown. As yielding a larger proportion of bark as compared with the almost tasteless woody centre, the roots of Savanilla or Pará rhatany are both preferable to the Payta rhatany, the knotted upper portion of which is difficult to powder or contuse. Moreover, the Savanilla rhatany is richer in soluble matter. In the P.G. the root of *K. triandra* is still the only official kind, probably on account of the colour of the tincture, which is redder than that of either Savanilla or Pará rhatany (*Pharm. Journal*, [3], vi., p. 21). Tests are given which preclude the use of either of the two varieties last mentioned (*Pharm. Journ.*, [3], i., p. 84). The woody portion being practically useless, and forming a large portion of the crude Peruvian drug, a weighed portion of the root bark would give a more uniform preparation.

LACTUCARIUM, U.S.P. and P.G.—The P.G. now directs that the liquid obtained by pouring boiling water on it should not, after filtration, become turbid when cold, nor become coloured if shaken with powdered iodine; the spirituous solution should not be changed by sesquichloride of iron. It should not yield more than 10 per cent. of ash.

LAPPA, U.S.P.—Retained from the secondary list, and a description added. It is referred to *Lappa officinalis*, Allioni.

LAVANDULA, U.S.P.; FLORES LAVANDULÆ, P.G. —According to the P.G. the calyx should be "coloris ferruginei." The greyish-blue calyx is here evidently confounded with the brown bracts.

MALVÆ, FLORES, P.G.—The flowers of *Malva sylvestris* only are now official. Under the name of "mallow flowers," both those of this species and of *Malva arborea* (*Althæa rosea*, Cav.) are popularly used in Germany, and the restriction to one species is likely to cause some inconvenience in certain districts.

MALVÆ, FOLIA, P.G., are obtained from *M. vulgaris* and *M. sylvestris.* It is difficult to understand why one species is not sufficient in this case. The ambiguity which results from the omission of the name of the botanical authority after the Latin name of a plant is well illustrated in this case. *Malva vulgaris*, Tenor, is identical with *Malva sylvestris*, L., and it is only by putting the name of Fries after *Malva vulgaris* that it is possible to know that *Malva rotundifolia* is intended by that name.

LIMONIS SUCCUS, U.S.P.—The sp. gr. should be not less than 1·030; and the juice evaporated to dryness and the residue ignited should not give more than 0·5 per cent. of ash. Fresh lemon juice should contain about 7 per cent. of citric acid.

LOBELIA, U.S.P.; HERBA LOBELIÆ, P.G.—The U.S.P. now directs the plant to be collected after a portion of the capsules have become inflated.

LUPULINUM, U.S.P.; GLANDULÆ LUPULI, P.G.—The U.S.P. directs that when agitated with water and allowed to stand no considerable sediment (sand, etc.) should be deposited. When ignited lupulin should not leave more than 8 per cent. of ash. The P.G. permits 10 per cent. of ash, and the glands when exhausted by ether should not leave more than 30 per cent. of insoluble matter, the ethereal solution on evaporation leaving a residue which should smell strongly of the hop. It should be kept from the light and not held in stock longer than a year. Owing to the great demand for hops, lupulin is at present scarcer and more adulterated than usual, vegetable matter which can only be detected by the microscope or by the ether test given in the P.G. being frequently mixed with it.

LYCOPODIUM, U.S.P., P.G.—It should be free from pollen, starch, sand and other impurities. The distinguishing features of lycopodium under the miscroscope are given. Dextrin and talc, which have also been found in lycopodium, are easily detected by means of the same instrument. The P.G. states that it should float on water or chloroform and leave no deposit in those liquids when shaken with them. It should not yield more than 5 per cent. of ash.

MALTUM, U.S.P.—It should be fresh, and not darker in colour than pale amber. Extract of malt is the only preparation.

MANNA, U.S.P., P.G.—The U.S.P. gives the specific gravity as 0·834. It should be slowly but almost completely soluble in 15 parts of boiling alcohol. The P.G., in which both *Manna cannulata* and *Manna communis* are still official, gives as a test of its purity that 5 parts boiled with 100 parts of spirit should leave about 1 part of insoluble but not viscid matter, and that 100 parts dried in a water-bath should not lose more than 10 parts of moisture.

MATICO, U.S.P.—The leaves are described as "oblong-lanceolate, pointed, unequally heart-shaped, very finely crenulate." The words "at the base" after the words "heart-shaped" are evidently wanting to complete the sense and the description.

MEL, U.S.P.—When diluted with 2 parts of water the resulting liquid should be almost clear, not stringy; it should have a specific gravity of 1·101 to 1·115 and a brownish or yellowish colour. If a small portion be diluted with 1 volume of water, then gradually mixed with 5 volumes of absolute alcohol, it should become only faintly opalescent, but not opaque, nor should it deposit a slimy substance at the bottom and along the sides of the test tube. When incinerated in small portions at a time in a platinum crucible it should not leave more than 0·2 per cent. of ash. It should not give evidence of the presence of starch, nor more than traces of chlorides and sulphates.

MEL DESPUMATUM, U.S.P.; MEL DEPURATUM, P.G. The U.S.P. preparation is made by merely heating the honey in a water-bath and straining off the scum which rises. The P.G. now omits the directions for preparing it, but gives the specific gravity as 1·30, and as tests of purity, that it should not change colour when mixed with an equal quantity of liquor ammoniæ nor be rendered turbid when a double quantity of spirit is added to it.

MELILOTI, HERBA, P.G.—This may now consist of *Melilotus altissimus*, as well as *M. officinalis*; the former is distinguished by the pods being distinctly acuminated and furnished with blackish hairs.

MEZEREUM, U.S.P.—The bark of *D. Mezereum* and of other species of *Daphne* is official. The bark is described as having the "outer surface yellowish or brownish yellow," a description which scarcely applies to the stem bark of *D. Mezereum*; indeed it is difficult to understand how it is possible to give a detailed description which shall equally apply to "other species."

MOSCHUS, U.S.P. and P.G.—According to the P.G. it should not afford an ammoniacal odour, a remark apparently intended to exclude Russian or Cabardine musk. It should be dried over sulphuric acid until it ceases to lose weight and should not afford more than 8 per cent. of ash when incinerated. The U.S.P. describes musk as contained in oval or roundish sacs about 1½ to 2 inches in diameter, apparently permitting the use of the Russian (oval) as well as Chinese musk, but excluding that of Assam. About 10 per cent. should be soluble in alcohol and 50 per cent. in water.

MYRRHA, U.S.P. and P.G.—The U.S.P. requires that the brownish yellow alcoholic tincture should acquire a purple hue when nitric acid is added. Pieces of gum which do not answer to this test, and others which dissolve entirely in water, or merely swell up in it, should be rejected, tests which are evidently taken from the last P.G. The P.G. now refers it to *Balsamea Myrrha*, and states that 30 per cent. of the gum resin should be soluble in spirit and the residue left on evaporation of the alcoholic solution, when dissolved in ether, should on the addition of bromine vapour give a red or violet colour.

NUX VOMICA, U.S.P.; SEMEN STRYCHNI, P.G.—In the U.S.P. the seeds are described as having a silky lustre, but nothing is said concerning the margin. The P.G., however, points out that when the seeds are softened in water the subacute marginal line becomes more visible. The diameter in both Pharmacopœias is given as 25 millimetres. It was pointed out some time since in Bentley and Trimen's 'Medicinal Plants' that some specimens of the seeds contain more alkaloid than others. It is well known that the large seeds are more active than the smaller ones, hence a limit of size is of some importance. Another point, however, does not seem to be so generally recognized, viz., that the Bombay seeds, with a subacute margin and more silky lustre, contain much more alkaloid than those from Madras and Cochin China. In future Pharmacopœias this point will be worth attention, as a variation of strength in preparations made from so potent a drug might lead to dangerous results.

OLEUM ADIPIS, U.S.P.—It should become opaque at or below 0° C., and the sp. gr. should be 0·900 to 0·920.

(To be continued.)

VEGETABLE ALKALOIDS, AND THE METHODS FOR THEIR SEPARATION.*

BY MATTHEW HAY, M.D., DEMONSTRATOR OF MATERIA MEDICA, UNIVERSITY OF EDINBURGH.

(Concluded from page 720.)

SEPARATION OF ALKALOIDS.—Without being intelligently acquainted with these various physical and chemical qualities of alkaloids it is impossible that any one can competently undertake their separation. And it is based almost entirely upon the qualities I have briefly sketched, especially upon the relation of the alkaloids to solvents and precipitants, that the various methods for the separation of alkaloids have been devised.

Assuming that we are all more or less familiar with these characters of alkaloids, let us proceed to inquire in as plain and as practical a manner as is consistent with accuracy how we are to set about the separation of an unknown alkaloid. A plant is brought to us with reputed toxic powers, and we are desirous of isolating the alkaloid to which we suppose that the activity of the plant is due. We are not at once to assume that because the plant possesses a considerable degree of activity that its active principle is necessarily an alkaloid. It may belong to that important class of active principles, whose exact chemical constitution and position, with the exception of the glucosides, is so little understood that they are known by the very negative name of "neutral" principles. These bodies behave in relation to the various solvents I have already enumerated much in the same manner as alkaloids, and are often thus to be obtained by such methods employed for the separation of alkaloids as do not involve the use of precipitants. The activity of the plant may reside in a resin, as is the case with several plants possessing a cathartic action (*e.g.*, podophyllum), in a volatile oil (as in copaifera), or in a fixed oil (as in ricinus), or in some other constituent of the plant possessing no alkaloidal characters whatever. It is almost impossible to predict from the nature of the action of the plant whether its activity is dependent on the presence of an alkaloid or upon some other of the constituents. But as a rough guide in the expectation of the presence of one or other kind of active principle, it may be remembered that all poisonous plants which primarily act on the nervous system, producing tetanus, paralysis or narcotism, generally possess alkaloids as their active principles. On the other hand, if the action of the plant is primarily on the muscular system, as, for example, the large class of plants possessing the action of digitalis, then expect to find a neutral principle. It is a rule without exception that all pure simple bitter tonic plants possess as their active ingredient, likewise, a neutral principle. Further, if the action of the plant be cathartic, emetic, or purely astringent, then again there is probably no alkaloid present, but merely a neutral principle, or, perhaps, a resin.

If, from a consideration of these and other points, we become tolerably assured of the presence of an alkaloid, we can the more confidently proceed to lay down our plans for its separation. It is always advisable, before beginning what may prove a long and tedious analysis of some imperfectly known plant, to ensure, by the administration of a small quantity of it to one of the lower animals—a frog, a rabbit, a cat, or a dog—that the specimen of the plant or drug about to be examined really possesses the action ascribed to it. There is another reason why it is desirable to make one, and, it may be, several such preliminary experiments, and it is, that we render ourselves familiar with the nature of the action of the plant, and therefore with that of the alkaloid we desire to separate; and, accordingly, by making a similar experiment with our successive extracts, solutions or precipitates, we are enabled readily to ascertain in which of them the alkaloid is present. This form of physiological testing is most conveniently made with frogs, and best by subcutaneous injection; but, unfortunately, under the Vivisection Act we are not permitted to practise even so small an operation as a subcutaneous injection without a licence from the Home Office, which is not always easily obtainable.

Preliminary Extraction.—This experiment having been made, and having selected for that purpose the portion of the plant (seed, bark, root, etc.) which we believe, or may have proved, to contain the active principle, we take for our analysis the same portion of the plant, and begin by having it well comminuted or pulverized.

Now, let us consider for a moment in what chemical

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form or combination the alkaloid exists in the plant or in the powder, and what is the nature of the substances with which it is mixed and from which it is to be separated. The alkaloid never exists in the plant in the free state but is invariably combined in the form of a salt, and oftentimes as an acid salt, with one or other of the organic acids which are found so generally in plants, particularly malic acid and the varieties of tannic acid. Sometimes the acid with which it is combined is, like the alkaloid, peculiar to the plant in which it is found, as meconic acid in opium, quinic acid in cinchona; and occasionally the acid may be even inorganic, as, for example, the sulphuric acid with which some of the opium bases appear to be united. To whatever acid the alkaloid may be joined it almost invariably forms a salt which is readily soluble in water or in alcohol, and which therefore can be extracted by either of these menstrua.

The various substances with which the alkaloidal salt is mixed is dependent, of course, upon the nature of the plant, and may be thus arranged, and at the same time their solubility in the three most common menstrua represented:—

	Water.	Alcohol.	Ether.
Cellulose . . .	insol.	insol.	insol.
Starch	insol. in cold. sol. in hot.	insol.	insol.
Gums and pectose.	sol.	partly sol.	insol.
Sugars	sol.	sol.	insol.
Fixed oils . . .	insol.	partly sol.	sol.
Volatile oils . .	slightly sol.	sol.	sol.
Resins	insol.	partly sol.	partly sol.
Albuminoids, incl. mucus. . . .	sol.	insol.	insol.
Neutral principles.	partly sol.	partly sol.	partly sol.
Colouring matters.	sol.	sol.	partly sol.
Organic acids and salts	sol.	sol.	partly sol.
Other organic matter	partly sol.	partly sol.	partly sol.
Inorganic salts .	mostly sol.	mostly insol.	insol.

It can be perceived at a glance what portions of the plant, in addition to the alkaloidal salt, are likely to be met with in extracts made with water, alcohol, or ether.

Continuing the examination of our plant, we now make choice of what solvent or menstruum will most readily dissolve the alkaloidal salt out of the plant, and at the same time carry into solution as few and as little as possible of the other constituents of the plant. Were the natural alkaloidal salt freely soluble in ether, which it is not, and did the ether penetrate readily the particles of the pulverized drug, we would feel inclined on account of its dissolving so few of the other vegetable substances to adopt it as an extractive solvent. As, however, a perfect extraction of the alkaloid is the primary object, we commonly find it advisable to use water or alcohol in preference to ether. Pure hot water is in nearly every case the best extractive solvent, and, after the plant has been repeatedly exhausted with water, the solvent power of the water in the final extraction may be increased by the addition of a small quantity of sulphuric acid or of tartaric acid. Even when alcohol is used it is sometimes advantageous to add a little acid. But on the whole it is advisable to use as little acid as possible. It is well not to employ too large a bulk of the solvent, for it may necessitate prolonged evaporation in order to remove a portion of the alcohol or the water at a later stage of the process. The extraction may be made by mixing the powdered plant with three or four successive portions of the solvent and allowing each mixture to stand for some hours, then draining and pressing; or the extraction may be made with the help of a percolator, particularly if the drug at our disposal is small in quantity or if alcohol is employed as the solvent.

Methods for Separation of Alkaloid.—We have now obtained a fluid extract of the plant, either watery or alcoholic, and its treatment for the separation of the alkaloid may take one of two different directions. We may endeavour to separate the alkaloid by precipitating it in the form of an insoluble salt, or we may remove it from the extract by means of solvents. The former method yields, as a rule, better results than the latter in respect both of the purity and the amount of the product, although it is not generally so well adapted for the separation and detection of small quantities of alkaloids in chemico-legal investigations, where often the absolute purity of the product is of less account, provided it satisfies the tests and possesses the physiological action of the alkaloid sought for. As the more important, therefore, for our purpose let us first consider in what manner the method by precipitation is to be followed.

A. Methods by Precipitation.—*Purification of Extract.*—The watery extract, or the alcoholic extract deprived of its alcohol by evaporation and the residue exhausted with water, if it has been prepared from a portion of the plant, as, for example certain woods and barks which yield to the water not much else than extractive matter besides the alkaloidal salt, may at once be treated with the precipitant; and this is also in many cases the course pursued if the alkaloid is present in large quantity, and can, on account of its insolubility in water, be precipitated in an uncombined form by the addition of an alkali (*e.g.*, morphine). If, on the other hand, the precipitation of the alkaloid, on account of the solubility of the alkaloid in water, or its presence in small quantity, requires the use of some of the more complex but more effective reagents, as phospho-molybdic acid or the double iodide of potassium and mercury, it is always necessary to previously remove from the extract as much of its inert organic matter as possible. For this purpose nothing surpasses a combination of basic acetate of lead and of ammonia. The basic acetate can of itself form insoluble precipitates with most of the organic acids, as malic acid; with many glucosides, as tannin, and with all albuminoids, starches, and gums. It can also very effectually remove the colouring matter; but the presence of free ammonia is essential to its completely precipitating dextrine and the various sugars. The ammonia may be added either immediately after the addition of the basic acetate of lead without previous filtration; or the precipitated lead compounds may be first removed by draining or filtration, and the ammonia mixed with the filtrate which should contain an excess of the basic acetate. The ammonia is added until the fluid, after stirring, begins to smell distinctly of ammonia; no alkaloid is known to be precipitated by basic acetate of lead and ammonia. The fluid having been again filtered is now evaporated at a moderate heat over the water-bath to drive off the excess of ammonia and to diminish the bulk of the fluid, which may with advantage be reduced until the fluid becomes of a syrupy consistence, so that the ammonia may be almost completely removed. The partially evaporated fluid is, if syrupy, diluted with some water, and now treated with dilute sulphuric acid in sufficient quantity to precipitate all the lead in the form of the insoluble sulphate of lead, and the fluid is once more filtered. The fluid will generally at this stage be found pure enough to permit of the precipitation of the alkaloid by means of any form of precipitant. If it is still highly coloured and evidently contains a large proportion of extraneous organic matter, the process of precipitation with the basic acetate of lead and with ammonia may be repeated; but, generally, this is not needed.

Precipitants.—The stage has now been reached when we must select an alkaloidal precipitant. If the alkaloid be insoluble in water, a solution of any one of the alkalies or alkaline carbonates, or of the alkaline earths, will prove the most ready and effectual precipitant. But if, as it far oftener occurs. the alkaloid is soluble to some extent in water—and, indeed, whether soluble or not—we must resort to the use of some of those acids or salts, which have already been mentioned as forming insoluble precipitates with practically every alkaloid. These precipitants may be divided into four classes :—

(1.) Some *simple organic acids,* as tannic acid (Berzelius) and picric acid (Hager).

(2.) Some *compound inorganic acids,* as phospho-wolframic acid (Scheibler), phospho-molybdic acid (De Vrij, Sonnenschein), and phospho-antimonic acid (Schulze).

(3.) The *chlorides of the heavier metals,* as those of platinum (Dragendorff), gold, iridium, and palladium (V. Planta).

(4.) Certain *double metallic iodides,* as those of potassium and mercury (V. Planta, Mayer), potassium and bismuth (Dragendorff), and potassium and cadmium (Marmé).

The cost of the third group precludes their general use, but each of the precipitants of the other groups has its advocates. The best of them are probably phospho-wolframic acid, phospho-molybdic acid, the double iodide of potassium and mercury, the double iodide of potassium and bismuth, and tannic acid.

Precipitation.—Each precipitant, except the last, acts most effectually in the presence of dilute mineral acid; and the acid most commonly used is sulphuric, which is at any rate present in excess in the extract, on account of its having been used to remove the lead. Tannic acid must be added in a neutral or faintly acid solution, and sometimes, owing to the acid which is being set free from the precipitated alkaloid being large in amount and rendering the fluid too acid, a little alkali or alkaline carbonate may require to be added before complete precipitation can be secured. In the use of the other precipitants, no precaution is, as a rule, necessary, unless it is to take care that the fluid has a well-marked acid reaction, and that previous to filtering the fluid is allowed to stand for a day or so, in order to ensure the complete precipitation of the alkaloidal compound. It is important, as Schmiedeberg has remarked for the double iodide of potassium and mercury, that the solutions of the double iodides do not contain any more iodide of potassium than is sufficient for the solution of the heavier iodide, otherwise the excess of the iodide of potassium may, in certain cases, dissolve the alkaloidal precipitate. To avoid this, the solution should be made by adding excess of the heavier iodide to a solution of the iodide of the alkali, allowing the latter to dissolve as much of the former as it can, then filtering, to remove the undissolved iodide, and observing that the filtrate does not give a precipitate on dilution; if it does, dilute and again filter. The alkaloidal precipitate obtained by the use of tannic acid, or of one of the composite organic acids, or of one of the double iodides, is now separated by filtration. The tannic acid precipitate may be washed with a little water; the others must be washed with dilute sulphuric acid, as water alone is apt to decompose and dissolve them. The precipitate is then dried in the usual way by pressure between several folds of filter paper, and is transferred to a beaker and mixed with a little water.

Liberation of Alkaloid from Precipitate.—The means necessary for the liberation of the alkaloid from its insoluble salt varies with the nature of the precipitant, but is the same for the members of each of the different kinds or groups of precipitants; that is, there is one method to be followed in the treatment of the precipitate with tannin, another for all the precipitates with the double iodides, and a third for all those with the composite acids.

a. From Tannic Acid Precipitate.—The treatment of the precipitate with tannic acid is simple, and consists in gently digesting it for some time with moist and freshly precipitated oxide of lead, until a portion of the supernatant fluid or filtrate is no longer darkened by the addition of ferric chloride. If the alkaloid which has been set free is soluble in water, then it will all be contained in the filtrate, from which any trace of lead is removed by passing sulphuretted hydrogen through it, and again filtering. The filtrate, if gently heated for a short time over the water-bath, will have the excess of sulphuretted hydrogen readily dissipated. By continued slow evaporation, crystals of the alkaloid may be got; or it may be exactly neutralized with a dilute mineral acid, and a crystalline salt obtained by evaporation. The further steps necessary for the perfect purification of the alkaloid or of its salt, I shall immediately come to.

If the liberated alkaloid be insoluble, it remains mixed with the precipitated tannate of lead, and with the excess of lead oxide, and requires to be extracted with alcohol. The alcoholic extract is evaporated almost to dryness and dissolved in dilute sulphuric acid, any trace of lead remaining undissolved as sulphate of lead. The acid solution of the sulphate of the alkaloid is then treated with carbonate of barium to remove the acid, but of course at the expense of the precipitation of the alkaloid (as the carbonates of the alkalies or alkaline earths behave as bases towards solutions of alkaloidal salts). The mixture is filtered, and the alkaloid once more extracted with alcohol. Slow evaporation of the alcohol will, under favourable circumstances, yield crystals of the alkaloid.

b. From Double Iodide Precipitate.—If one of the double iodides has been employed for the original precipitation of the alkaloid, then the precipitate, which is a double iodide of the alkaloid and the heavier metal, requires a different process for the recovery of the alkaloid. It is mixed with a little water and with an equal volume of the moist hydrated oxide of barium, and a stream of sulphuretted hydrogen gas is passed through the mixture until the fluid, after being shaken, smells strongly of the gas, when the double iodide will have become completely decomposed, forming an insoluble sulphide of the heavy metal—mercury, bismuth or cadmium, as the case may be—the alkaloid being dissolved in the form of the simple iodide. The previous addition of the baryta facilitates the decomposing action of the sulphuretted hydrogen. The fluid is filtered to remove the insoluble sulphide, and the filtrate which contains the iodide of the alkaloid, and the iodide and the sulphide of barium, is treated with excess, either of moist and freshly prepared oxide of lead, or of sulphate of silver. The latter precipitates the hydriodic acid in the form of iodide of silver, the sulphuretted hydrogen in the form of sulphide of silver, and the barium as sulphate of barium, and leaves the alkaloid in the form of a soluble sulphate; whereas, the oxide of lead, whilst it precipitates with equal effectiveness the hydriodic acid and the sulphuretted hydrogen, and the barium as oxide of barium, yet it sets free the alkaloid in an uncombined state; and if the alkaloid be insoluble in water, it remains mixed with the precipitates.

Where the sulphate of silver has been employed, the filtrate, after the addition of this reagent, contains the unused excess of the reagent as well as the sulphate of the alkaloid. To remove the silver, the fluid is treated with an excess of barium hydrate, and sulphate of barium and oxide of silver are formed and the alkaloid is liberated, which, according as it is soluble or insoluble in water, is dissolved in the filtrate or remains precipitated with the barium and the silver. If it is dissolved in the filtrate, the small excess of barium hydrate is removed by a stream of carbonic acid gas, and the barium carbonate is then got rid of by filtration, and the filtrate gently evaporated, when the alkaloid will be obtained. If the alkaloid is insoluble in water and remains mixed with the precipitates, then, after filtration, the residue is exhausted with alcohol, and the alcoholic solution treated in the same manner as that obtained from the tannate of lead in the previous process.

If oxide of lead has been used for the precipitation of the iodine, it is advisable to previously render the fluid slightly acid with sulphuric acid, so as to precipitate the barium as sulphate of barium. The oxide should then be digested with the fluid, until the fluid has an alkaline reaction. The precipitate from the oxide of lead may, as already mentioned, contain the alkaloid, if it be insoluble. If it be soluble, it will be met with in the filtrate, which, in order to deprive it entirely of its lead, is treated with a little sulphuretted hydrogen and again filtered. The filtrate then requires the same treatment, in order to isolate the alkaloid, as was described in connection with the filtrate obtained at the same stage of the tannin method. The alkaloid if insoluble in water is also obtained from the mixed precipitate in the same manner as previously described.

c. *From Precipitate with Composite Inorganic Acid.*—The process required for the separation of the alkaloid from its precipitate with the composite inorganic acids is simpler than the preceding; and to that extent is one or other of these acids to be preferred for the precipitation of the alkaloid. The precipitate, after being pressed, is thoroughly mixed by frequent stirring with a little water and more than an equal volume of pure barium hydrate, until it is completely decomposed, which is readily indicated by the excess of the dissolved barium hydrate forming with the carbonic acid of the atmosphere an insoluble scum of carbonate on the surface of the fluid. The mixture is now filtered, and the alkaloid, if it be soluble in water, passes through in the filtrate mixed only with a little barium hydrate, which can be readily removed by precipitation with a stream of carbonic acid gas. The filtrate on gentle evaporation will yield the alkaloid; or, if it be previously neutralized with dilute sulphuric acid, or other simple acid, crystals of a salt of the alkaloid may be obtained. If the alkaloid be insoluble in water, it remains mixed with the insoluble wolframate of barium and with the excess of baryta, and can be removed by alcohol, and the alcoholic solution treated in the usual way.

Purification of Alkaloid.—By these various methods of precipitation it is possible to obtain, and in the manner described, a tolerably pure alkaloidal product. For its more complete purification it is sometimes necessary to make a solution of it in water and a little acid, and to repeat the process of precipitation and isolation; and, whether it be reprecipitated or not, if it possesses a tinge of colour it is often advantageous to treat its solution in water or in alcohol, or the solution of its salt in one of these menstrua, with pure animal charcoal, remembering that the charcoal is apt to remove a portion of the alkaloid, which can, however, be re-obtained by treating the charcoal with boiling alcohol. Also, repeated crystallization of the alkaloid or its salt from a solution in alcohol or in water may be required to furnish a perfectly pure product. The *technique* of the methods employed for this purpose is quite familiar in every department of chemistry, and, therefore, requires no further mention.

When it is desired to procure a very pure salt of the alkaloid of definite composition and of good crystalline form for the purpose of an elementary analysis, the double salt obtained by the addition of chloride of platinum or chloride of gold to a solution of the alkaloid, will generally be found to best meet the requirements.

These, then, are, quickly stated, the most reliable methods for the separation of the alkaloid by precipitation, and important modifications may be necessitated in each individual practical application of the methods, which can only be suggested in the course of the analytical investigation. For example, other solvents than alcohol may be required for the extraction of the alkaloid from the mixed precipitates, and it is an easy matter to try one after another until the most efficient is obtained.

Separation of Volatile Alkaloids.—I have described these methods as if the alkaloid were non-volatile, which in the great majority of instances it is; but there are exceptions, as I formerly mentioned. In such cases the separation of the alkaloid is generally most easily accomplished, often even without making a preliminary extract with alcohol or water, merely by mixing the drug with a little water and alkali or alkaline earth, and distilling, neutralizing the distillate, and again distilling to remove other volatile substances, the alkaloid remaining in the retort in the form of a non-volatile salt. This can be dissolved in water or alcohol and purified by crystallization, etc., in the usual way, and a perfectly pure alkaloid obtained from the salt by a final distillation with an alkali. The presence of a volatile alkaloid is generally to be perceived by its odour at that stage of the operations required for the separation of an alkaloid by precipitation, where oxide of lead or barium hydrate is being employed for the decomposition of the precipitated compound of the alkaloid, on the alkaloid being set free. If so, it is advisable to add excess of barium oxide and distil. A tolerably pure alkaloid will in this manner be obtained.

B. METHODS BY SOLUTION.—The other series of methods for the separation of alkaloids, and which mainly involves the use of solvents, without precipitants, is that which, as I have already mentioned, is in one form or other most frequently employed for the medico-legal isolation of alkaloids. They were formerly the only methods used, but at the present time the precipitation methods are considered more serviceable in pharmaceutical research. These methods mainly depend on the following facts:—(1) When an acid solution of the alkaloid is shaken with ether, chloroform, amylic alcohol, benzol, acetic ether or petroleum ether, the alkaloid is not removed by these solvents; but, (2) When the solution is alkaline, the alkaloid is readily taken up by one or other of these solvents. In short, these methods rely on the solubility of the free alkaloid and the insolubility of its salts, in certain menstrua which are nonmiscible with water.

Purification of Extract.—When it is desired to separate an alkaloid by means of solvents, an extract of the plant is made with acidulated water or alcohol just as when precipitants are intended to be employed. The watery extract, which is the more preferable, is neutralized with carbonate of soda, and cautiously evaporated almost to dryness, and the residue is treated with acidulated absolute alcohol, which dissolves the alkaloid and leaves some albuminous and other matter. The filtrate is again neutralized with carbonate of soda and evaporated to dryness, and the residue dissolved in water. It is always strongly advisable never to evaporate fluids containing alkaloids without previously neutralizing them, otherwise the alkaloids are very prone to suffer decomposition.

Separation of Alkaloid.—The aqueous solution is now rendered acid with a little sulphuric acid or other simple acid, and is well shaken with successive portions of ether to remove fats and resins, and the ether poured off. The ether, as a rule, in the presence of acid dissolves none of the alkaloid; but there are one or two exceptions where a small portion of the alkaloidal salt is removed by the ether. If any of the alkaloid should chance to be thus removed, evaporate the ether and treat the residue with water. The watery extract will contain the alkaloid. But, if, as almost invariably happens, the ether has removed none of the alkaloid, the acidified aqueous solution is now rendered alkaline by means of carbonate of soda or a little caustic soda, and is again well shaken with successive quantities of ether, which, in the great majority of cases, will completely dissolve out the alkaloid. Should the alkaloid prove to be insoluble in ether, it is necessary after pouring off the ether to neutralize the aqueous fluid and heat to drive off the ether, and again render it alkaline, and shake it with another of the alkaloidal solvents enumerated, as chloroform, or amylic alcohol, or benzol, or with a succession of them. The ethereal or other solution of the alkaloid, in order to purify it, is then shaken with an equal volume of slightly alkaline water. Sometimes, to ensure a still greater degree of purity, the ethereal or other solution is next shaken with water containing a little sulphuric or hydrochloric acid, which transfers the alkaloid to the water, and this may now be shaken with successive portions of pure ether, or whatever solvent has been previously used, to completely remove from it all substances soluble in the ethereal menstruum in the presence of acid. On adding an alkali or alkaline carbonate to the water, it readily gives up the alkaloid to a fresh portion of the ethereal solvent when shaken with it. Evaporation of this purified ethereal solution will generally yield the alkaloid in a tolerably pure condition. For its further purification, digestion with charcoal and crystallization of the alkaloid or its salts from their solution in water or alcohol may be necessary.

This is merely an illustrative outline of a process embodying the principles involved in the method of separating alkaloids by means of solvents. As this method is very largely employed in medico-legal investigations, several more detailed descriptions of processes will be found in the numerous works on toxicology (Husemann, Otto, Dragendorff, Taylor, etc.). Of these, the process or method of Stas, as improved by Otto, is the oldest and the best known, and, perhaps, still the most frequently employed. In it ether and amylic alcohol are successively employed as solvents. The method of Erdmann and Uslar, in which amylic alcohol is the main solvent employed, has been also favourably received. Dragendorff's method is, perhaps, of all the most thorough, and involves the use of nearly all the important alkaloidal solvents.

Separation of Alkaloids from one another.—In the processes which I have described as being used for the separation of alkaloids, I have nearly always spoken as if but one alkaloid were to be met with in each plant. But, as a matter of fact, many plants, perhaps, it will be eventually found, most toxic plants, contain more than one alkaloid. The product obtained by the methods described may, therefore, consist of a mixture of alkaloids. If so, the alkaloids are to be separated from each other by taking advantage of the differences in the degree of the solubility of themselves or their salts in the various solvents mentioned, water included.

Recognition of Alkaloid.—When once the substance is supposed to have been isolated in a pure form, it is necessary to make certain that it is in reality alkaloidal. If it be an alkaloid or alkaloidal salt it will when heated to redness, like all organic matter, completely burn away. Mixed and heated with soda-lime (a mixture of caustic soda and lime) it will, unlike neutral active principles and other nitrogen-free organic substances, evolve the odour of ammonia. Further, a solution of the alkaloid or of its soluble salts, will give a precipitate with nearly all the substances already mentioned as generally forming insoluble salts with alkaloids. The physiological action of the separated product will also sometimes be of help in determining whether it is alkaloidal or not. One must guard against mistaking a salt of ammonia for a salt of an alkaloid, as the former behaves chemically in almost every respect quite like an alkaloid.

Conclusion.—These, then, are, briefly stated, the various processes or methods employed for the separation of alkaloids. It is impossible in the present state of our knowledge to lay down any single general method which will suffice for the separation of any alkaloid. It will therefore rest with each chemist to choose the method that may appear to him the most suitable for the plant he is about to examine, and to use his own discretion and ingenuity in modifying it when necessary. It has been mainly my aim in the present communication to lay before you the general principles which guide us in the separation of alkaloids.

In conclusion, allow me to say that, whilst only a few of you may have the opportunity of discovering an unknown alkaloid, yet many of you may be able to improve and cheapen the processes by which we at present obtain known alkaloids. Pure alkaloids of definite composition, and, therefore, of unvarying action, are what the therapeutist requires; and the chemist who can furnish him with these, and by the readiest and cheapest methods, benefits both therapeutics and pharmacy as much as he who brings to light a new alkaloid. For all new alkaloids are not of value medicinally.

To those who are proficient scientific chemists, and who devote themselves in great part to pharmaceutical research, there lies open the almost untrodden field of the artificial production of both known and unknown alkaloids. The syntheses of Schiff and Schmiedeberg cannot surely remain solitary. The capability of the artificial formation of all alkaloids is in the highest degree probable. And what synthetical chemistry is now in certain instances doing for the arts, we are all hopeful, and even confident, will soon be accomplished for the materia medica.

During the course of the lecture Dr. Hay very successfully demonstrated the practicability of the various methods of separation to which he referred. He also showed a collection of rare active principles, as well as the more important bodies existing in vegetable tissue and from which alkaloids are separated.

The President, in moving a vote of thanks to the lecturer, said that he was sure that those present would join with him in admiration of the manner in which the interesting subject had been treated. It was a subject of great pharmaceutical importance, and he was sure that the younger members, who had the opportunity before them, would receive from the lecture a stimulus for research, since Dr. Hay had made each stage of investigation appear so simple. He had much pleasure in proposing a cordial vote of thanks to Dr. Hay.

Mr. Dott, in supporting the motion, said that although there were some points on which he differed from what had been said, yet, generally his experience would lead him to agree with the principles laid down. It should not be forgotten that a process which might be applicable in a chemico-legal investigation, for instance, might not, for economical grounds, be suitable on the manufacturing scale. There were at least two general laws to be observed in all cases, namely, *low temperature* and *neutrality*. It was commonly stated that all alkaloids were soluble in alcohol. This was not universally so,—pseudo-morphine and rhœadine forming striking exceptions to the rule. Regarding the greater solubility of acid salts of alkaloids, he mentioned that the acid tartrate of morphia was an exception, the neutral tartrate in this case being more soluble. There was a process recommended for the elimination of alkaloids, in which a solution of oxalic acid was employed for exhausting the drug. He thought that this was probably the worst acid which could be used as a solvent, because oxalates were the most insoluble salts of alkaloids, and, moreover, alkaloids in combination with organic acids were far more liable to be decomposed on evaporation than when they were in combination with inorganic acids. For these reasons he thought that acids of the latter class ought always to be used.

Mr. Stephenson having made a few remarks in support of the motion,

Dr. Hay thanked the meeting for the manner in which his communication had been received. Referring to Mr. Dott's remarks, he said that the methods which he had proposed were such as were best adapted for the purposes of investigation; they were well-tried methods, and in his own hands they had been very satisfactory, the only trouble he had had being in the separation of one alkaloid from another in a good crystalline form. Regarding the solubility of acid salts, he said that the exception which had been referred to was worthy of note, since it was another indication of the brotherhood existing between alkaloids and ammonia—the acid tartrate of ammonia being less soluble than the neutral tartrate.

The Pharmaceutical Journal.

SATURDAY, MARCH 17, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PHARMACEUTICAL EDUCATION AND EXAMINATION.

THE adoption by the Council, at its last meeting, of the whole of the recommendations contained in the report of the Committee to which the subject of the relation to each other of pharmaceutical education and pharmaceutical examinations had been referred for reconsideration, closes the history of the first stage in a praiseworthy attempt to prevent failures in passing the pharmaceutical examinations by ensuring that candidates shall have gone through a systematic course of study before presenting themselves. At present it is proposed to bring the new regulations into force on and after December 31, 1887, and although it is not certain whether this will be effected under the powers of the Pharmacy Act, 1868, or of the legislation which it is hoped will take place during the present session of Parliament, it should be noted that if this arrangement be carried out it will have a retrospective effect reaching back to the end of the present year. The whole subject is of the greatest importance to persons who contemplate becoming qualified pharmacists and their friends, by whom the new scheme should be carefully considered, and to facilitate this it may be as well to give a *résumé* of the principal features of the proposed regulations, as now adopted, especially as they have only appeared in a fragmentary form in the official report.

The first step to be taken by a candidate for qualification to practise pharmacy will be to become registered as a "pharmaceutical student," either by passing the Preliminary examination of the Pharmaceutical Society, or by presenting to the Board of Examiners evidence that he has passed one of the examinations the certificates of which are accepted in its stead. A list of these latter examinations will be found in the *Pharmaceutical Journal* for March 5, 1881, or may be obtained upon application to the Registrar. Between the date of effecting this registration and that of the candidate presenting himself for the final portion of the qualifying examination at least four years will necessarily have to elapse in order to comply with the following requirements. Three of these years will have to be spent in practical employment as an apprentice or pupil in the pharmacy of a pharmaceutical chemist or registered chemist and druggist, after which the pharmaceutical student will be eligible to present himself for the first portion of the qualifying examination. In the event of the student passing this, he will have to pursue his studies, and at the end of another year he will be entitled to present himself for the second and final portion of the qualifying examination. That the provision as to the regulations coming into force at the end of the year 1887 is intended to have a retrospective effect in regard to these four years is shown by a special note, appended to the report, in which it is stated that the effect will be that "all candidates who shall "pass the Preliminary examination after December "31, 1883, will not be eligible to present them- "selves for the first portion of the qualifying "examination until the expiration of a period of "three years from the date of their having been "registered as having passed the said Preliminary "examination."

As to the range of studies to be undertaken by the pupil during these four years, it may be stated that besides such practical training as he may obtain during his stay of three years in a pharmacy, he will have to attend at some school recognized by the Council, and at some period between the date of his registration as a "pharmaceutical student" and the time when he presents himself for the second portion of his qualifying examination, three courses of lectures, of a defined scope and character, one on Chemistry, one on Botany, and one on Materia Medica, as well as a course of instruction in Practical Chemistry. The course on Chemistry will have to comprise not less than eighty lectures, that on Botany not less than forty-eight lectures, and that on Materia Medica not less than forty lectures, at least four-fifths of which must be attended by the student; each lecture is to be the length of at least one hour, and each course is to extend over at least five months. The course of instruction in Practical Chemistry is to extend to two hours daily for ten months, three hours daily for five months, five hours daily for three months, or some modification in which the course shall not extend over a period of less than three months or more than twelve months, or exceed five hours in any single day.

It will be apparent from the foregoing that the qualifying examination is to be divided into two portions. The first portion, for which the "pharmaceutical student" will be eligible as soon as he can present evidence that he has passed the prescribed three years in a pharmacy since his first registration, will include Prescriptions, Pharmacy, and Theoretical Chemistry. This will be entirely in writing, and will be conducted in London, Edinburgh, and other centres in the provinces, under the superintendence of members of the Board of Examiners. The second portion, upon entering for which the candidate will have to produce evidence that he has passed the first portion at least a year, has completed the "curriculum," and is twenty-one years of age, will be practical and *vivâ voce*. It will include Practical Dispensing, Botany, Materia Medica and Chemistry.

No argument is needed to enforce the probability that the carrying out of a scheme of systematic training for the calling of a pharmacist, such as that described above, will contribute materially to reduce the proportion of rejections in the examination rooms; as to this all are agreed, and objections that have been raised against the scheme have been based on other considerations. But just a reference may be made to the statistics contained in one of the short notes published in the Journal for last week, as bearing upon this point. It appears from these that at the end of the last term of the Paris School of Pharmacy nearly an equal number of candidates presented themselves for their final examination as pharmaciens in each grade. But whilst only 19·5 per cent. of the candidates for the first class failed to pass, those for the second class, from whom the requirements as to preliminary education are less stringent, suffered 45·4 per cent. of rejections.

MEDICAL ACTS AMENDMENT BILL.

Since the publication of our last number, a Bill has been introduced into the House of Lords by the Lord Privy Seal for the consolidation and amendment of the law relating to medical practitioners. This Bill is based upon the report of the Royal Commission on the Medical Acts, a *résumé* of which appeared in this Journal last July. Conformably with the recommendations contained in that report it is proposed in the present Bill to establish three Medical Boards for England, Scotland and Ireland respectively, consisting, in the case of England, of members chosen by the Universities of Oxford, Cambridge, London, Durham and the Victoria University, the Royal College of Physicians of London, the Royal College of Surgeons of England and the Apothecaries Society of London. The Scotch Board is to consist of members chosen by the Universities of Edinburgh, Glasgow, Aberdeen and St. Andrew's, the College of Physicians and Surgeons of Edinburgh and the Faculty of Physicians and Surgeons of Glasgow. The Irish Board is to consist of members chosen by the Universities of Dublin and Irelond, the King's and Queen's College of Physicians, the Royal College of Surgeons and the Apothecaries' Hall.

These Medical Boards are to be renewed every five years by election, the retiring members being eligible for re-election, and casual vacancies by death or resignation meanwhile are to be filled up by the choice of fresh members by the constituent authorities which returned the members who caused the vacancies. The Privy Council is to have power to extend or withdraw the privilege of returning members to a Medical Board. The functions of these Boards are to regulate examinations, appoint examiners, and as far as possible establish uniformity of standard in the qualifying examinations, subject to the control of the Medical Council and the Privy Council.

For the reconstitution of the Medical Council it is proposed that it shall consist of eighteen members, six of them nominated by the Crown, with the advice of the Privy Council, two elected by registered medical practitioners resident in England, one by registered practitioners in Scotland, and one in like manner for Ireland, four by the English Medical Board, two by the Scotch and two by the Irish Boards. The Crown nominees need not be members of the medical profession. The duties of the Medical Council are to comprise visitations of the examinations conducted for the purposes of the Act, inquiry into their efficiency and regulation of the duties to be performed by the Medical Boards.

The course of medical education is to be prescribed and regulated by the respective Medical Boards, and the sufficiency of the education provided at recognized schools is to be ascertained periodically by inspection carried out by the Medical Boards.

In regard to the regulation of medical practice the Bill indirectly recognizes the existence of unqualified practitioners and does not impose penalties upon them unless they use medical titles to which they have no right, or represent themselves to be legally qualified, or use designations or descriptions denoting that they are qualified by law to practice. Consistently with the provisions of the Bill in this respect it proposes to repeal so much of the "Apothecaries Act, 1815," as confers any privileges or enacts any restrictions inconsistent with the provisions of the present Bill.

Lastly, the provisions for the publication of the British Pharmacopœia are in effect the same as those in the Medical Act, 1858, namely, that the Medical Council shall, from time to time, cause the Pharmacopœia to be published under its direction. Among the saving clauses it is provided that nothing in the Act shall in any way prejudice or affect the lawful occupation or business of chemists or druggists, nor the rights, privileges or employment of duly licensed apothecaries in Ireland, so far as relates to selling, compounding or dispensing medicines.

PROPOSED INTERNATIONAL PHARMACEUTICAL EXHIBITION IN VIENNA.

We have been favoured by the Executive Committee with a copy of the arrangements that have been made for carrying out this exhibition, which promises to be one of remarkable interest to pharmacists. From this we learn that the enterprise is to be under the auspices of the Allgemeine oesterreichische Apothekerverein and the Oesterreichische pharmaceutische Gesellschaft of Vienna, the Apotheker-Hauptgremien of Vienna, Gratz and Troppau, and the Lower Austrian Apotheker-Gremien of Fünfhaus and Melk, so that the entire empire is well represented. The exhibition, which is to be held in the rooms of the Imperial Horticultural Society, in the Park Ring, Vienna, will open on the 11th of August and close on the 27th, and will be divided into five "groups." Group 1 will consist of scientific instruments and contrivances used for pharmaceutical purposes; Group 2, of literature of pharmacy and the allied sciences; Group 3, of apparatus and machinery for the preparation of medicinal products; Group 4, of apparatus and utensils necessary or useful in pharmacy; Group 5, of drugs, chemical products, pharmaceutical preparations and articles intended for medicinal purposes; and Group 6, of contributions to the history of pharmacy. All medicinal specialties, of which the composition and manner of preparation are not based upon recognized rational and scientific principles, are to be excluded, as well as all nostrums without distinction, whether their composition is known or not.

For the management of the exhibition a large Executive Committee is formed, consisting of representatives from the above-mentioned Societies, and from manufacturing and commercial firms. Of this Committee, Herr A. von Waldheim is President, and Dr. A. P. Hellmann, Vice-President, the Secretaries being Dr. Hans Heger and Herr F. Kwisda. The distinctions which it is proposed to award in recognition of special merit in the exhibits are—diplomas of honour, gold medal diplomas and silver medal diplomas.

A charge will be made for space according to the following scale:—Per square metre, having a metre or a portion of a metre, of frontage, 16*s.* 8*d.* Per square metre in the open room, or portion of a metre, £1 13*s.* 4*d.* Per metre of wall surface, 8*s.* 4*d.* A reduction of 20 per cent. will be made in cases where at least ten square metres are taken. All expenses connected with an exhibit will fall upon the exhibitor, the Committee only promising to exercise careful supervision. The articles will have to be in place before the 6th of August and removed by the 31st. Applications for space or for further information should be addressed to Dr. Hans Heger, 22, Berggasse, Vienna, IX.

We regret to have to report the death, on Sunday week, of two Benevolent Fund annuitants, Mr. George Godden, in the 87th year of his age, and Mrs. Ellen Parkes, in her 64th year. Mrs. Parkes was elected in December, 1878, and as the only annuitant who previous to the last election came within the requirement of having been "a subscriber or the widow of a subscriber," received the £5 "Robbins Gift." Mr. Godden was elected in 1881.

On Wednesday next, at noon, a meeting will be held at 17, Bloomsbury Square, with the object of making preliminary arrangements for the usual Dinner of the Members of the Pharmaceutical Society and their friends in connection with the Annual Meeting in May. For obvious reasons it is desirable that the company at the Dinner should this year be numerous and representative, and it is hoped that with a view of attaining this end many of our readers will make a point of being present at the meeting on Wednesday.

* * *

Just before going to press we have received a telegram from Leeds stating that a good meeting of the trade was held there on Wednesday for the purpose of considering the Draft Bill for the Amendment of the Pharmacy Acts. The result was a unanimous expression of cordial approval of the Bill, the only addition suggested being an extension of the present exemption from jury service, which it was decided to ask the Council to endeavour to obtain.

* * *

In the House of Commons, on Friday the 9th inst., in reply to a question put by Mr. Warton, Mr. Mundella stated that it is the intention of the Government to introduce into the House of Lords a Bill for the further regulation of the sale of poisons, which will include provisions respecting the sale of so-called patent medicines of a poisonous character.

* * *

A Bill to amend the law governing the sale of drugs and poisons in the County of Kings, State of New York, has been drawn up by the local pharmaceutical association, which proposes to make it illegal for any but registered pharmacists to "open or conduct any store or place for retailing, compounding or dispensing drugs, medicines or poisons, or to practise pharmacy within the county." The Bill would create two grades of qualification: one for "registered pharmacists," who are to be persons whom the examiners may deem competent to act independently as principals or to be entrusted with the sole charge of pharmacies, the other for "assistant pharmacists," who will only be entitled to act under the direction of registered pharmacists. It would also make it unlawful to employ in a pharmacy any person who is not either a registered pharmacist or an assistant pharmacist or a student, apprentice or aid acting under the immediate supervision of such a person.

* * *

Special committees have been appointed by the College of Pharmacy of the City of New York and the New York Deutschen Apotheker-Verein to act jointly in taking steps to induce physicians to refrain from prescribing "ready made identical specialties of rival manufacturers," and to omit from their prescriptions the names of makers of such preparations.

* * *

According to the *British Medical Journal* the Upper Sanitary Council of Italy has just passed an important resolution regulating the importation of patent medicines into the kingdom. A list of the foreign patent medicines admissible was drawn up, which showed that they were all French but two; to these a few more English articles have now been added. The subject is said to be engaging the attention of the British Embassy and we gather that further modifications in the regulation are probable.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, March 7, in the College of Physicians, Dublin, at three o'clock.

The President, Dr. Tichborne, in the chair.

The other members of the Council present were the Vice-President, Dr. Aquilla Smith, Dr. Montgomery, Dr. Collins, Messrs. Allen, Bennett, Brunker, Grindley, Hayes, Hodgson, Pring, Simpson and Wells.

The President said a letter had been received from Mr. Middleton, dated March 2, reminding the Council that he had not up to that date, received any answer to his communication of December 19, 1882, asking that a declaration should be accepted in lieu of a certificate. He (the President) had a visit, two or three days ago, from Mr. Middleton, who wanted to know why he had not received a reply.

The Registrar, Mr. Fennell, said he laid the matter before the Certificate Committee.

Mr. Hayes: The Certificate Committee only meets immediately before the examinations for the purpose of examining the certificates.

The President said a reply ought to have been sent to Mr. Middleton.

Mr. Allen: Mr. Fennell brought the matter before some members of the Committee informally assembled and it was arranged that I should speak to Mr. Grindley about giving him a certificate. I did so, and the certificate has since been handed to Mr. Middleton. Nothing more can be done until he sends that certificate before us.

It was resolved that Mr. Fennell should write to Mr. Middleton stating that the Certificate Committee had not met since the receipt of his letter in December, 1882; but that it would meet before the next examination, when his case would be considered; and that in the meantime he should send in any further documents relating to his qualification.

A letter was read from Mr. E. Worth, of Bournemouth, presenting some prescriptions to the Society.

On the motion of Mr. Hayes, seconded by Dr. Collins, thanks were voted to the donor.

A letter was read from Dr. A. N. Montgomery, Secretary of the Medical Section of the Academy of Medicine in Ireland, requesting the use of the Council room on an evening in each month to exhibit specimens in.

On the motion of Mr. Hayes, seconded by Mr. Brunker, a resolution was passed granting the use of the Council room on an evening in each month, provided it did not interfere with the examinations or meetings of the Society, and also provided the sanction of the College of Physicians was obtained.

A letter was read from Mr. G. T. Dobson, of 1, Gilbert Road, Kennington Road, London, stating that he proposed taking a chemist's business in Ireland, and asking for a syllabus of the subjects required in the examination of the Society; and also asking whether the licence of the Society of Apothecaries, London, would be accepted in lieu of the final examination of the Society.

The President: It does for the Preliminary examination of our Society, but that is all.

The Registrar was directed to inform Mr. Dobson that the licence of the Society of Apothecaries, London, could not, under the Act, be accepted by the Pharmaceutical Society of Ireland in lieu of its final examination.

A letter, dated March 3, was read from Dr. J. W. Moore, Registrar of the College of Physicians, Ireland, stating that a communication had been received from the Privy Council, asking whether the provisions of the Sale of Poisons (Ireland) Act, 1870, as far as regarded the sale of poisons to persons unknown to the seller, were generally observed in Ireland, and if so, whether any inconvenience had been caused thereby; and that he had been directed to ask the Council of the Pharmaceutical Society whether it would inform the College of the results of the inquiry which it was making on the subject.

The President: The way to meet that would be to send a copy of the report of our Pharmacy Act Amendment Committee.

Mr. Brunker submitted a report from the Pharmacy Act Amendment Committee of the Society. It stated that in reply to the queries addressed to licentiates as directed at the last committee meeting thirty replies had been received from twenty different localities. The answers to the first query were nearly unanimous as to qualified persons observing the provisions of the Poisons Act. The answers to the second query unanimously were that no inconvenience arose to the public from the restrictions being observed by qualified persons. The answers to the third and fourth queries showed that the sale of scheduled poisons was largely carried on by persons describing themselves as chemists and druggists, ironmongers, grocers, seedsmen and small huxters. Replies to those queries had been received from seventeen towns. Two or three of the replies stated that no such sales took place in Dublin; and a negative reply had been received from Warrenpoint. The towns from which the answers had been received included such important places as Dublin, Belfast, Limerick, Omagh, Monaghan, Mullingar and Athlone. Replies to the fifth query mentioned only three fatal cases resulting from unqualified persons selling poison, but stated that numerous serious mistakes were reported. Replies to the sixth query went to show that the police had taken some action towards seeing the provisions of the Act carried out in Dublin, Blessington and Naas, but not elsewhere.

The President: I do not think the police have taken any action, except so far as making inquiries. We know of no prosecutions for illegal sales.

Mr. Brunker: They have issued circulars and called at some places to see if poison books were kept.

Mr. Wells said that in one instance two detectives called at an establishment in Sackville Street and asked to see the poison book, and they also called at a number of other houses; but the object of their inquiries was to ascertain where the poison had come from in connection with a recent case of poisoning that had occurred.

Mr. Brunker said that since the report was drawn up a reply had come from Ballymoney stating that some action was being taken by the police there. The report concluded as follows:—

"The Committee then took up the consideration of the Poisons Act (Ireland), 1870, with the view to amend same, and suggest that the sale of proprietary or patent medicines, containing scheduled poisons, should be subjected to the following restrictions:—

"(*a*). A specification of the poisonous contents, and the quantity of same to be printed on label or wrapper.

"(*b*). The word 'poison' to be printed on the various labels or wrappers of the article, together with the name and address of the first seller.

"(*c*). The sale of such articles to be confined to persons legally qualified to sell scheduled poisons.

"The Committee also recommend the addition to Schedule II., Poison Act (Ireland), 1870, of sulphuric acid, hydrochloric acid, nitric acid, solution of chloride of antimony, and carbolic acid.

"In addition to the amendments already adopted by the Council of the Pharmaceutical Society of Ireland to the Pharmacy Act (Ireland), 1875, Committee suggest that Clause 10 of the draft Bill, proposed by the Pharmaceutical Society of Great Britain, should be adopted, with the addition 'that delivery of such notice by registered letter shall be deemed good service,' after the words 'notice signed by him.'"

The object of inserting that clause was to provide means for discovering who were the actual owners of establishments about the ownership of which there was a doubt.

The Committee had been instructed to draft a letter to Dr. Kaye, and had prepared the following:—

"Pharmaceutical Society of Ireland.
"Kildare Street, Dublin,
"*7th March*, 1883.

"W. S. B. Kaye, Esq., LL.D.,
"Clerk to the Privy Council,
"Dublin Castle.

"Sir,—In reply to your letter of 29th January, 1883, I am directed by the President and Council of the Pharmaceutical Society of Ireland to state, for the information of the Lords of the Privy Council in England, that they have carefully considered the queries contained therein, and, having instituted inquiries among the Licentiates of the Society residing in various parts of Ireland, have to convey the following replies to those queries:—

"I. (1). The provisions of the Sale of Poisons (Ireland) Act, 1870, with regard to the sale of poisons to persons unknown to the seller, are pretty generally observed by duly qualified pharmaceutical chemists and apothecaries.

"(2). The observance of these provisions has not caused any inconvenience to the public.

"(3). But the sale of poisons is largely carried on throughout the country by general traders, such as chemists and druggists (not holding the licence of the Pharmaceutical Society), grocers, ironmongers, seedsmen, huxters, etc., and by this class of persons the provisions of this Act are generally ignored.

"This is the case in seventeen towns from which returns have been received, including Dublin, Belfast, Limerick, Omagh, Dungannon, Monaghan, Maryborough, Mullingar and Athlone —all large centres of population.

"(4). Though few fatal accidents have occurred through this indiscriminate dealing in poisons, numerous serious mistakes have been made by ignorant persons.

"(5). The returns show that in no towns, except Dublin, Naas and Blessington, have any steps been taken by the police authorities to ascertain whether the provisions of the Act are observed or not; and that no prosecutions have been instituted by them in any part of the country.

"II. In reference to the second query contained in your letter, I am to state that the President and Council recommend, for the consideration of the Privy Council, the following additional provisions for the better regulating the sale of poisons in this country:—

"(1). That the sale of proprietary or patent medicines containing scheduled poisons should be subject to the following restrictions:—

"A. A specification of the poisonous contents, and the quantity of same to be printed on the label or wrapper.

"B. The word *Poison* to be printed on the various labels and wrappers of the article, together with the name and address of the first seller.

"C. The sale of such articles to be confined to those legally qualified to sell the scheduled poisons.

(2). That the following substances be added to schedule II. of the existing Act:—sulphuric acid, nitric acid, hydrochloric acid, carbolic acid and solution of chloride of antimony.

"III. I have also to state that some difficulties and deficiencies have been experienced by this Council in the working of the Pharmacy Act (Ireland), 1875, since its enactment; and I am to bring under your notice the following considerations, with recommendations based thereon:—

"The Act conferred upon the Licentiates of this Society—

"(1). The right formerly enjoyed in Ireland by Apothecaries only, to compound medical prescriptions (sec. 30).

"(2). The right—confined to them and to Apothecaries —to retail the poisons scheduled under the Poisons Act (33 and 34 Vict. cap. 26).

"(1). The former privilege was opened up to chemists and druggists who were in business at the time of the passing of the Act; but only on their submitting themselves for examination, in accordance with the regulations of the Society.

"(2). By section 31 of the Act, such persons had reserved to them the right to sell poisons, without any restriction as to any qualification by examination, if they were engaged in that trade at the time of the passing of the Act.

"No machinery was adopted or laid down under the Act whereby such persons should be registered, nor was any line of demarcation drawn between them and others, who at some subsequent date might choose to enter upon that trade. The consequence is that the sale of poisons throughout the country is carried on without hindrance by any person who cares to engage in it.

"The Council, feeling that such a state of things should not, in the interests of the public, be allowed to continue, have adopted the following resolutions:—

"1. That it is desirable that the Council of the Pharmaceutical Society should seek powers which will enable them to compel all chemists and druggists actually engaged in the sale of poisons and poisonous drugs at the time of the passing of the Pharmacy Act (1875), on making a declaration to that effect, and giving reasonable proof thereof, to register their names, paying a fee of three guineas for same; such persons to be styled 'Registered Druggists.'

"Since these resolutions were adopted, nearly three years have elapsed, rendering the enforcement of amendment No. 1, even if it were now passed into law, much more difficult. The Council therefore think that it would be satisfactory if the privilege of registering were extended to those engaged *bonâ fide* in the sale of poisons at the present date.

"That a list of 'registered druggists' for the sale of poisons shall be published from time to time by the Council of the Pharmaceutical Society, containing the names and addresses of all persons entitled to be placed thereon.

"3. That it shall be illegal for any person to sell poisons or poisonous drugs, or to style himself a 'registered druggist,' except he shall be so registered, save and except he be a registered medical practitioner, or duly registered by the Pharmaceutical Society of Ireland, or otherwise qualified under the provisions of the Pharmacy Act.

"4. That it shall be unlawful for any registered druggist, or other person, to keep open shop for retailing, dispensing, or compounding medical prescriptions, unless he be registered as a pharmaceutical chemist, or apothecary.

"5. That the penalties for infringement of this Act shall be the same as provided in the Pharmacy Act.

"6. That all bye-laws or rules for registration shall be approved of by the Privy Council prior to their adoption.

"Some inconvenience has arisen under Clause 11 of the Act, from the short interval allowed for filling occasional vacancies on the Council, to meet which the following amendment is suggested:—

"After the word 'Society' (line 3) read:—'Such day not to be later than the next monthly meeting after the vacancy has been notified to the said President.'

"The following amendments have also been adopted by the Council, and I am to recommend them for the consideration of the Privy Council:—

"That in reference to the Pharmacy Act (Ireland), 38 and 39 Vict. cap. 57, and more especially in reference to Clause 30 of same, the word *person* shall be held to mean and imply any association of persons, whether as a partnership, society, or company (limited or otherwise), of which one or more members shall not be qualified under the provisions of the Act.

"That the Society shall have powers to institute an Examination for Assistants to Pharmaceutical Chemists.

"That no pharmaceutical chemist shall legally hold any establishment for the retail of poisons, or compounding of medical prescriptions, except under the responsible management of a duly qualified pharmacist.

"This Council further recommend the extension to Ireland of Clause 10 of the draft Amendment Bill proposed by the Pharmaceutical Society of Great Britain, adding after the words 'notice signed by him,' 'the delivery of such notice by registered letter to be held sufficient service.'

"I have the honour to be, sir,
"Your obedient servant,
"H. J. Fennell,
"*Registrar.*"

On the motion of the Vice-President, seconded by Mr. Pring, the report was adopted.

On the motion of Mr. Bennett, seconded by Mr. Grindley, it was ordered that fifty copies of the draft letter to Dr. Kaye be printed, and that a copy of it be sent to the College of Physicians of Ireland.

On the motion of Mr. Allen, seconded by Mr. Grindley, it was ordered that all the replies received to the queries which had been addressed to licentiates should also be sent to the College of Physicians.

Mr. Henry Forewell, of 53, Lower Sackville Street, Dublin, was elected a member of the Society.

The following donations were announced:—

The Year-Book of Pharmacy for 1882.
From the British Pharmaceutical Conference.

The Calendar of the Pharmaceutical Society of Great Britain for 1883.
Presented by that Society.

Fourteen volumes of Curtis's 'Botanical Magazine.'
Presented by the Registrar, Mr. Fennell.

The thanks of the Council were voted to the donors.

The Council then adjourned.

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL ASSOCIATION.

Discussion on "The Pharmacy Acts Amendment Bill."

In response to an invitation from the Council of the Sheffield Pharmaceutical and Chemical Association, a meeting of members and the trade was held in the Society's rooms, Market Place, Sheffield, on Wednesday, March 7, to discuss "The Pharmacy Acts Amendment Bill now or about to be introduced into the House of Commons." Mr. J. Preston (President of the Society) occupied the chair.

The President said that the meeting had been called at the instigation of the Council, and said there had been meetings held in other towns in connection with the question which would form the subject of discussion that afternoon. It was proposed that the preamble of the Bill as published in the *Pharmaceutical Journal* of February 10 should be read, and the clauses discussed one by one. He would ask them to consider the Bill broadly, remembering that Acts of Parliament were not made for individuals, but for communities, and he trusted that they might have a wise and fair discussion of the several points in the Bill.

Mr. Newsholme (Hon. Sec.) then read the preamble of the Bill.

Mr. J. M. Furness rose to move that the word "poisonous" in the second line of the preamble should be omitted, remarking that clause 2, specifying the "regulations to be observed in the sale of poisonous articles," appeared to him to be the most objectionable in the whole Bill.

Mr. W. Ward asked if Mr. Furness proposed to leave out the word "poisonous" and substitute some other word.

Mr. Furness said he proposed to omit the word "poisonous" and put the word "dangerous" in its place. He then moved to that effect.

Mr. Learoyd seconded the motion.

Mr. Ward moved as an amendment that the word "poisonous" should remain in the preamble.

The President stated that a simple negative would suffice, and he then put the resolution moved by Mr. Furness, which was carried, 8 voting for and 3 against it.

The preamble was adopted with the alteration.

Clause 1, as simply a definition clause, was agreed to without discussion.

Clause 2. *Regulations to be observed in the sale of poisonous articles.*

Mr. E. R. Learoyd remarked that clause 2 referred to a number of articles to which for the first time since the passing of the Pharmacy Act a condition had been provided for the sale of articles which were no doubt poisonous, but which should be sold by others than registered chemists. The reason that clause had been introduced into the Draft Pharmacy Bill was this. Some time ago a number of men interested in agriculture and in the keeping of horses,—such men as stud farmers and stud keepers,—found great injury done to their stock by maladministration of those very deleterious and injurious bodies which were easily obtained by horse-keepers and grooms. It was felt that this was a great injustice, and it was suggested by the Pharmaceutical Society that these poisons should be added to the second part of Schedule A in the Pharmacy Act of 1868, which would render their sale liable only by registered chemists, who would have to label them "poison" in the ordinary way. When the Pharmaceutical Society represented this to the Privy Council it was clearly shown that the Government would not entertain that suggestion, as these drugs were largely used in manufactures. They would not entertain the idea of restricting the sale to chemists alone. In the Draft Pharmacy Bill, therefore, in order to cover and protect the people injured thereby, this clause had been inserted as a sort of compromise, and it had become necessary in the opinion of the Pharmaceutical Society instead of having them placed on the list of poisons that they should be marked "poisonous," as they could be sold by any dealer. The resolution he should propose referred to the last article in the schedule of poisonous articles; he spoke more particularly of carbolic acid. So far as they had any information with regard to this particular drug it was not used in manufactures. He also believed he was correct in stating that this article was largely used for medicinal purposes and appliances, and he did think that when the Pharmaceutical Society considered it necessary to have these things labelled "poisonous" it would be wise to place carbolic acid in the list of "poisons" to be marked with the name of the seller, and sold by chemists only. Numerous mistakes had occurred in hospitals and elsewhere in applying the article, and he moved that the second clause be adopted with the exception of the article carbolic acid, recommending that it should be placed in the second part of the Schedule A of the Pharmacy Act of 1868, to be sold by chemists only.

Mr. A. Archer, in seconding the motion, said that in his opinion carbolic acid should be placed in the list of poisons only to be sold by registered chemists and druggists. It was, he said, a mistake to include it in the list of "poisonous" articles.

Mr. H. E. Ibbitt said he should like to ask if there was any legal distinction between a poisonous article and a poison. He could not conceive of any. He had looked in Taylor's 'Medical Jurisprudence,' and there he found only poison defined. If the word "poisonous" had any use at all it meant a minor form of poison. The articles proposed to be included in the schedule were not minor forms of poison, though they were deadly, if he might use such a word. If the Act was passed it would place them in this position, that suppose a customer came for a pennyworth of paregoric in half a pint of vinegar they must put "poison" on it, but if he wanted oil of vitriol or nitric acid they must label it "poisonous," which meant that it was not a strong poison. It might come to a question as to which were "poisons" and which were "poisonous" articles.

Mr. Learoyd said he thought he should be able to show that the Act of 1868 very clearly defined what were "poisons," and that the present clause defined what were "poisonous."

Mr. Ibbitt thought the word "poisonous" should be left out altogether.

Mr. W. Ward said it was quite well known, and had been clearly explained, that the Council was not able to add to the schedule of poisons the acids mentioned along with carbolic acid. The Privy Council rejected them, and no doubt they had strong reason for putting carbolic acid along with the other acids. He thought they should give the Council credit for what was no doubt a judicious plan. On that ground he was not prepared to support Mr. Learoyd's motion.

Mr. J. M. Furness said he was prepared to move that the whole of clause 2 be expunged from the Bill. They had been told by Mr. Ibbitt that the articles proposed to be added to the schedule were not merely "poisonous" but poisons. The Pharmaceutical Society itself, when asked to represent their opinions to the Government, said these very articles should be placed in the second section of Schedule A of the Act of 1868; yet it was now proposed they should be labelled "poisonous." Were they to understand that this very objectionable clause was to be a sop for the whole Bill. If they voted now that those articles should be labelled "poisonous" they would stultify their opinions of last year, and he maintained that if the Privy Council wanted this clause let it have it on its own responsibility. No chemist sold those articles without labelling them poison, and the public was safe if they were exclusively in the hands of the chemist. Therefore he asked why they should bind themselves to the Privy Council in order to do objectionable work which was against their own opinions of last year.

Mr. J. Ellison said that he objected to other people besides chemists and druggists selling poisons, and he thought the Privy Council ought to restrict the sale of them.

The motion, upon being put, was carried, 10 voting for, and 4 against it.

Clause 3.—*Regulations on sales by wholesale of poisons in part* 1 *of Schedule A to the Pharmacy Act of* 1868.

Mr. Ellinor said he thought the wholesale houses should be registered as wholesale dealers, that there should be a register of wholesale druggists.

No other remarks were made on this clause, which was agreed to.

Clause 4.—*Labelling of patent medicines being or containing a poison.*

Mr. Learoyd said he should be sorry indeed if they, as representing in some slight degree a branch of the Pharmaceutical Society, let it go forth to the public that they were at all selfish in their views. It was the greatest mistake in the world to suppose that they, as a branch of the Society, or that the Pharmaceutical Council representing the great mass of pharmacists, wished to legislate with any selfish views whatever. The principle they desired to lay down and promulgate was that they as a society were bound to legislate for the public good, and in taking that view they were bound as a body to protect the public from the use of articles people did not quite understand. The word "poison" was distinctly placed here with the object of stating most clearly that the "poison" meant one of those articles contained in Schedule A of the Pharmacy Act of 1868, in distinction from other things which the Privy Council said had a right to be sold to the public at large, but which by improper use would be dangerous. He moved that the clause be adopted.

Mr. Ward seconded the motion.

Mr. Furness moved as an amendment that the inside should be labelled "poison," as well as the outside, believing that this was necessary for the public safety.

Mr. Learoyd said the clause took that precaution, and he read a portion of it, pointing out that it would be unlawful to sell "unless the box, bottle, package or vessel in which the same is contained, the wrapper, if there be only one, or the outermost wrapper, if there be more than one, be labelled."

The President said the clause seemed a little ambiguous on the point, but he thought so long as the word "poison" was placed on the outside wrapper there need be no other label, because the word "or" instead of "and" was used in the clause.

Mr. Ellinor considered that the clause should be more definite, and suggested that the part should read "unless the box, bottle, package or vessel in which the same is contained, *and* the wrapper, if there be only one, or the outermost wrapper, if there be more than one, be labelled."

Mr. Learoyd thought the word was quite unnecessary.

The clause was agreed to, with the addition of the conjunction suggested.

Clause 5, which provides *Penalties for certain offences*, was agreed to.

Clause 6.—*Duly qualified keepers of open shops entitled to remedies in certain cases.*

The President said this was a very important clause, rendering, as it did, chemists liable for things over which they had little or no control.

Mr. Ward remarked that in his opinion this clause contained a very mischievous principle. He should have been much better pleased to see the fine made on the manufacturer, or the proprietors of the article. It seemed to him that if the seller, through no fault of his own, was to be continually dragged up before the justices for selling these articles, of the non-labelling of which he might be perfectly ignorant, he was likely to get into litigation most damaging to his reputation. He therefore moved —"That the manufacturer be sued for the fine, and not the seller."

Mr. Ellinor was much surprised that Mr. Ward should oppose this principle in the clause. It was the very principle upon which the life and existence of the Adulteration Act depended. They could not go to the proprietor in the first case; they must go to the seller, as in the Adulteration Act. They would never be able to get a conviction if they went to the proprietor first; indeed they might not know who he was for long enough.

Mr. Learoyd wished to support Mr. Ward in his idea, but not in the method in which he proposed his resolution. They had, he contended, quite hardships enough to suffer in the present exigencies of their condition, without having them amplified. Perhaps it might meet Mr. Ward's view if he put the matter in this way,—"That in case a seller is summoned for selling poisons not duly labelled, on his showing that he obtained them direct from the manufacturer or wholesale dealer, the manufacturer or wholesale dealer shall be rendered liable to this penalty and costs."

Mr. Ward expressed his willingness to accept this resolution, which he moved.

Mr. Furness pointed out that the seller frequently did not know the contents of the patent medicines he had for sale, and said he could only make himself safe by labelling every patent medicine in his shop "poison."

The President observed that under the Adulteration Act, the retailer was always summoned, and power given into his hands to deal with persons from whom he obtained the article. But supposing a bottle of chlorodyne came from the manufacturer. It was quite possible the label might fall off in the chemist's shop. Now was the manufacturer of that article to be summoned because it had not the word "poison" upon it?

Mr. Ward said the bottle would have the word "poison" upon it beneath the wrapper.

Mr. Hall presumed that if the bottle were wrapped up the label could not fall off.

Mr. Ward maintained that it would be exceedingly annoying for the vendor to be in fear of being dragged up before the magistrates, of being fined, and having his name made prominent. He might be subjected to this annoyance frequently, and that was his objection to the seller being made liable.

Mr. Hall had pleasure in supporting Mr. Ward on that point, at any rate.

Mr. Archer asked one question as to the liability of the manufacturer and wholesale dealer, how they were to get their penalties in the case of patent medicines imported from abroad—from France and America.

Mr. Learoyd pointed out that the wholesale dealer would be liable.

Mr. Ellinor asked if they got these medicines direct from the foreign makers how they were to manage about getting the penalty. Were they to go abroad to prosecute? In his opinion they would get no conviction at all. Would not the clause as it stood make those who dealt in patent medicines more careful what they supplied?

Mr. Ward's motion, having been seconded, was put to the meeting, and carried, 9 voting for it, and 4 for the clause as it stood.

Clause 7.—*Persons keeping open shops to be liable for their assistants, apprentices and servants.*

Mr. Learoyd asked whether it was fair in clause 7 to say the master was to be rendered liable for any accident or mistake of his assistants, and in the next breath, in clause 8, to say the chemist was compelled to employ a qualified man, and yet, although employing a qualified man, he himself was to be liable to the penalties. He moved that clause 7 be struck out, thinking it a hardship that chemists should be trammelled with this liability for the accidents and mistakes of their *employés.*

Mr. Ward said they would like the clause to be expunged, but it was impracticable.

Mr. Ellinor believed the clause was a greater gain than a loss.

Mr. Furness suggested an addition to the effect that the qualified assistant at the branch shop should be answerable for his own doings.

Mr. Archer considered this a proper suggestion.

Mr. Fox seconded Mr. Learoyd's motion.

Mr. Ellinor moved as an amendment that the clause be retained in its entirety. They could not, he remarked, do away with their responsibility, whether the clause was expunged or not; but seeing that the latter part of the clause would be of great service in administering the Act, he thought they had better retain the clause as it stood.

Mr. Ward seconded Mr. Ellinor's amendment.

The voting was then taken, with the following result:—For Mr. Ellinor's amendment, 11; against, 2.

Mr. Learoyd's motion was therefore declared lost.

Clause 8.—*Regulation for conducting branch businesses.*

Mr. Learoyd then moved that clause 8 be struck out. He did so, he said, because it was perfectly clear that the object of the clause was to make the proprietor of the shop responsible for acts committed in that shop, and it said nothing about how many branch shops he had. According to the clause if he had a qualified assistant in each he would still be liable. There might be some other meaning hidden in the clause, something they did not understand; but if the hidden meaning was one relating to the question of co-operative stores, and to meet that part of the question, he maintained that it was perfectly absurd to suppose it did anything of the kind. When clause 10 came on he should submit that that met the case of the co-operative societies quite fully, and that clause 8 was a great hardship.

The President said this was a very important clause, and he hoped somebody would be found to second the motion, so that there might be some discussion. There were a lot of people in the business who were not registered chemists and druggists; it was true they had the privilege of becoming registered, and of passing the Modified examination. Still, there were a number of older people who had not been registered, and to them he was afraid this clause would be rather a hardship.

Mr. Fox seconded the motion in order to facilitate discussion.

Mr. Ellinor thought they had in this clause a great provision of safety. Of course, if a person took fifty branch shops he took fifty responsibilities. He believed if the clause was expunged they would have a lot of difficulty. If a man wished to have an open shop he must have a qualification, and for every branch shop he must have a qualified assistant. It was so in the Irish Pharmacy Act and he did not see why they should not have it with the English Pharmacy Act. If men would take these extra responsibilities they must be prepared for the consequences or responsibilities they assumed. By the Act of 1868 everybody had an opportunity of becoming registered; people were crammed like turkeys, and put through their examinations like wildfire. He saw no hardship in retaining the clause, and moved that it stood in its entirety.

After some further remarks from Mr Learoyd and Mr. Ellinor, the discussion was continued by Mr. Ward, who said with respect to the question of the proprietor of a shop and a co-operative store, there was a marked difference. The proprietor of the chemist's shop was a registered pharmacist, and must be a registered man; the members of a co-operative store were not registered men. And there was a difference between the registered man employing a qualified assistant, and a co-operative store, not registered, employing a qualified man. The owner of the branch shop having a qualified man should be held responsible for his assistant, and he therefore supported the clause as it stood, believing it was one of the most sensible and best calculated to benefit not only the cause of pharmacy, but to protect the public.

The President then put the question to the meeting. Only 2 gentlemen voted for Mr. Learoyd's motion, and 11 against it.

Clause 9.—*Duly qualified persons to sell medical prescriptions and sell poisons.*

Mr. Learoyd pointed out that the Pharmacy Act of 1868 referred to the poison clauses, and the amendment to that Act merely related to additions to those clauses.

Mr. Archer, quoting a portion of the clause, "provided nevertheless that nothing in this section shall extend to or interefere with the business of wholesale dealing in patent medicines," said Messrs. Birks, of that town, were wholesale dealers in patent medicines. Would the clause extend to them?

Mr. Learoyd said the clause referred to selling by retail, and he was not aware that wholesale dealers were supposed to sell retail.

Mr. Furness suggested an addition to the clause to the effect that all dealers, wholesale and retail, in any of the poisons in the schedules of 1868, should be qualified as registered chemists and druggists.

Mr. Ward was afraid that would never be carried.

Mr. Ellinor said he would have them all registered if he possibly could, but there was a great doubt about it.

Mr. Furness thought not with regard to poisons.

Mr. Ellinor remarked that they could not have all the wholesale druggists registered and he did not see how they could go on with the suggestion.

The clause was then agree to.

Clause 10.—*Persons having open shop must, on application, inform the Registrar of the name or names of proprietor or proprietors.*

Mr. Learoyd said that this clause was one with which he had a great deal of sympathy. It met the case clearly and comprehensively. If it became an Act of Parliament it would settle the store question finally. At the same time he must say this was the clause on which he should have relied if they had expunged clauses 7 and 8. If this clause 10 became law and they were subjected to its restrictions, he could not help thinking that in years to come some of them would arrive at the conclusion that it would have been better to take his advice with regard to clause 7.

The President said they knew the difficulty the Pharmaceutical Society had experienced in ascertaining the names of proprietors of shops where nefarious practices had been carried on. He supposed it was to meet these cases that the clause had been framed.

Mr. Ellinor said if Parliament would only adopt it, the Society would no doubt make great use of the power given by the clause.

The clause was then agreed to.

Clause 11.—This clause was agreed to without discussion.

Clause 12.—*Regulations may be made by bye-law to subdivide examinations, etc.*

The President observed that this was the educational part of the Bill. They had, as a local association, given their opinion on the question a little time since.

There was no discussion, and the clause was adopted.

Clause 13.—*Certificates of having passed Preliminary examination requisite to apprenticeship.*

Mr. Archer remarked that this clause said that no pharmaceutical chemist should take as an apprentice any person who had not obtained a certificate. Assuming that any chemist took a youth who was not legally bound, he contended that youth was not an apprentice. Apprenticeships were getting shorter, and the time might come when they would be materially altered. Now they heard of people who had passed no examination, served no time, never been bound to a master. It ought to be absolutely defined that youths entering the trade in this way were not apprentices.

Mr. Ward asked how he would define it.

Mr. Archer, continuing, said he might find a youth who was suitable and take him on verbal conditions, but he would not be an apprentice. He might remain to the end of four years, and yet he would not be an apprentice. In such a case the matter would be left open.

The President remarked that it would be an evasion.

Mr. Archer, continuing, observed that the word "apprentice" would have to be defined. Then there was another matter. In clause 8 were the words "a duly qualified keeper of an open shop." Any shopkeeper who was not a chemist and druggist might say he was "a qualified keeper."

The President said a definition of "a qualified keeper of an open shop" was given in the former Bill. Certainly no person was "duly qualified" unless he had passed.

Mr. Archer admitted that in that case it was all right, but with regard to the word "apprentice" they should have it defined.

Mr. Learoyd said there was a clause in the bye-laws which set forth distinctly that no person was eligible for examination until he had served three years with a qualified chemist.

Mr. Archer remarked that if that was so they were all right.

Mr. Ellinor said Mr. Archer was probably not aware that each student must have a certificate showing that he had served three years, and that the youth would have to serve three years after he was registered before he could present himself for examination.

Mr. Fox asserted that the clause would not interfere with a chemist having a boy in his shop. It was merely that the apprentice must pass his Preliminary examination before he stayed three years for the Minor examination.

Mr. Ward pointed out that the youth would have to stay three years between passing the Preliminary and passing his Minor examination.

The President, by way of illustration, said if he took a boy for two years and gave a certificate that the lad had been three years as an apprentice, then he should render himself liable to the extent of £5 or £10; but if he took a youth who was not apprenticed, but was merely serving his time as a porter or servant, not wishing to enter the trade, he could not give that youth a certificate.

Mr. Learoyd said the word in the clause was "previously," meaning that a man should not take an apprentice until he, prior to the commencement of his apprenticeship, passed this Preliminary examination.

The clause was adopted without further discussion.

Clause 14.—*Certificates may be accepted in lieu of Preliminary examination.*

The President said he only wished other bodies would imitate the Pharmaceutical Society with regard to the liberality shown in that clause.

The clause was agreed to.

Clause 15.—*Certificates of death and expense of same.*

This clause was adopted without discussion.

Clause 16.—*Certain persons to be registered as Pharmaceutical Chemists and eligible for membership.*

The President said he took it that this clause was a position taken up by the Pharmaceutical Society with the object of continuing its existence. It was a lengthening of its stakes, and a strengthening of its cords.

Mr. Ellinor observed that this was not the time when he should take strenuous opposition to this clause, although he did not see there was any advantage to be gained. It seemed as if the assistant qualification of the Society qualified a person as a chemist, and the Minor examination qualified for a pharmaceutical chemist. But the Society had not provided anything for those who had borne the heat and burden of the day. Nothing was said for those who had worked for progress. He thought it was wrong to take away the title of pharmaceutical chemist without giving him, who had passed all the examinations, another title. He thought there should be some distinction for those who had worked upward in this way. This clause had a double action, and referred to attendance on juries. The chemists and druggists were desirous of getting rid of this jury service if they possibly could, and this section would give the means to every chemist and druggist who qualified after the time named to get rid of the jury service. But those who were chemists and druggists under the present Act would have to remain on juries. What he objected to was that nothing was being done for those who had passed the examinations. He thought a time would come when they would have to have a fellowship.

Mr. Ward thought Mr. Ellinor was mistaken. That gentleman referred to the Minor examination as qualifying for a pharmaceutical chemist, but the clause did not say so.

Mr. Ellinor read the clause, and believed he had interpreted it rightly.

Mr. Ward said it did not necessarily follow that the Minor examination was meant; indeed, he did not think the Council had the remotest idea of making the Minor examination an entrance for the degree of pharmaceutical chemist. Looking at the matter from a broader standpoint, he was bound to confess that it would be a wise and judicious course to take. At present it was confusing to the public, who were not able to distinguish between the Minor and Major examinations. Mr. Ellinor had referred to the Irish Pharmacy Act. They had two examinations—a Preliminary, and a Pharmaceutical; and he thought the proposed change would not only advance the cause of pharmacy amongst themselves, but in the eyes of the public. He was glad they were going to show a liberal spirit and admit all as pharmaceutical chemists.

Mr. Learoyd said those who were aware of the inner working of the Pharmaceutical Society were prepared to see a very amended scheme of examinations, and he believed the examination of "chemists and druggists" would not be the examination chemists would have to undergo to be placed on the Register of Pharmaceutical Chemists.

Mr. Furness was certain the Minor examination was stiff enough for chemists to pass at any time. He felt inclined to move that these examinations should be placed under the authority of the Privy Council. The Pharmaceutical Society were a very go-a-head people. They had an idea that everything was to be tested by examinations; but the Minor examination was strict enough for anyone to pass who wished to qualify as a chemist and druggist. The objection he had was that the people who passed the Minor were to be raised to be members of the Pharmaceutical Society. If the Bill became law those who passed the Minor examination would be pharmaceutical chemists and those who had passed it previously would be simply chemists and druggists. It was manifestly unjust that the man who passed the Minor examination before the Act came into force should be in an inferior position to the person who passed the examination after it came into force. It was also unjust to the Major men who had qualified as pharmaceutical chemists that the persons who only passed the qualifying examination should be able to assume their title.

Mr. Ellinor also thought it would be a great injustice.

Mr. Archer thought all who passed the Minor were going to be pharmaceutical chemists and that they were going to abolish the Major. If that was the case, he considered it would be quite as fair to take them all in.

Mr. Ibbitt asked what would happen to those who were in business before 1868?

It was pointed out that the next clause dealt with such chemists, and clause 16 was then agreed to.

Clause 17.—*Certain persons to be eligible for membership.*

Mr. Learoyd moved the adoption of this clause, and said that from 1841, when the first Act passed, until 1852 the method of obtaining entrance to the Pharmaceutical Society was not by examination but by subscription only. And although that had been the foundation of the great success of pharmacy in these dominions, they must consider that those gentlemen who had by reason of examinations become chemists and druggists were to be placed on a par with gentlemen who passed none at all. Those who commenced this great work were already passing away, their subscriptions were ceasing, and it would be necessary from a pecuniary point of view that somebody should step in their shoes and support the Society. He thought it a very proper thing that this clause should take effect, and he also thought there would be a sufficient distinction that these chemists would only become members of the Society while the pharmaceutical chemists, attaining the high position to which Mr. Ellinor had referred, might obtain a fellowship.

The clause was agreed to.

Clause 18.—*Certain claims for registration not valid unless made before January* 1, 1885.

This clause was agreed to without comment.

Clause 19.—*Repeal of Section XI. of Pharmacy Act,* 1852, *and Section XX. of Pharmacy Act,* 1868.

Mr. Learoyd stated that in 1869 an amended clause was inserted by which any medical man could commence business and be registered under the Act if he had passed the pharmaceutical examination in conjunction with his medical examination.

The clause was adopted without further remark.

Clause 20.—*Penalties under Act not to exempt from other penalties*;

Clause 21.—*Penalty for wilful falsification of register, or for obtaining registration by false representation*; and

Clause 22.—*This Act shall not extend to Ireland*;—were agreed to without discussion.

Clause 23.—*Commencement of Act.*

Mr. Learoyd said he rose to propose a resolution. The spirit of the clause was perfect with one exception. It was intended the Act should come into force on January 1, 1884. In clause 8 they had already decided that no person should have a branch shop without having a qualified assistant. In many cases throughout England and Wales chemists had not only one but several shops, and the question arose whether in the time stated they would be able to get a sufficient supply of qualified assistants. It would be an unaccountable hardship, and he was sure one never intended by the Pharmaceutical Society, if chemists were liable to a penalty, although it might be impossible to obtain a qualified assistant in the time specified. He therefore moved that the Act should come into force as stated, with the exception of clause 8, which should come into force on and after January 1, 1886.

Mr. Furness submitted that the resolution was out of order, and that it should have been proposed previously.

Mr. Learoyd said this was a question of date, and he could not see why it was not applicable to the question of date in the Bill.

The President thought it would be in order to consider the question of date.

Mr. Archer seconded the amendment, saying he was not personally interested in branch shops, and did not wish to be, but he thought the suggestion thrown out was quite to the point. It did not seem quite fair that people having branch shops should be expected to get qualified assistants in such a short time, and he was in favour of the period being extended to January 1, 1886.

Mr. Ward moved—"That the clause remain as it is."

Mr. Ellinor seconded the amendment, remarking that the Pharmaceutical Society would not draw a hard and fast line, or begin to take proceedings against persons without giving them an opportunity to get qualified assistants.

Mr. Learoyd said the Pharmaceutical Society were expected to be guided by the Act of Parliament. Even though they were as lenient as possible other persons might take action, and he looked upon this short period as a serious objection.

The amendment was put—4 voting for it, and 8 against it.

The discussion on the Bill being concluded, Mr. Learoyd said he rose to express the gratification he felt at the very able manner in which the President had conducted the business. He then moved a vote of thanks to the President.

The resolution was seconded by Mr. Hall, and supported by Mr. Ellinor, and carried.

The President, in acknowledging the vote, complimented the meeting on the celerity and thoroughness with which it had dealt with the various clauses, and the proceedings concluded.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The eighth meeting of the session was held on Wednesday, February 21, in the rooms of the North British Branch. Mr. William Aitken in the chair.

The minutes of the last meeting having been read and adopted, the Chairman called upon Mr. J. MacGlashan to read a paper on "The Manufacture of Alcohol."

The paper was illustrated by an interesting series of specimens showing the stages in the process of manufacturing alcohol from grain, and a microscopic slide showing the yeast plant (*Torula cerevisiæ*).

On the motion of the Chairman, seconded by Mr. MacEwan, a cordial vote of thanks was awarded to Mr. MacGlashan.

The discussion which followed was taken part in by Messrs. Crowder, Fraser, MacEwan and Hill.

The ninth meeting of the session was held on Wednesday, March 7, in the rooms, 119A, George Street. Mr. P. Boa, President, in the chair.

The minutes of last meeting having been read and confirmed, the Chairman called upon Mr. W. Pirie to read a paper on "Chloral."

The paper will be published in a future number.

Mr. Pirie exhibited specimens of chloral, chloral hydrate, chloral alcoholate and chloral sulphydrate, and on the motion of the Chairman, seconded by Mr. J. D. Robertson, he was awarded a hearty vote of thanks.

A discussion followed, in which Messrs. Boa, Crowden, Henry, MacEwan, Robertson and Hill took part, the latter giving a practical illustration of Ogston's ammonium sulphydrate test for the detection of chloral, butylchloral and croton chloral.

Mr. W. S. Turnbull then started a discussion on the new Pharmacy Act Amendment Bill, and gave notice of the following motion for the next meeting, which was fixed for Wednesday, March 21, viz.:—"That this Association, while giving its cordial support to the larger portion of the Pharmacy Acts Amendment Bill, cannot overlook the desirability of having a common title for all who have or may become qualified by examination prior to and after 1886, and would respectfully urge upon the Pharmaceutical Council the necessity for deleting the following from clause 17:—'But no person shall in right of membership acquired pursuant to this clause be placed on the Register of Pharmaceutical Chemists,' and the following words be added:—'And shall be entitled to be placed on the Register of Pharmaceutical Chemists.'"

The Chairman having intimated that at the same meeting a paper would also be read on "The Alimentary Canal," the meeting was closed.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, March 8, Mr. H. G. Greenish, Vice-President, in the chair.

Mr. E. Baily read a "Note on Dried Alum," which will be published in a future number of this Journal.

A discussion followed the reading of the paper, in which the Chairman, Secretary, and Messrs. Crow, Corder, Parker, Thompson and Short took part.

A vote of thanks was passed to Mr. Baily for his paper, which had been worked out with the aid of a grant from the Research Fund.

The Reporter upon Analytical Chemistry, Mr. C. Thompson, then made a report upon the "Separation of Cadmium and Copper."

A discussion followed the reading of the report, in which the Chairman, Secretary, Messrs. Crow, Parker, Ransom, Rees and Short took part, after which—

Mr. F. W. Short, the Reporter upon Inorganic Chemistry, made a report upon "The Alkali Manufacture." Various processes were described for converting NaCl into Na_2CO_3, but those chiefly dwelt upon were the Leblanc and ammonia processes. Special attention was devoted to the reactions which occur in the intermediate stages of the Leblanc process, with regard to some of which there is a difference of opinion among various authorities. The different methods proposed from time to time for the recovery of sulphur from the bye-products, or for their utilization in other ways, were reviewed, and the most important of them, including the Schaffner and Helbig process for recovering sulphur, were fully described. The report concluded with a description of the ammonia process, and details of the most recently published modifications and improvements.

In the discussion that followed the Chairman, Secretary, Messrs. Crow, Parker, Ransom and Thompson took part.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the Association on Wednesday, February 21, Mr. C. Thompson read a paper on "Lithiæ Citras," which will be published in a future number.

After a discussion, in which several members took part, a vote of thanks, proposed by Mr. Cracknell, and seconded by Mr. Billson, was given Mr. Thompson for his valuable paper.

Another meeting of the Association was held on Wednesday, February 28, Mr. W. A. Wrenn in the chair, when a paper on "Tobacco of Commerce" was read by Mr. C. E. Palmer.

Mr. Palmer divided his subject into two divisions, viz., unmanufactured and manufactured tobacco. Under the first division he gave a brief description of the most important species of the tobacco plant, including *N. tobacum*, *N. rustica* and *N. repanda*, pointing out that *N. repanda* is not now to be found either wild or cultivated in Manilla. He then proceeded to give the history of the tobacco plant and of smoking, referring to Sir Walter Raleigh and his companions as being the first to introduce the practice of smoking into England in 1586. The collection of the leaf and preparation of it for the market was next spoken of. Lastly, its chemical composition and medicinal uses were treated, Mr. Palmer saying that he thought the use of tobacco as a medicine was nearly obsolete, for having been for ten years actively engaged in dispensing, he had only had occasion to dispense any preparation of tobacco three times. Under the division of manufactured tobacco, the laws regulating the manufacture and sale of tobacco were enumerated, and the operation of cutting tobacco, making cigars and snuff were fully explained. The enormous revenue derived from tobacco and snuff was stated, also the adulteration to which tobacco is subject, the latter being illustrated by drawings.

A lively discussion followed, in which the President, Messrs. Alcock, Braithwaite, Coe, Cracknell, Kerr, Park, Parkinson, Thompson, Woods and Millhouse took part.

A vote of thanks to the author was proposed by Mr. Winfrey and seconded by Mr. W. T. Cooper, jun.

A meeting of the above Association was held at the rooms, on Tuesday, March 6, when a paper, on "Photography," was read by Mr. C. F. Wyatt, who commenced by giving the history of the early processes which led to the practice of photography in its present form, with a short description of the more important ones, including those of Wedgwood, Niépce and Daguerre. The more recent wet-plate process was described, and the difficulties met with by the wet-plate worker mentioned, after which, the different dry-plate collodion and gelatine processes were described, and details given of the manufacture and use of gelatine dry plates. Printing and toning were described, and the precautions necessary in order to obtain permanent pictures commented upon.

The paper was illustrated by specimens taken by different processes, and after a lengthy discussion, in which the President, Messrs. Crow, Fell, Glow, Thompson, Millhouse and others took part, a vote of thanks, proposed by Mr. W. E. Crow and seconded by Mr. Palmer, was given to Mr. Wyatt.

Parliamentary and Law Proceedings.

Alleged Poisoning by a Cough Mixture.

Mr. F. Price, district coroner, has held an inquiry at the Murraytown Liberal Club, Cheetham, respecting the death of a child named Minnie Rendle Wilson, three months old. The evidence of the mother and grandmother showed that the child was a full-grown and healthy one up to Friday, when it caught cold and commenced to cough very badly. Mrs. Wilson applied bran poultices to its chest, which gave the child temporary relief. On Saturday afternoon, however, the mother went to the shop of Mr. C. G. Breadnor, chemist, 256, Waterloo Road, Cheetham, where she purchased a small bottle of "Breadnor's celebrated cough mixture." The deceased was given half a teaspoonful in a little warm water about half-past 10 o'clock, another dose was administered at half-past 2, another about half-past 5, and a fourth about half-past 8 on Saturday evening. The child slept all the following day till about half-past 11, when it became very bad, and Dr. Husband was sent for. On arriving at midnight the doctor found that the deceased had died a few minutes previously.

Dr. W. E. Husband said he examined the child, and there were no marks of violence upon the body, but the appearance of the eyes showed symptoms of poisoning. He took the medicine bottle with a portion of the medicine in it to Mr. Breadnor, and asked him what it contained. Mr. Breadnor showed him the prescription from which the mixture was made, and from that it appeared that it contained morphia. The bottle would hold about sixteen doses, and the child had had doses which would have about the 1-32nd part of a grain of morphia, which would be more than sufficient to cause the death of a child of that age.

The Coroner: Have you any doubt that the death of this child has been accelerated by the taking of this mixture?

Dr. Husband: I have no doubt whatever.

The Coroner: And in fact had not this mixture been taken and the child been properly treated it might probably have been alive?

The Doctor: Yes.

In answer to a juryman, the Coroner stated that the description on the label of the bottle stated that the mixture was "for children under six months old; half a teaspoonful in the same quantity of warm water every three hours."

Mr. Price said there could scarcely be any doubt that the child had died from an overdose of this medicine, which had been administered innocently enough on the part of the mother and grandmother. Mr. Breadnor had sold it in the ordinary course of his business, and he (the Coroner) did not know that any fault could be found with him, for if people would purchase these medicines and administer them indiscriminately it could not be helped. He thought, as the doctor had said, that it was a dangerous practice to give narcotics to very young children.

The Jury returned a verdict that the deceased had died from an overdose of cough mixture containing morphia inadvertently administered.

Prosecutions under the 17th Section of the Pharmacy Act.

At Mansfield Petty Sessions, last week, before Mr. Oakes, Captain Need, R.N., and Captain Salmond, John Davidson, grocer, Kirkby-in-Ashfield, was summoned for selling a packet containing poison, to wit, strychnine, in the form of vermin-killer, without registering the transaction, on the 6th ult.

Police constable Cuckson said on the day in question he called at defendant's shop in plain clothes and bought the packet of vermin-killer produced from defendant's wife, who asked no question whatever.

Police constable Blackburn said he took the packet to Mr. Cutts, Mansfield, for analysis.

Mr. Cutts, Mansfield, said he had examined the contents of the packet, and it contained strychnine.

Defendant pleaded ignorance.

Fined £2, Captain Need saying that it was a very dangerous practice, which must be stopped.

Ann Wharmby, shopkeeper, Kirkby, was similarly charged. She failed to appear. She had been previously cautioned.

Mr. Cutts, in speaking to the analysis of the contents of this packet, said it was a 6*d.* one, and he calculated that there was sufficient strychnine in it to poison fifty people.

Fined £2.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Draft Pharmacy Acts Amendment Bill.

Sir,—The nature and amount of correspondence which appears in the Journal of the 3rd inst. is alone a sufficient index of the very widespread interest which has been awakened by the publication of the Pharmacy Acts Amendment Bill, and it will probably assure the Council —if such assurance were needed—that whatever may be the ultimate fate of this Bill, to the production of which so much time and ability have been given, it will scarcely be opposed by that weight of apathy, or absolute indifference, which has been the chief factor of opposition to all similar efforts in former years.

In all parts of the country the want of legislation in some shape or form, connected with things pharmaceutical, has long been plainly manifest, and, in many cases, the more remote the district from London, the more urgent the necessity. Points of divergence in opinion have latterly occurred only in the expression of ideas as to the exact nature of the change desirable, and whilst most of us are agreed upon broad principles, it can scarcely be expected that the present Bill will exactly adapt itself to the want and wish of every individual. However, it seems already to be very generally regarded as a reasonable demand for that which undoubtedly the interest of the public requires at the hand of pharmacy; and if, with this, is preferred a moderate request for certain clauses which may react to the benefit of her devotees, it must be extremely necessary that our desires for the latter may not be accompanied by too much commotion about the former, or both will surely suffer.

As in the Council itself, so amongst your correspondents, clause 2 aroused the greatest amount of controversy, and that part of your leading article which refers to this subject is of particular interest. Upon reading the clause in question, and its discussion by the Council, it appeared to me that so far from being a departure from any of the recognized principles of the Society, it rather tended towards an extension of power. And were it not for your history of its origin, it would be hard to realize that such a demand could by any possibility be accorded. If the Society acquires the right to go outside its own community and insist upon certain restrictions in the sale of dangerous articles which it may from time to time schedule, a vast accession of influence must result, and such increase cannot be reflected, to the detriment of individual members. Hitherto the complaint has been, that the Council of the Pharmaceutical Society was not sufficiently active in comprehending the extent to which general traders encroached upon the border land of pharmacy; it is now asserting its right to interfere with the manner of conducting business in these self-same establishments, and thus claiming universal recognition as the guardian of public safety.

I have always held that two degrees of qualification, the higher being purely optional, constitute a source of weakness; our spheres of labour are, to a certain extent, far too contracted to admit of such distinction, and it would be better for the public, the Society, and ourselves if in this respect at least we were upon terms of equality.

The matters connected with the educational clauses have been thoroughly discussed by the Council, and particularly agreed upon by the trade at large before their appearance in the Bill. Clause No. 13, to which Mr. Burrell takes exception, has for its object the protection of the pharmacists of the future. Many young men have entered upon their apprenticeship with very ill-defined notions of what is expected of them in the matter of preliminary education, or even of the examinations which await them at the expiration of their pupilage, whilst parents or guardians have totally ignored their responsibility upon this point. That the result has been deplorable the periodical pass list affords almost certain proof.

Every pharmacist, who is actually engaged in business, hears from time to time expressions of opinion upon the part of the outside public as to his position in comparison with other members of the trading community; almost every one of the educated public admits readily, with but little argument, that the pharmacist has rights for consideration and emolument which no other individual who keeps an open shop can urge. I cannot hesitate in believing that members of Parliament, differing in no great degree from the general public, would willingly admit such rights to a lawful recognition if only they were properly represented to them. In order to ensure an efficient representation I would suggest that a copy of the Bill should be sent by every Local Secretary, or other person appointed or approved by the Society, to all the members of Parliament in their district, together with a personal request for its consideration and support when the proper time came. By this means it would be possible to reach every member of Parliament from the most accessible quarter and perhaps do much to secure an easy passage for the Bill.

Meanwhile, every pharmacist can do much to this end, by lending hearty support and losing no opportunity of giving a *résumé* of the proposition to all those of influence who are willing to listen.

Kilburn, N.W. CHARLES B. ALLEN.

Sir,—The draft Pharmacy Bill, which has so anxiously been waited for, and which for such a length of time has engaged the attention of the Pharmaceutical Council, is at length in the hands of those who cannot but be deeply interested in its provisions. To those amongst us who have been cherishing utopian ideas of legislative enactments which should secure to the chemist a monopoly of the sale of all poisonous substances, to say nothing of an exclusive right in the retailing of drugs and pharmacopœial preparations, the Pharmacy Acts Amendment Bill will doubtless be a sore disappointment. The general favour, however, with which the Bill seems to be regarded, judging from the correspondence which has appeared in the Journal, must be a source of gratification to its promoters. That it should be perfection in all its details is more than would be reasonably expected. A generous expression of opinion with regard to the Bill by the members of the trade generally will, doubtless, be the means of removing anything which is objectionable in its provisions.

Mr. Sandford has done good service by pointing out the injustice and unnecessary hardship which will be inflicted upon the retailer of an insufficiently labelled patent medicine by clause 4, and I think his suggestion that the first action should lie against the proprietor of the medicine is an exceedingly wise one. With regard to the labelling of patent medicines containing poisons, I think both the inner and outer label should bear the word "poison."

The regulation concerning branch businesses will remove one of the most glaring inconsistencies of the existing law, and will operate beneficially alike in the interest of the pharmacist and in the protection of the public.

The distinction between pharmaceutical chemist and chemist and druggist is one which is not well understood by the public, and under the special circumstances of the case I do not see how any one can seriously object to that distinction being removed.

Considering the difficulties which surround the subject of pharmaceutical legislation I think the Council are to be congratulated upon the result of their labours, and I sincerely hope that their exertions many meet with that success which all who are interested in the progress of pharmacy must desire.

72, *Lancashire Hill, Stockport.* THOMAS HART.

Sir,—Although I have nothing much to add to what has already been said concerning the proposed "new Pharmacy Bill," it may, perhaps, be desirable that the views of those engaged in business in various parts should be made known.

In the Journal of the 3rd inst., Mr. Wade compares the result of the deliberations of the Society to the oft repeated quotation, "The mountain in labour after much commotion brought forth a mouse."

Certainly, the proposed Bill at first sight appears a simple measure, but inasmuch as it deals with most of the difficulties which have filled chemists' minds during late years, therein lies its merit.

It is clear that chemists now in business cannot expect much if any individual benefit from the Bill; but I cannot find any fault on that account, for the sooner we make up our minds to the fact that we must depend entirely upon our own individual energy for success, both monetary and social, the better for the business and all connected with it.

If we expect that the Pharmaceutical Society or the Government will make laws which will, in any sense, create a monopoly, or limit the number which enter our ranks, we shall expect that which, under the existing order of events, is impossible, for neither the Pharmaceutical Society nor the Government can improve our social position or our incomes by making laws. On the other hand, it must be evident that had not the Pharmaceutical Society always shown itself ready to take the initiative in regulating the sale of poisons, laws would have been passed by bodies outside our ranks to accomplish the same purpose, and taking into consideration the peculiar nature of our calling, harassing laws they would have been. Hence I maintain that we have much to thank the Councils (both past and present) of our Society for in so carefully looking to our interests. We are apt to overlook the fact that the Council is a representative body of ourselves. If the Council is not composed of such men as are best able to look after our interests, then we have ourselves to blame; in fact, in attempting to fling mud at the Pharmaceutical Council most of it must come back upon ourselves. I make these remarks knowing how deeply rooted among some in our ranks is the idea that the Council, in not providing us all with profitable businesses, has neglected its duty.

And now a few remarks concerning the Bill itself. With regard to clause 2, I cannot help recognizing that there are many articles requiring to be labelled "poisonous," which belong more properly to the business of the oil and colourman, and the sale of which cannot well be confined to chemists, without imposing a hardship upon the former tradesman. Moreover, dealing in such articles does not well assort with the chemist's business, now that the oil and colourman's business has become separated in towns of any size. On the other hand those chemists whose businesses partake of the nature of the oil and colourman's will not be at all injured by the clause.

I think that clause 4 will be found to require modification before the Bill is finally accepted. The large vested interests it will affect are well known, and the clause will undoubtedly meet with great opposition, unless care is taken to make it applicable only to those patents which strictly require to be labelled "poisonous." Undoubtedly it is a great anomaly that at present patent poisons can be sold without any restrictions; on the other hand, many patents, although they contain poison, contain it in such small quantities as to be harmless.

My own cough lozenges contain a poison. On one occasion a customer ate a whole box-full at one sitting, but suffered no greater harm than an attack of sickness. He might, indeed, have increased the dose without more injury. There are probably many patents similarly constituted, and it would be objectionable to label them "poison," as to do so would either unnecessarily injure their sale, or educate the public to regard the word "poison" as of little importance. I would suggest that all patents containing poison should be registered by the Pharmaceutical

Council, and the nature and proportion of the poison being known the Council shall decide upon the necessity for labelling them as poisons.

I would endorse the remarks made by Mr. Proctor on clause 4, and the remarks made by Mr. Sandford upon clauses 3, 4, and 8.

Undoubtedly clause 6 will press heavily on many unqualified managers, but to produce a Bill which would be hard on no one is a practical impossibility, and to as far as possible expunge all inconsistencies from the pharmacy laws will be a great point gained.

Mr. Burrell anticipates that inconvenience will be caused by clause 3. I do not myself think that a chemist, as the law now stands, can honourably have an apprentice bound before he passes his Preliminary, as there must be a great chance of his not passing it at all, and consequently he would waste his time during his apprenticeship, in learning a trade which he would not be able to follow up afterwards. I make it an absolute rule not to accept an apprentice until he has passed his Preliminary, and I find no inconvenience in carrying out that rule.

I am aware that the members of the Council have probably, in framing the proposed new Bill, been guided by considerations which, were they known to me, might change my views upon some of the above points.

Colchester. J. C. SHENSTONE.

Sir,—I am sure that all who have the true interests of the body at heart will be rejoiced to see the steps the Council has taken, both in adopting the recommendations of the Educational Committee and with regard to the amended Pharmacy Bill.

There can be no doubt that both these will tend to considerably elevate the position of pharmacy in this country.

But I certainly think, if it is thought advisable to admit the "Minor" men as members of the Society, that a fellowship should be formed by the Council for those who have taken the Major qualification. If this is done I am quite sure there will be a great increase of candidates for the Major examination.

I do hope the Council will not let this matter pass, but carefully consider it for the interests of pharmacists.

Bentley Road, Princes Park, Liverpool. C. J. S. THOMPSON.

Sir,—The admission of my letter, representing, perhaps, the extreme of opposition, must convince members of your impartiality and desire to have all opinions represented. I should not have trespassed on your indulgence again had you not in your last leader on the Pharmacy Act, by some mistake, misinterpreted one portion of my letter, and made me express the very opposite opinion to that I put forth on the clause relating to branch shops.

I have no objection whatever to clause 8. I contended that if co-operative stores and corporate bodies could become proprietors, having qualified chemists to conduct their business, that orthodox chemists should enjoy the same privilege upon condition that their managers were qualified men.

I fail to perceive any clause in the Bill which will prevent corporate bodies dispensing and retailing poisons—and if there were, I should consider the passing of it through the Legislature highly improbable after the decision of the highest Court of Appeal in their favour. At present, I appear to be the only "adverse critic." Although holding so unenviable a position, I must, in justice to myself, ask you to allow me to say that I am hopeful that the weak "vinegar" I have been able to distil out of the Bill may be beneficial in cooling the imagination of those pharmacists who seem to indulge too hopefully in the remedial effects of the pharmaceutical wine.

174, *Warwick Street, Pimlico, S.W.* JOHN WADE.

THE COMPOSITION OF CACAO BUTTER.

Sir,—In "The Month" article published in your issue of February 24, attention is called to some experiments of Herr Traub, from which I gather that he has been unable to confirm the existence of my theobromic acid, $C_{64}H_{12}O_{28}$ and did not suceed in obtaining a higher fatty acid than arachic acid, $C_{20}H_{40}O_2$.

I have not been able to consult the original paper by Herr Traub, but as I did obtain an acid of the composition here given, and have a quantity still in my possession, I can only conclude that his investigation was not conducted with the same patience and pains with which I worked, and that he too soon grew tired of fractionations, which, if steadily pursued, would, in all probability, have resulted in obtaining the acid.

As I wish to stand well with your readers, I will add that I entirely adhere to the results of my original investigation (*Journ. Chem. Soc.*, January, 1878) and have no doubt that Herr Traub's arachic acid was a mixture of lower and higher fatty acids. I obtained such a mixture as an intermediate product, and if he had gone on fractionating this, his highest product, again and again, he would have been better advised than in committing himself to a gratuitous assumption and a pointless criticism.

	Kingzett's Theobromic Acid. Theory.	Obtained.	Kingzett's Intermediate product.	Composition of Arachic Acid.
C.	82·75	82·62	76·81	76·92
H.	13·79	13·92	13·14	12·82
O.	3·46	3·46	10·05	10·24

There could be no confusion of such widely differing substances as are here indicated.

Further, in spite of Herr Traub's statement to the contrary, no proof has yet been afforded that either palmitic acid or stearic acid is obtainable from cacao butter.

In conclusion, should any reader of this protest wish to investigate the matter, I will gladly place in his hands such products as I have preserved, for analysis, and I extend the offer to Herr Traub.

C. T. KINGZETT, F.I.C., F.C.S.

SPIRITUS AMMONIÆ AROMATICUS.

Sir,—I should like to point out a slight inaccuracy into which Dr. Thresh has fallen, in his paper on the above subject, published in the Journal of February 17. He says, "Taking the official quantities, the ammoniæ carbonas refuses to dissolve in the requisite amount of water and solution of ammonia without the aid of heat." The "requisite" amount of water I take to be about 10 ozs., and I find that using this quantity complete solution takes place at ordinary temperature in about one hour, provided that the ammon. carb. be powdered and the mixture be continuously agitated. Mr. Martindale attempted to demonstrate this, but failed in not carrying out the conditions as to the "requisite" quantity of water, as pointed out by Dr. Thresh in the ensuing number of the Journal.

Tottenham High Cross. A. E. TANNER.

E. Fowler.—(1) Probably a bark derived from some species of *Quercus*. (2) Probably the bark of *Acacia melanoxylon* or *A. molissima*.

J. T. Hall.—(1) *Schistidium apocarpum*; (2) *Anomodon viticulosus*; (3) *Radula complanata*; (4) *Erodium cicutarium*.

J. F. Brown.—*Ptychotis Ajowan* seeds; cardamon seeds; coriander seeds, decorticated; and (?) cocoa nut.

Herbalist.—(1) *Mercurialis perennis*; (2) *Chelidonium majus*; (3) *Sedum reflexum*; (4) *Potentilla Fragariastrum*; (5) *Cotyledon Umbilicus*; (6) *Triticum repens*.

Alpha.—For recipe for "bay rum," see before, p. 39.

Novice is referred to the rule as to annonymous communications.

Felix.—At present it is not illegal for an unregistered person to make up such recipes unless they contain a scheduled poison. The subject of prescribing does not come within the scope of the Bill.

M. A.—Cooley's 'Cyclopædia' or Besley's 'Receipt Book.' See also the indexes of the *Pharmaceutical Journal*.

G. A. T.—The ingredients appear all to belong to the class of specialties with which the United States is flooded.

D. R. Howell.—Yes.

C. E. Dungate.—Your letter, with enclosure, has been handed to the Secretary.

Nemo.—The legality of the use of any one of the designations would depend much upon the object for which it was used. See section 40 of the Medical Act, 1858.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Evans, Hay, Heger, Cutts, Bowness, Nandin, Wood, Cernum, Major, Gulielmus, Assistant, A. J. W., T. D., M. A.

ACETIC ETHER.*

ITS TRADE COMPOSITION, MANUFACTURE AND SPECIFIC GRAVITY.

BY WILLIAM INGLIS CLARK, D.SC.,

Pharmaceutical Chemist.

In the spring of 1882, while working with a sample of acetic ether, supplied by an eminent London firm, I was surprised to find that the addition of dry potassium carbonate to it resulted in the production of a lower layer of solution, and I arrived at the conclusion that the so-called acetic ether contained a certain amount of water. Further investigation led me to examine the acetic ether supplied by other makers, with the result that in only one case did I find the commercial article to resemble what it professed to be. I may mention that I have not examined any samples guaranteed chemically pure, but have confined myself to the samples known as pure acetic ether in the London and other markets. Before giving you the results of this examination, I propose to explain the analytical methods adopted in estimating the acetic ether and alcohol present.

1. *Estimation of Real Acetic Ether.*—In this I followed the method recommended in Allen's 'Organic Analysis,' vol. i., p. 141. A solution of caustic potash in pure rectified spirit (free from aldehyde, the presence of which, by the formation of aldehyde resin, renders titration very difficult), of the strength of about 8 per cent. real KOH is prepared, and its alkalinity accurately determined by standard sulphuric acid; 50 c.c. of this solution are transferred to a strong glass flask, and to this are added 5 c.c. or a weighed quantity of the sample of acetic ether under examination. The flask may be either closed with a rubber stopper, securely tied down, or connected with an inverted Liebig's condenser, and it is then heated in a water-bath for three hours. Having allowed the flask to cool, the contents are carefully washed into a beaker, and the alkalinity determined. The loss of alkalinity evidently represents the amount of acetic or other acid which has been present in the ether, either free or in combination. "Each c.c. of *difference* between the normal sulphuric acid *originally* and *ultimately* employed represents one equivalent in milligrammes (·088 grms.) of the ether present."

The reaction corresponds to the following equation:—

$$C_2H_5C_2H_3O_2 + KOH = KC_2H_3O_2 + C_2H_5OH$$

the resulting products being potassium acetate and ethyl alcohol. To reduce the *weight* of acetic ether obtained to *volumes* it is only necessary to divide by ·901 the specific gravity of acetic ether (·898 according to Allen).

It is, of course, necessary to determine the percentage of free acid present in the acetic ether. This is easily obtained by dissolving 5 c.c. of the ether in proof spirit and titrating with standard alkali. I may here call attention to the necessity of previously neutralizing the acid present in the proof spirit or taking it into account in the estimation. The following example is taken from my note book:—

Sample A. 5 c.c. ether taken.
50 c.c. sol. KOH alcoholic neutralized . . . . . 52 c.c. standard H_2SO_4.
Free acid in 5 c.c. acetic ether . . . . = 5·1 c.c. standard alkali.

Alkalinity before action = 46·9 c.c. standard H_2SO_4.
Alkalinity after action = 9·1 c.c. standard H_2SO_4.

Loss . . . . = 37·8 c.c. standard H_2SO_4.
Acetic ether = 37·8 × ·088 = 3·3264 grams.
3·70 c.c.
74 per cent.

2. *Estimation of Alcohol.*—Having first ascertained the percentage of acetic ether present, the amount of alcohol is determined by taking advantage of the reaction between acetic ether and caustic potash, for which I have already given an explanatory equation in reference to the estimation of acetic ether. We saw that the final products were potassium acetate and ethyl alcohol, and if we can determine the total amount of alcohol after the action is complete, we have a ready means of knowing how much was present originally in the free state. You will of course understand that any ether (sulphuric), aldehyde, or other volatile substances present in the acetic ether will prevent the process being absolutely accurate, unless these are estimated and allowed for; but as these do not occur to any great extent, the process is sufficiently accurate for ordinary purposes.

The "*modus operandi*" is as follows:—

In a flask connected with inverted Liebig's condenser, place 200 c.c. of the ether under examination (or any less quantity) along with 200 c.c. of water and about 120 grams caustic potash in sticks. In a short time reaction spontaneously occurs, but to complete this the flask is heated on a water-bath for two hours and allowed to cool. Another 200 c.c. of water are now added, and distillation carried on till 500 c.c. in all have passed over. This contains all the alcohol and it may be readily estimated by the Sikes hydrometer, or the careful determination of specific gravity. By subtracting the amount corresponding to the acetic ether known to be present, we know how much was present as alcohol.

In giving the approximate composition of trade samples, I regret that I have only been able to procure eight of these, representing, however, most of the makers (two from scotch houses, one of German manufacture, the others, believed to be of English manufacture, from London), acetic ether not being an article of large consumption.

From a glance at the accompanying table it will be seen that of these only one contains over 75 per cent. of real acetic ether, while in one case only 30·6 per cent. were present.

Table showing Approximate Percentage Composition of Acetic Ether (1882).

Parts by Volume.	A.	B.	C.	D.	E.	F.	G.	H.
Acetic ether ($C_2H_5C_2H_3O_2$)	90·14	74·8	67·02	60·0	46·1	41·7	31·4	30·6
Alcohol absol. (C_2H_5OH) .	7·2	22·8	21·93	24·3	37·4	33·4	48·0	32·8
Ac. acetic glac. ($HC_2H_3O_2$) .	trace	·9	·30	·4	trace	2·0	1·1	7·0
Water, ether, etc.	2·66	1·5	10·75	15·3	16·5	22·9	19·5	29·6

In order to see whether the large percentage of free alcohol and the water had been added intentionally or were the result of careless manufacture,

* Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, March 14, 1883.

I have made an extensive examination of the more commonly accepted processes, and present the more important results to you now. These processes may be at once divided into two classes, viz., those in which acetic acid is made to act in the free state on alcohol in presence of sulphuric acid, and those in which it is liberated from an acetate in presence of alcohol.

No. 1. In the 'Year-Book of Pharmacy' for 1881, p. 68, a modification of the first of these is given, which resembles the continuous process in ether making, and is highly recommended. Equal parts of sulphuric acid and alcohol are placed in a retort, heated to 140° C., and a mixture of equivalent parts of acetic acid and alcohol run in, the temperature being kept nearly stationary. It is stated that 90 per cent. of the theoretical yield of ethyl acetate may be obtained. I made several trials of this process and give below the results of one operation taken more in detail. I regret that I did not accurately estimate the yield of acetic ether, but the specific gravity indicates the composition to some extent.

Forty-five ounces each of sulphuric acid and s. v. rect. were heated to 140° C. and into this was slowly run a mixture of—

Glacial acetic acid (6 lbs.)	91 fl. oz.
Alcohol, 56 o. p.	104 fl. oz.

The following fractions were obtained:—

275 c.c.	sp. gr. 766
235 c.c.	sp. gr. 807
900 c.c.	sp. gr. 837-883
505 c.c.	sp. gr. 890–900
985 c.c.	sp. gr. 907-917
1475 c.c.	sp. gr. 925–935
1365 c.c.	sp. gr. 940

i.e. 1915 c.c. below sp. gr. 900.
985 c.c. below sp. gr. 907–919.
2840 c.c. above sp. gr. 925.

From these figures it will be apparent that at first a large amount of ethyl oxide was produced, while during the last half of the operation combination took place very imperfectly. Were the process of any practical value I would give details as to the purification of this sample, but the large amount of ethyl oxide, free alcohol and free acetic acid at once shuts out this method of manufacture.

The other similar plans in which the acetic and sulphuric acids along with the alcohol are distilled together are open to the same objections, though to a less degree.

No. 2. *Action of Carbonic Acid on Potassium Acetate.*—In Allen's 'Organic Analysis,' reference is made to this little known process. Potassium acetate is dissolved in absolute alcohol and carbonic acid passed through. The potassium carbonate being insoluble, is supposed to be precipitated, and only acetic ether remains. I was unable to detect a trace of acetic ether when absolute alcohol was used, even after passing carbonic acid (dry) through for twenty-four hours, but by adding water till solution of the acetate was obtained a slight action took place, but not to any practical extent.

Thus:—Potassium acetate	13½ ounces.
Rectified spirit	283 c.c.
Water	57 c.c.

when treated with CO_2 for twenty-four hours and distilled, gave—

275 c.c. containing 1 per cent. ethyl acetate.

No. 3. *Action of Sulphuric Acid on Acetates.*—A. *The B.P. Process.*—As in other cases, where chemical substances of definite composition are in the Pharmacopœia, the directions do not bind us to any special method of manufacture, the ultimate purity of the product being secured by the tests appended. So it is in this case, the formula being given and the specific gravity and boiling point almost coinciding with those of the pure substance. The specific gravity is given as about 900, practically agreeing with that of the pure article, sp. gr. 901, as obtained by myself. There is much confusion in text books as to the real specific gravity.

Thus:—Bache says	·866	at 15° C.
Cooley and 'Dict. Chem. Manuf.'	·890	
U. S. Pharm.	·889-897	
Gmelin (authorities) . . .	·812-930	
Squire	·900	
Mendelejef	·8981	
Gössman	·932	at 20° C.
Kopp	·9104	at 0° C.

In any case there can be no doubt that a pure article was intended, and not such an one as would include the samples, the composition of which I have already referred to. Indeed, in their case the sp. gr. (which at any rate is no evidence of purity), differed widely from that of the B.P. The numbers obtained were 892, 910, 912, 894, 904, 908.

The B.P. says it may be obtained by distilling a mixture of dry acetate of soda, 8 parts; rectified spirit, 5 parts; sulphuric acid, 10 parts, adding the distilled product to half its weight of chloride of calcium in a stoppered bottle; letting them remain together for twenty-four hours, and then decanting and rectifying the ethereal liquid.

I accordingly took—

Alcohol, 56 o.p.	283 c.c.
Sulphuric acid	566 c.c.
Mixed, cooled, and added,	
Sodium acetate, dried	453·6 grams.

After thorough mixing, the flask was heated on a water-bath with inverted condenser for two hours to ensure complete reaction, and the contents distilled. Let me here give a warning with regard to the addition of the sodium acetate. Unless great care be taken, loss of ether will occur from the sudden heat evolved, and an efficient condenser should be at once attached. A still more important point is to ensure thorough decomposition of the acetate before beginning to distil off the ether. Should this be overlooked and the mass gather into knots, as soon as nearly all the ether (and of course along with it the uncombined alcohol) has passed over, the sodium sulphate will melt, and, along with the sulphuric acid, form a viscid liquid, which acting on the knots of acetate of sodium gives rise to sudden and violent frothing, which may readily burst the flask. When the mixing has been carefully attended to the distillation goes on quietly till the end. In the B.P. process, in which, as we shall afterwards see, large excess of sulphuric acid and sodium acetate are added, the action is specially violent and knots form readily, with the result that frothing is very persistent and commences early in the distillation.

To return to the operation: 372 c.c. of distillate were obtained, sp. gr. ·9185, which on analysis showed 88·18 per cent. ethyl acetate, =294·6 grams, =328 c.c. in all. Following out the directions, I macerated with 171 grams fused chloride of calcium for twenty-four hours and decanted. I only obtained—

134 c.c., sp. gr. ·930,

and on distillation obtained the greater part, say 130 c.c., sp. gr. ·9024, and containing 91·6 per cent. ethyl acetate, the total yield being thus 119 c.c. I shall again refer to the method of purification later on, but at present I would just call your attention to the extravagance of the B.P. process.

The reaction which goes on may be represented by the equation—

$$NaC_2H_3O_2 + H_2SO_4 + C_2H_5OH = C_2H_5C_2H_3O_2 + NaHSO_4 + H_2O,$$

and the proportions therein indicated correspond closely to—

Rectified spirit	283 c.c.
Sulphuric acid	230 c.c.
Sodium acetate, dried	351 grams,

while in the B.P. an excess of 336 c.c. sulphuric acid and 102 grams sodium acetate are ordered.

We have above assumed an equation representing the action of sulphuric acid on acetate of soda and alcohol; but there is still another equation which might be adduced, in which neutral instead of the acid sodium sulphate is obtained, only half of the sulphuric acid being required.

This is—

$$2NaC_2H_3O_2 + H_2SO_4 + 2C_2H_5OH = 2C_2H_5C_2H_3O_2 + Na_2SO_4 + 2H_2O.$$

Which is correct? To decide this I prepared some acetic ether with the above proportions.

No. 4.	Sodium acetate (dry)	351 grams.
	Sulphuric acid	120 c.c.
	S. v. rect.	283 c.c.

The acid and alcohol were mixed and cooled, thoroughly mixed with the acetate, heated with inverted condenser for one hour, and distilled. This was a matter of difficulty, for owing to the absence of excess of sulphuric acid, the contents of the flask remained unmelted or undissolved, and distillation proceeded but slowly.

400 c.c., sp. gr. ·928, were obtained, which, on analysis gave—

Acetic ether 173·18 grams 192·8 c.c.
Acetic acid $HC_2H_3O_2$ 53·28 grams.
Alcohol and water, the remainder.

The 283 c.c. s. v. rect. = 357 grams acetic ether
The 351 grams sod. acet. = 376 grams acetic ether.

The sulphuric acid is also slightly in excess of what is necessary for the alcohol, and we see that—

If $H_2SO_4 = C_2H_5C_2H_3O_2$, yield should be 178·5 grams
$= 2C_2H_5C_2H_3O_2$, yield should be 357 grams.
Yield actually obtained 173·18 grams,

so that the first given equation is the correct one.

Action of Sulphuric Acid on Acetic Ether.—When sulphuric acid is heated with acetic ether it decomposes it into ethyl oxide and acetic acid, with the formation of numerous compounds dissolved in the sulphuric acid. It will be probable, if this statement be correct, that the effect of using excess of sulphuric acid in the preparation of acetic ether must be to decompose some of it as soon as formed and to lessen the yield. In order to examine this more closely,

I mixed

Acetic ether 200 c.c. (90·14 per cent. by volume)
Acid sulphuric 100 c.c.,

allowed to lie for two days and distilled.

Much sulphurous acid was given off and a treacly residue was left in the flask. The distillate 140 c.c. sp. gr. 925 contained now only 81·32 per cent. of acetic ether, giving the following result:—

	Acetic Ether.	Acetic Acid.
Before . . .	161·92 grams	None.
After . . .	102·25 grams	16·63 grams.
Loss	58·67 grams.	

This fact determined me in examining the production of acetic ether when the theoretical amount of sulphuric acid was used. It will be observed from the equations already given that water is set free in the reaction, and on this account it might be supposed that a slight excess of sulphuric acid would be useful in absorbing this, thus preventing formation of aqueous acetic acid. It is to avoid this that it is recommended to dry the sodium acetate before adding it to the sulphuric acid and alcohol. For this reason also Frankland and Duppa have recommended the use of absolute alcohol, although others have pointed out that a trace of moisture seems to assist etherification. I have accordingly, in dealing with this matter of excess of sulphuric acid, used absolute alcohol, rectified spirit, and crystallized as well as dried acetate of soda.

No. 5. *With Crystallized Sodium Acetate and S. V. Rect.*—

Sod. acet. cryst. 582 grams
S. v. rect. 283 c.c.

	Theoret. H_2SO_4 227 c.c.	Excess H_2SO_4 280 c.c.
Yield . . .	400 c.c. sp. gr. 927	407 c.c. sp. gr. 916
Acetic ether.	266·1 grams	295·8 grams
Acetic acid .	24·4 grams	11 7 grams.

No. 6. *With Dry Sodium Acetate and S. V. Rect.*—

Sod. acet. sic. 351 grams.
S. v. rect. 283 c.c.

	Theoret. H_2SO_4= 227 c.c. (Average of 3.)	Excess H_2SO_4= 280 c.c. (Average of 3.)
Yield . . .	400 c.c. sp. gr. 909	400 c.c. sp. gr. 909
Acetic ether .	318·9 grams	318·5 grams
Acetic acid .	7·1 grams	8·1 grams.

No. 7. *With Dry Sodium Acetate and Absolute Alcohol.*—

Sod. acet. sic. 351 grams
Alcohol absol. 246 c.c.

	Theoret. H_2SO_4 (227 c.c.)	Excess of H_2SO_4 (280 c.c.)
Yield . . .	400 c.c. sp. gr. 912	400 c.c. sp. gr. 911
Acetic ether.	310·2 grams	325·7 grams
Acetic acid .	19·2 grams	19·2 grams.

Summarizing these results we have—

Table showing Yield with Varying Sulphuric Acid.

Materials. H_2SO_4 Yield	120 c.c. grams	227 c.c. grams	280 c.c. grams	566 c.c. =B.P. grams
Sod. acet. cryst. + s. v. rect.		266·1	295·8	
Sod. acet. sic. + s. v. rect .	173·1	318·9	318·5	294·6
Sod. acet. sic. + alc. absol. .		310·2	325·7	

From these we see (1) that the water in the crystallized salt should be removed; (2) that great excess of sulphuric acid (as in the B.P. process) or deficiency are equally to be avoided; (3) that any advantage gained by using absolute alcohol instead of s. v. rect. is very small and not worth the extra expense; (4) that a slight excess of sulphuric acid is advantageous, and (5) that in no case have I obtained more than 91·2 per cent. of the theoretical yield. This last is to some extent accounted for by loss from evaporation, etc., etc., as I purposly omitted to pass the uncondensed vapours from the flask through absorbing bulbs; but in every case secondary actions took place between the acetic ether or alcohol and the sulphuric acid which no doubt reduced the yield.

Effects of Delay on the Yield.—Frankland and Duppa recommend that the mixture of alcohol and acid be allowed to lie for some time before addition of the sodium acetate, and that thereafter it is advisable to leave the mixture for some time before distillation. The latter proposal is probably intended to ensure complete decomposition of the acetate, and, in my experience, this is necessary, unless great care be taken in thoroughly mixing the acetate, in which case it can be dispensed with. Before the action of sulphuric acid on ethyl acetate had been satisfactorily made out, I thought that the complete decomposition of the acetate could be most easily effected by heating the flask with inverted condenser for an hour, and all the already detailed experiments were made under this condition. A little reflection will, however, show that if excess of sulphuric acid be present an undesirable opportunity is afforded for the subsequent decomposition of the already formed acetic ether, and I found, by mixing thoroughly in the cold, and immediately heating rapidly and distilling (as described in my "model process" later on), a still larger yield was obtainable.

Thus:—

		Heated for one hour before distilling	Mixed in cold and distilled.
S. v. r. 283 c.c. . . H_2SO_4 280 c.c. . . Sod. acet. sic. 351 grms.	yields	318·5 grams	338·7 grams

The object of the former, *i.e.*, delay before addition of the acetate, as stated in their paper, was to favour the formation of sulphovinic acid, but in the six annexed experiments on the point I find it to be undesirable; not only is there a smaller yield, but there is a greater residuum of secondary products in the flask, when delay occurs before addition of the sodium acetate.

Table showing Effect of Delay on the Yield.

Average results.	Acetic ether.	Acetic acid.
No delay (av. of 3) . .	318·9 grams	7·1 grams.
18 hours (one trial) . .	301·6 „	6·7 „
48 „ (av. of 2) . .	295·9 „	7·6 „

We have now examined pretty fully the various processes of manufacture (I may mention that my experiments have included the acetates of potash and lead) and it is evident that whether we use the B.P. process or any one of the modifications of it, using rectified spirit, absolute alcohol, dried or even crystallized sodium acetate, in every case *even without purification*, we at once get a distillate purer, stronger and better than any of the commercial articles obtainable, and we are forced to one of two conclusions, either that a wilful adulteration has been practised or that the manufacture has been accomplished in a careless manner, by the distillation of free acetic acid, sulphuric acid and alcohol. It may be asserted that as acetic ether gradually decomposes in presence of moisture into acetic acid and alcohol, the samples under discussion were at first of greater strength and had deteriorated by keeping; but this is inadmissible, for in the first place, the free acetic acid is, after all, so small, that were it in combination the composition would be but slightly altered, and, secondly, I have again estimated the free acid after keeping the samples from one to nine months and find no great change, as shown in the following table:—

Table showing Increase in Free Acid by Keeping.

	Free acetic acid in 100 c.c. acetic ether. At first.	After keeping.		Increase.
A . .	Only two days in possession.			
B . .	·998 gms.	9 months.	3·484 gms.	2·486 gms.
C . .	Only one day in possession.			
D . .	·442 „	3 „	·422 „	None.
E . .	None kept.			
F . .	2·121 gms.	9 „	3·168 „	1·047 „
G . .	1·248 „	9 „	1·742 „	·494 „
H . .	7·440 „	1 „	7·440 „	None.

Up to this point we have dealt only with the subject of manufacture, and the purification of the acetic ether must now receive our attention. You may perhaps think it sufficient if I say how to purify it; but the right understanding of this depends so much on knowing how not to purify it, that I make no apology for dwelling on this point at length, and bringing in some experiments which have at first sight little to do with the main question.

From a careful study of the subject of manufacture we learn what are the impurities to be removed from the acetic ether. These are ether, products resulting from the secondary action of sulphuric acid, acetic acid, alcohol and water. Of these, the first two can be most easily removed by distillation; but the ether, at least, is only present in a badly manufactured preparation, and I therefore shall not refer to it again.

The acetic acid is present in all samples of crude acetic ether, though in some cases to a very slight extent, and is most easily removed by agitating the ether with a solution of an alkaline carbonate. If the sample is free from water the acetic acid is not readily removed by dry potassium carbonate, but the addition of a few drops of water facilitates the absorption of the acid.

The removal of alcohol is not so easily effected, and although, as I shall afterwards show, it is quite easy to obtain an article, at the first distillation, free from alcohol, yet the examination of the methods usually employed have, in my hand, yielded such interesting results that I must refer to these more fully.

It will be remembered that in the B.P. process a large excess of sodium acetate and sulphuric acid are employed, with the evident intention of ensuring the absence of alcohol in the resulting product, and I find that this object is attained; but we also noticed that it is directed to add to the distillate half its weight of chloride of calcium (fused); allow to stand for a night, decant and distil. The chloride of calcium is added to remove alcohol or water, and the use of it has been advocated or objected to by various writers. Chloride of calcium forms with acetic ether a crystalline compound, and in the B.P. process so large a proportion is absorbed by it that only a very small amount (174 c.c. out of 372 c.c.) is separable by decantation. The addition of water separates the acetic ether, but at the same time destroys any advantage that had been gained by the use of the calcium chloride. In this dilemma some have adopted distillation from fused calcium chloride, a plan which others have objected to on account of the bumping which occurs during the distillation, owing to the solubility of the chloride in acetic ether. In my opinion a much more serious objection (and one which I nowhere find alluded to) lies in the decomposition which occurs. Fused calcium chloride is always alkaline, and the free lime decomposes acetic ether with the production of alcohol and calcium acetate. In addition to this the distillate has a somewhat pungent smell, the cause of which I have not determined, and after all it is not even comparatively pure acetic ether. Thus in the B.P. process, ·372 c.c. containing 88·18 per cent. of acetic ether, when treated with calcium chloride, decanted and distilled, gave only 130 c.c. containing 91·9 per cent.; an enormous loss with only an impure product.

The solubility of calcium chloride in acetic ether is not great, and I have determined it by estimating the chlorine in a given volume of the ether after digestion with the chloride.

At 0° C.—100 c.c. acetic ether dissolve ·3688 gram $CaCl_2$.

At 15° C.—100 c.c. acetic ether dissolve ·15008 gram $CaCl_2$.

Use of Solution of Calcium Chloride.—Saturated solution of this salt has the property of absorbing water and alcohol, while it does not, to any great extent, dissolve acetic ether.

In 'Year-Book of Pharmacy,' 1881, p. 68, M. Pabst is represented as affirming "pure ethyl acetate is insoluble in a solution of calcium chloride; but if it contains 30 per cent. alcohol, calcium chloride solution dissolves appreciable quantities. A mixture of 1 volume ethyl acetate and 1 volume alcohol forms a homogeneous mixture with 2 volumes of a solution of calcium chloride."

This statement I believe to be incorrect, and in support of this I adduce the following experiments made with an acetic ether 96·36 per cent.

Five c.c. acetic ether were placed in a burette and sol. $CaCl_2$ saturat. added to it in successive quantities of 10 c.c. When 40 c.c. in all were added the acetic ether measured only 4·15 c.c. showing a loss of ·85 c.c. We therefore find—

1 c.c. acetic ether (99·36 per cent.) soluble in 47 c.c. sol. calc. chlorid. sat. at 15° C.

and *very slightly more soluble at* 0° C.

The second part of the statement I find to be also incorrect, as will be seen from the following table, and this seems accounted for by the evident fact that M. Pabst, by his own process (which I previously discussed), had obtained and was using an impure acetic ether. I have already shown that acetic ether is slightly soluble in solution of chloride of calcium, and I have also determined the amount of absorption which takes place when acetic ether diluted with alcohol, water, or both together, is shaken with an equal volume of the saturated solution, and on this, at first sight, untrustworthy basis I have worked out a rapid process of examining acetic ether, which gives fairly approximate results.

Table showing the Action of Sol. Calc. Chlor. Sat. on Acetic Ether (99·36 *per cent.*) *at* 15° *C.*

A. Diluted in Absolute Alcohol.

Equal parts of Dilute Acetic Ether and Calcium Chloride solution.

Acetic ether (99·36 p.c.). Parts.	Alcohol. Parts.	Ether separated. Parts.	Error. Per cent.
100 . . .		97	– ·3
90·9 . . .	91·1	91·1	+ ·2
83·4 . . .	16·6	83·75	+ ·35
71·5 . . .	28·5	68·5	– ·3
62·5 . . .	37·5	52·8	– 9·7
55·6 . . .	44·4	38·9	– 16·7
50·0 . . .	50·0	26·7	– 23·3
45·5 . . .	54·5	16·1	– 29·4
41·7 . . .	58·3	7·5	– 34·2
38·5 . . .	61·5	None separated.	

B. Diluted with Alcohol and Water.

Acetic ether (99·36 p.c.). Parts.	Alcohol. Parts.	Water. Parts.	Ether separated. Parts.	Error. Per cent.
100			97	–3
90·9		9·1	87·2	–3·2
83·4	8·3	8·3	82·3	–1·1
76·9	15·4	7·7	77·6	+ ·7
66·8	26·6	6·6	66·5	– ·3
58·9	35·2	5·9	53·2	–5·7
47·7	38·0	14·3	41·8	–5·9
40·0	40·0	20·0	33·4	–6·6
37·2	37·0	25·8	32·4	–4·8

From these tables it will be seen that as long as the percentage of acetic ether ranges between 75 per cent. and 90 per cent., the amount of separable ether fairly agrees with that known to be present, but as the percentage becomes less and less the ether separated varies according as the diluting agent is alcohol alone or along with water. It would have been easy to construct a table which would apply to all mixtures of acetic ether and absolute alcohol, but as water is constantly present we must resort to a very simple device. In the first place, we must have some pure acetic ether as a standard, and having shaken up 10 c.c. of the sample under examination with 10 c.c. solution calcium chloride, note how much ether separates. If this amount be more than 75 per cent. the result may be taken as nearly correct, but if less, we must add pure acetic ether to the sample in such proportion as will ensure the final per cent. reaching 75 per cent. Thus, if only 30 per cent. separated we know from the tables that the sample must contain something between 30 and 55 per cent., and we therefore add to it twice its volume of pure acetic ether (the per cent. then being at least 76 per cent.) and taking 10 c.c. of the mixed sample again shake with 10 c.c of the chloride solution and note how much separates. If, say 8·0 c.c. separate, subtract 6·5 c.c. (the amount corresponding to the two volumes of pure ether added) and we have 1·5 c.c. as the ether from 3·33 c.c. of the sample = about 45 per cent. It is of course desirable to work with, say 20 c.c. or 30 c.c. when the sample is very impure; but it must be remembered that the results are not within 1 per cent. of the truth, and this method should not be resorted to when the method first described is applicable.

It may be said that in this discussion we have lost sight of the purification of the acetic ether from alcohol, but it will be noticed that in the solution of calcium chloride we have an excellent means of removing any alcohol present. If the percentage be but small, a single washing with an equal volume will practically effect separation, and we may now therefore consider—

2. *Removal of Water from Acetic Ether.—To what extent is Water Soluble in Acetic Ether?*—I do not find this question answered in references to this ether, and I have accordingly determined not only this point, but the converse, viz., the solubility of acetic ether in water. These two inquiries have

brought out a most instructive lesson, one which shows forcibly how easy it is to fall into error in deductions from a few experiments. When (about) 34 c.c. of acetic ether and 10 c.c. of water are shaken together in a stoppered burette (temperature 15° C.), on standing exactly 34 c.c. of acetic ether and 10 c.c. of water separate again, and shall we therefore say that the liquids are non-miscible? At first we might think so; but a little reflection will show that if they are not, they must be reciprocally soluble in the proportions we have alluded to, *i.e.*, that the ether must have dissolved exactly as much water as the water dissolved ether; and that this is the true explanation is evident from the appended tables.

Table shoowing the Addition of Water to Acetic Ether at 50° *F.*

	Water.	
10 c.c. acetic ether +	10 c.c. = 9	c.c. ether undissolved.
10 c.c. acetic ether +	20 c.c. = 8	c.c. ether undissolved.
10 c.c. acetic ether +	30 c.c. = 7	c.c. ether undissolved.
10 c.c. acetic ether +	50 c.c. = 4·7	c.c. ether undissolved.
10 c.c. acetic ether +	70 c.c. = 2·2	c.c. ether undissolved.
10 c c. acetic ether +	80 c.c. = 1	c.c. ether undissolved.

On cooling now to 0° C., the whole of the ether dissolved after standing, while on heating to 15° C., 1·8 c.c. separated again. From these and duplicate experiments, I find—

Solubility of acetic ether in water = 1 c.c. in 8 c.c. at 0° C.
Solubility of acetic ether in water = 1 c.c. in 9 c.c. at 15° C.

Table showing Addition of Acetic Ether to Water at 15° *C.*

		Water.
10 c.c. water +	50 c.c. acetic ether =	7·5 c.c. undissolved.
10 c.c. water +	100 c.c. acetic ether =	5·5 c.c. undissolved.
10 c.c. water +	150 c.c. acetic ether =	3·5 c.c. undissolved.
10 c.c. water +	200 c.c. acetic ether =	1·5 c.c. undissolved.
10 c.c. water +	250 c.c. acetic ether =	all dissolved.

When cooled to 0° C., about ·05° c.c. separated again.

Solubility of water in acetic ether = about 1 c.c. in 26 c.c. at 0° C.

Solubility of water in acetic ether = about 1 c.c. in 24 c.c. at 15° C.

We have thus the following curious results:—

Calcium chloride more soluble in acetic ether at 0° C. than 15° C.
Water less soluble in acetic ether at 0° C. than 15° C.
Acetic ether more soluble in sol. calc. chlorid. at 0° C. than 15° C.
Acetic ether more soluble in water at 0° C. than 15° C.

Dried potassium carbonate is usually employed to dry the acetic ether, and Berthelot has recommended that it should be finally distilled off this salt; but I have found this to decompose the ether. In preparing a pure sample for examination I distilled it, after digestion, with potassium carbonate and found—

Before distillation 93·48 per cent. $C_2H_5C_2H_3O_2$.
After distillation 90·14 per cent. $C_2H_5C_2H_3O_2$.

I therefore again heated the 90·14 per cent. lot with potassium carbonate in a water-bath for one hour. A green colour was developed along with a disagreeable odour, and on distillation the product only contained 86·22 per cent. $C_2H_5C_2H_3O_2$. Digestion with the carbonate, however, does not decompose acetic ether, and in the course of a few days it will be found practically dehydrated.

I have also made use of dried sodium acetate, which on the large scale is undoubtedly the best to use, since distillation over this has no decomposing effect, and after drying, the acetate may be again used in preparing acetic ether.

We are now in a position to decide on a process to be adopted, and I would therefore propose that in the next Pharmacopœia the following or a modification of it should be adopted:—

Rectified spirit . . .	283 c.c. = 10 oz.
Sulphuric acid . . .	283 c.c. = 10 oz. fluid.
Dried sodium acetate .	351 grams = 12⅜ oz.

Place the alcohol in a copper or glass flask, and into it pour the sulphuric acid, adopting means to keep it cool. Allow to stand, and when the temperature has fallen to about 60° F., gradually add the sodium acetate with constant agitation, to insure thorough mixture, keeping the flask as cool as possible, and connecting it with an inverted condenser to avoid loss. When all has been added, connect with a condenser, and distil the contents by means of a naked flame or sand-bath till 400 c.c. (about 14 fl. oz.) have passed. Digest the distillate for three days with 2 ounces of freshly dried potassium carbonate. Filter and distil the filtrate by the aid of a water-bath, stopping the distillation before the last ounce has passed over.

I have already discussed the process of manufacture so fully that I need hardly say more with reference to the one just detailed; but a few points merit attention. By the excess of sulphuric acid ordered, the absence of alcohol in the distillate is secured, while the action of this excess on the newly formed acetic ether is minimized by the directions to secure thorough mixture before applying heat. Alcohol being absent in the distillate it is only necessary to neutralize and free the ether of water. I recommend for this purpose the potassium carbonate, as most convenient on the small scale, but the sodium acetate is equally efficient.

As an example of the operation of this process I give the following details:—

Using the quantities above mentioned I distilled off—

375 c.c., sp. gr. ·912, containing 94·06 per cent. acetic ether.
30 c.c., sp. gr. ·912, containing 81·42 per cent. acetic ether.

The 375 c.c. contained	316·8	grams or	352·7	c.c. acetic ether
30 c.c. „	21·9	„	24·4	„
	338·7		377·1	„

After washing with water, and digestion with potassium carbonate, the sp. gr. was found slowly to diminish—

After eighteen hours	·904
After thirty hours	·9023

when it contained 99·36 per cent. real acetic ether.

I must here enter a protest against some of the characters of acetic ether given in the B.P., and also in the new United States Pharmacopœia.

The solubility in water is given as—

B.P.	1 in 12 parts (vol. or weight?)
New U.S.P. . . .	1 in 17 parts by weight.
While I find it to be	1 in 9 parts by vol.

Again, as regards specific gravity, I have already pointed out the great diversity among observers as to the real sp. gr. of pure acetic ether; and this, no doubt, arises from the impurity of the article examined; but looking to the latest authorities only we find—

B.P., corrected addendum	·900.
U.S.P. (1883)	·889 to ·897.
Mendelejef and Allen	·898.

After much work on the subject I am convinced that in all these cases the acetic ether contained alcohol or some other light liquid, and the following are my grounds. I took two samples of acetic ether, one known to contain alcohol (A), the other known to contain water (B). I distilled A, dividing the distillate into fractions, and by analysis having selected the purest of these, sp. gr. about 890, I twice shook up with an equal volume of calcium chloride solution, digested with excess of potassium carbonate, filtered, distilled, rejected the first portions and selected the middle portion. On analysis it showed 95·04 per cent. ethyl acetate. After prolonged digestion with pot. carb. sic., and afterwards with cupri sulph. sic. for ten days, it was sp. gr. 9004 and contained 98·76 per cent. ethyl acetate. I now washed it with water to remove any trace of alcohol still remaining. The watery acetic ether was now sp. gr. ·909 at 60° F., I divided it into two portions (1 and 2), and set aside—

1. 100 c.c. + 20 grams . . . Sod. acet. fused.
2. 100 c.c. + 20 „ . . . Pot. carb. sic.

and noted the lowering of the sp. gr.—

	In 48 hours.	In 72 hours.
1.	·90191	·9014.
2.	·90205	·9018.

I then mixed them (170 c.c. in all) distilled off 40 c.c., which I rejected, and retained the next 75 c.c., sp. gr. 9015 and containing about 99·4 per cent. ethyl acetate.

On the other hand, I took sample B containing water, but no alcohol, and digested it for some weeks with pot. carb. and cupri sulph. sic. and finally distilled, selecting fractions by analysis as before, and obtained—

Sp. gr. ·902	= 99·36 per cent.
Sp. gr. ·9015	= 99·58 „
Sp. gr. ·9012	= 99·70 „

To sum up: we see that it is exceedingly difficult to obtain anhydrous acetic ether, the last traces of water obstinately adhering, and we can have no doubt as to the accuracy of the determination (oxalic acid from methyl oxalate having been used in the preparation of the standard solution). In the absence then, of an absolutely pure sample we may reason as follows. Sample A after purification, but before treatment with water, was—

Sp. gr. ·9004 and 98·76 per cent. ethyl acetate
B = sp. gr. ·9012 and 99·7 per cent. ethyl acetate,

and as A originally contained alcohol, while B contained water, it would seem most likely that the sp. gr. of the former would be too low while that of the latter would be too high. But by purifying A so as to remove the alcohol the sp. gr. was raised to

Sp. gr. ·9015 and it then contained about 99·4 per cent.

so that on all grounds the sp. gr. must be higher than ·9004 and lower than ·9012.

It is of course not to be expected that such purity will be met with, but I see no reason why 95 per cent. or even higher should not be insisted on in the Pharmacopœia.

In closing this discussion, I am aware that some, perhaps many, of my deductions may hereafter be proved to be incorrect, and it is in order that subsequent experimenters may know the grounds on which these were based that I have troubled you with such complexity and detail.

Postscript.—Since writing the foregoing it has been suggested to me that the *parts* in the B.P. formula may be intended to be taken by weight. When working on the subject the question as to what was meant came up, there being an undesirable ambiguity in the wording of the process. Opinions of those consulted agreed in giving the solids by weight, liquids by measure. This view was also confirmed by the statement in the text that "1 part dissolves in 11 or 12 parts of water at 60°," which was understood by all to mean parts by volume. On consulting Squire on the subject, I found "solids by weight, liquids by measure," at the top of the page, showing that according to English usage the sulphuric acid and alcohol were understood generally to be parts by measure. On this ground I examined the process, and founded the objections above detailed, the more serious of which, as will be seen, lie, not so much in the formula, as in the method of purification. If we, however, calculate out the proportions as represented by weight as well as by measure, it seems probable that all the parts are intended to be taken by weight, and that if this be so, the proportions in themselves are satisfactory enough. The following figures indicate this:—

1st. *Liquids and Solid by Weight.*

500 grams s. v. rect. . . = 420 grams absolute alcohol.
1000 grams sulphuric acid = 960 grams H_2SO_4.
800 grams sod. acetate.

But 420 grams alcohol require 895 grams sulphuric acid and 748 grams dried sodium acetate, showing in this case a slight excess of these bodies.

2nd. *Liquids by Measure, Solid by Weight.*

500 c.c. or 419 grams s. v. rect. . = 352 grams C_2H_6O.
1000 c.c. or 1843 grams sulphuric acid . . . . = 1769 grams H_2SO_4.
800 grams acetate of soda,
But 352 grams C_2H_6O require 750 grams H_2SO_4.
352 grams C_2H_6O require 627 grams $NaC_2H_3O_2$.

So that in this case the proportions are very much further, than in the former case, from the theoretical. It is to be regretted, therefore, that if the former be the correct reading, the wording is not so framed as to avoid all doubt, and I would suggest that in that case the solubility should be expressed in similar terms.

LITHIÆ CITRAS.*

BY C. THOMPSON.

It is very difficult to say when this salt was first used in medicine. Dr. Ure, in 1843, introduced the carbonate as a specific for gout, pointing out the remarkable solvent power of lithia over uric acid compared with the other alkalies, hence its great use in cases of gout. The urate of sodium with which gouty patients all seem charged, is converted into the more soluble lithia salt, and so washed out of the system.

In 1857, Drs. Garrod and Ringer mention using strong lotions of lithia salts to disperse gouty swellings. Lithium citrate was not officially recognized until 1864, when it appeared in the new British Pharmacopœia of that date. It appeared in the United States Pharmacopœia of 1870, also in the revised edition lately published, and these are the only two Pharmacopœias in which it is recognized.

* Read before the Chemists' Assistants' Association, February 21, 1883.

The German Pharmacopœias of 1872 and 1882 have the carbonate, but not the citrate, and the same is the case with the French Codex.

The instructions for making this salt are different in each Pharmacopœia.

In the British of 1864, the directions are—

Take:—

Carbonate of lithia	50 grs.
Citric acid in crystals	90 grs.
Warm distilled water	1 fl. oz.

Dissolve the citric acid in the water and add the carbonate in successive portions, applying heat until effervescence ceases, and a perfect solution is obtained. Evaporate by a steam or sand bath until water ceases to escape, and the residue is converted into a viscid liquid. This should then be dried in an air oven at about 240° F., then rapidly pulverized, and enclosed in a stoppered bottle. The process in the British Pharmacopœia for 1867 is exactly the same.

In the United States Pharmacopœia for 1870, we find:—

Take of—

Lithium carbonate	100 grs.
Citric acids in crystals	200 grs.
Distilled water	2 fl. ozs.

Dissolve the citric acid in the water, gently heated, and to the solution gradually add the carbonate until perfectly dissolved, heating the mixture, so long as effervescence is produced. Evaporate by means of a steam or sand bath to a viscid consistence, dry the residue in an oven, at a temperature of about 240° F., then rapidly pulverize, and preserve in a stoppered bottle.

In the revised Pharmacopœia of the United States, lately issued, no process is in accordance with the decision to omit processes except where necessary to ensure a particular result.

Neither the proportions of the British Pharmacopœia nor that of the United States Pharmacopœia are correct, for the former having an excess of carbonate gives an alkaline product, whereas the latter, having an excess of citric acid gives an acid product.

As Mr. Umney pointed out in a paper read at the Pharmaceutical Conference of 1875, if the formula—

$$3Li_2CO_3 + 2(H_3C_6H_5O_7,H_2O) = 2Li_3C_6H_5O_7 + 5H_2O + 3CO_2$$

be accepted as correct, then 100 parts of carbonate of lithium will be required to neutralize 189·2 parts of citric acid, the product of anhydrous lithium citrate being identical with the amount of citric acid originally employed in the operation. But as the best commercial carbonate of lithium does not contain more than 98·5 per cent. of real carbonate, the proportion will be 100 parts of carbonate to 186·5 parts of citric acid.*

Lithium citrate, according to Mr. Umney, when prepared from these proportions and dried until anhydrous, is neutral to test paper.

According to the 1864 Pharmacopœia, lithium citrate is a white, amorphous powder, *deliquescent*, and soluble in water without leaving any residue. Heated to redness it blackens, evolving inflammable gases, and the residue, neutralized by hydrochloric acid, yields with rectified spirit a solution which burns with a crimson flame. Twenty grains of the salt burned at a low red heat, with free access of air, leave 10·6 grains of white residue.

The U.S.P. of 1870 gives the following characters and tests by which this salt may be recognized:—

"A white powder, *deliquescent* and soluble in 25 parts of water; upon ignition it leaves a residue which if dissolved in dilute muriatic acid gives a solution, which burns with a crimson flame, showing the presence of lithium. The citric acid is indicated by the solution becoming turbid when heated with lime-water and clear again on cooling. Twenty grs. of this salt burned at a low red heat, with free access of air, should leave $10\frac{6}{10}$ grs. of white residue. The revised edition, before alluded to, gives a much fuller account of the characters and tests.

"A white powder, *deliquescent* on exposure to air, odourless, having a slight cooling, faintly alkaline taste, and of a neutral reaction, soluble in 5·5 parts of water at 15° C. and in 2·5 parts boiling water; only slightly soluble in alcohol. When exposed to a red heat, the salt chars, emits inflammable vapours, and finally leaves a black residue having an alkaline reaction, which imparts a crimson colour to a non-luminous flame. The aqueous solution of the salt mixed with test solution of calcium chloride deposits a white precipitate on boiling. On dissolving the residue left on ignition in diluted hydrochloric acid, and evaporating the filtered residue to dryness, 1 part of the residue should be completely soluble in 3 parts of absolute alcohol, which when ignited, should burn with a crimson flame, and the addition of an equal volume of stronger ether to the alcoholic solution should produce no precipitate (salts of alkalies absent). On dissolving another portion of the residue in a small quantity of water, the solution should produce no precipitate with the test solution of ammonium oxalate (salts of alkaline earths). The aqueous solution should remain unaffected by sulphuretted hydrogen or ammonium sulphide (absence of metals)."

Lithium citrate, as Squire remarks, is not deliquescent. It appears in commerce either as a crystalline or pulverulent substance. When crystalline its composition is exceedingly uniform; when in powder its composition is rather apt to vary, and does not resemble the citrate of lithium of the B. P., which is anhydrous; whereas Mr. Umney found, in an examination of some ten different samples, in no case more than 84 per cent., while most were about 74 per cent. of anhydrous salt.

Mr. Umney dried the specimens examined first at 100° C., and then finished at 115° C., or so as to produce the official article; the difference between the two dryings is about* 5 per cent., corresponding to about 1 molecule of water, so that, if the formula $Li_3C_6H_5O_7.4H_2O$ be accepted, then the salt dried at 100° will lose three of these four molecules of water. This was the composition of some crystals of pure lithium citrate, made by Mr. Sandford and presented to Mr. Umney, which contained about 73 per cent. anhydrous citrate.

Out of four samples examined by me, one contained 86 per cent., another 83·5 per cent., and the other two 75·2 per cent. of anhydrous citrate of lithium.

But not only does the commercial article contain water of crystallization, but other substances, distinct impurities,† the most common of which are calcium, magnesium, potassium and sodium, and sometimes traces of the heavier metals. Occasionally the citrate is found adulterated with powdered petalite, bitartrate of potassium, etc. Before proceeding to discuss the methods of detecting and estimating these impurities it will be as well to see how they get into the citrate.

There are two sources:—

1st. The carbonate of lithium.

2nd. The citric acid.

The chief impurities in the carbonate are calcium, potassium and sodium chlorides.

The citric acid may contain tartaric acid, salts of potassium and calcium, together with iron, lead and copper.‡

The mineral lepidolite, a silicate of aluminium, potassium and lithium.

Petalite, a silicate of aluminium, sodium and lithium.

* In some formulæ for new medicaments adopted by the Paris Pharmaceutical Society, it is recommended to use 100 parts carbonate of lithium to 186 parts citric acid (*Pharm. Journ.*, July 21, 1877).

* Since writing the above, Mr. Umney has found that this varies considerably.

† Mr. W. L. Scott, out of twenty-seven samples of lithium salts, found sixteen pure, six fair, and five adulterated with Na_2CO_3, $KHC_4H_4O_6$, powdered petalite, etc., etc. ('Year-Book of Pharmacy,' 1870, p. 452).

‡ A. H. Allen, *Chem. News*, xxxi., 277.

Triphyline, a phosphate of iron, manganese, sodium and lithium, and

Spodumene, another silicate of aluminium, sodium and lithium, are the principal sources whence the lithium carbonate of commerce is derived.

A description of two of the processes by which the carbonate of lithium is prepared from lepidolite, etc., may be interesting, as showing how the impurities before alluded to come to be present in the carbonate.

1. Schering's process for obtaining lithium carbonate from lepidolite, which is the greatest source of the lithium.—The lepidolite is ground up, treated with strong sulphuric acid. It is heated with constant stirring until it gains consistency enough to be made into balls, which are then introduced into a reverberatory furnace. The slight excess of sulphuric acid is driven off at a gentle heat, the temperature is then raised, and the pieces, while still hot, are treated with water in vessels lined with lead. Silica is then removed by filtration, and to the lye sufficient carbonate of potassium is added to convert all the alumina present into alum, as lithium does not replace potassium in alum. The alum meal separating on boiling is removed, and the small remaining quantity of alum is precipitated by milk of lime; all the lyes are united, the salts converted into chlorides by treatment with barium chloride, the liquid is evaporated to dryness, and the lithium and calcium chlorides are extracted with absolute alcohol in order to separate them from the barium, sodium and potassium chlorides present. The calcium is separated by ammonium oxalate. Any heavy metals which may happen to be present are got rid of by ammonium sulphide. The lithium chloride is evaporated to dryness in a large silver vessel, treated with ammonia and ammonia carbonate and the resulting lithium carbonate washed to free it from chlorides.

2. Frost's method, for obtaining lithium carbonate from lepidolite.—Fuse together lepidolite, well powdered, 10 parts; barium carbonate, 10 parts; barium sulphate, 5 parts; potassium sulphate, 3 parts. The heavy silicate and sulphate of barium sink to the bottom, whilst a layer of sulphates of potassium and lithium floats on the surface of the fused mass. These are then extracted by lixiviation, and the sulphates are converted into chlorides by precipitation with chloride of barium. The liquid is evaporated to dryness and the potassium and lithium chlorides are separated by treatment with a mixture of absolute alcohol and ether, which dissolves the lithium and leaves the potassium. Ammonia and ammonium carbonate are then added and the carbonate of lithium is collected and well washed. It will be seen that the impurities, *i.e.*, the calcium, potassium and sodium chlorides, are very difficult to separate entirely from the lithium, owing to the partial solubility of potassium and sodium chloride in alcohol.

Both the B.P. and the U.S.P. recommend, as a means for the quantitative estimation of the citrate, incineration, at a red heat, and weighing the residue as carbonate, when 53 per cent. (52·8 per cent.) should be obtained.

This method is useless as a means of estimation of the amount of lithium present, for the carbon cannot be entirely got rid of without very prolonged heating, by which means the carbonate becomes caustic; the resulting greyish-white mass is very deliquescent, thus introducing another source of error.

An improvement on this method is given in the 'U.S. Dispensatory,' where it is directed to incinerate and treat the mass with sulphuric acid, and weigh the resulting sulphate of lithium.

100 grains citrate should yield 22·3 grains of sulphate.

In making an analysis of lithium citrate, the probable impurities and adulterations to look for are powdered petalite or lepidolite, salts of calcium, potassium and sodium.

First as regards powdered petalite or lepidolite. Take a weighed quantity (1 to 2 grams.), and treat with boiling water; if any of the powder remains insoluble, this must be collected, washed, incinerated and weighed. For calcium:—Take about 5 grams, dissolve in water, add ammonium oxalate, collect, wash, incinerate and weigh as $CaCO_3$.

The real difficulty is when it comes to the estimation of the potassium, sodium and of the lithium present in the samples. There are four processes for this, all starting with the salts as chlorides; therefore, a weighed quantity of the citrate is to be taken, incinerated in a platinum crucible, and the greyish-white mass dissolved up in as small a quantity as possible of dilute hydrochloric acid, and then having the salts present as chlorides, either one of the following four processes may be proceeded with.

1. Kobell separates the potassium by precipitation as platino-potassium chloride, and separates the sodium and lithium by heating the mixed chlorides to incipient fusion in a platinum crucible (care must be taken not to raise the temperature too high, or else some of the sodium chloride will be volatilized), then weighs the residue; he leaves it exposed for twenty-four hours to an atmosphere not moist enough to attack the sodium chloride, till the lithium chloride, which is very deliquescent, has absorbed water, drenches the partly deliquesced mass with alcohol, decants carefully, repeats the washing and decantation a second time and weighs the residual sodium chloride.

According to the author this process gives exact results.

2. Mayer's process, as given by Fresenius. Add to the solution (of the chlorides before mentioned) a sufficient quantity of sodium phosphate (which must be perfectly free from phosphates of the alkaline earths—this is very important), and enough soda, either carbonate or hydrate, to keep the solution alkaline; evaporate the mixture to dryness, pour water over the residue, in a sufficient quantity to dissolve the soluble salts by the aid of a gentle heat. Add an equal volume of a solution of ammonia, digest at a gentle heat, filter after standing for twelve hours, and wash the precipitate with a mixture of equal volumes water and ammonia. Evaporate filtrate and first and second washing to dryness, and treat the residue the same way as before. If any phosphate is obtained add it to that previously obtained. The phosphate is then dried and weighed.

The formula of the phosphate is Li_3PO_4 Rammelsberg asserted that a variable quantity of lithium sodium phosphate was formed. Fresenius, however, confirmed Mayer's work, and showed that no double phosphate was formed.

According to Mayer this process gives 99·61 for every 100 of lithium, and Fresenius obtained 99·8 per cent. The phosphate is not a very soluble body, 1 part dissolving in 2539 parts of pure, and 3920 parts of ammoniated water. This is the best and surest method of estimating the lithium.

Another process is to separate the potassium as platino-potassium chloride, then shake the mixed chlorides of sodium and lithium, dried at 120° C., with a mixture of ether and absolute alcohol for twenty-four hours, until the salts are disintegrated, decant on to filter, and treat the residue again with several smaller portions of alcohol and ether. It is best, in order to be as accurate as possible, to distil off the alcohol and ether, and again treat the impure lithium salt with alcohol and ether, a drop of hydrochloric acid being added. This method is not a very reliable one, however.

Bunsen, seeing the difficulty of separating the lithium and sodium by the alcohol treatment, devised an indirect method of determining the potassium, sodium and lithium.*

The solution of the chlorides of potassium, sodium and lithium is treated with nitrate of silver and the total

* Watts's 'Dictionary,' vol. iii.

amount of chlorine present determined; the filtrate is freed from excess of silver nitrate by hydrochloric acid, and the potassium contained in the filtrate determined by platinic chloride. The potassium thus determined, gives, when subtracted from the total chlorides, a remainder:—

$$A = x(LiCl) + y(NaCl)$$

and the quantity of silver chloride equivalent to a known weight of potassium chloride gives, when subtracted from the total weight of silver chloride, a weight B., whence quantity of lithium chloride is calculated by the formula:—

$$x = 1{\cdot}0823\ B - 2{\cdot}6525\ A.$$

As the citrate of lithium in crystals has been shown to be a non-deliquescent body, and all manufacturers now acknowledge that they can make it, although when the Pharmacopœia of 1867 was brought out they were dead against the crystalline article, it is to be hoped that in the Pharmacopœia of the future there will be found the crystalline body as the official citrate.

If this be the case, there will not be much fear of so great a dissimilarity between the commercial article and the official article.

I cannot close my paper better than by giving Mr. Umney's opinion on the crystalline body*:—

"The crystals are quite definite and reliable, and if indeed it were thought necessary to have a citrate containing less water, then let it be dried at 100°, which will be quite enough.

"I suppose the reason why the 1864 Pharmacopœia orders the anhydrous citrate, was to lessen the objections to the salt on account of its supposed deliquescence."

COSMETIC PREPARATIONS.†

Rose-Bandoline.—Digest 800 grains of tragacanth with 1 quart of rose-water for two days at a gentle heat in a closed vessel. Strain the mixture, and perfume it with oil of rose.

Or, macerate 1 part of quince seed with 40 parts of rose-water for several hours, repeatedly agitating; strain the mixture, and perfume it with oil of rose.

Almond-Bandoline.—Prepared like the preceding, except that oil of bitter almonds is used for scenting.

If either of the above are wanted coloured, an ammoniacal solution of carmine may be used.

Brilliantine.—Mix 1 part of glycerin with 3 parts of castor oil and 60 parts of alcohol.

Perfume according to taste.

Crême de Mauve.—Mix 1 part of glycerin with 1 part of alcoholic extract of jasmin, and colour with a little fuchsine.

Used to impart gloss to the hair.

Oleolisse Tonique (de Piver).—Dissolve 5 parts of castor oil in 15 parts of alcohol, and flavour with oil of bergamot or oil of Portugal.

Hungarian Cosmetic.—Melt 30 parts of white wax on a water-bath, and add 20 parts of powdered almond soap, and 20 parts of a solution of 1 part of gum arabic in 60 parts of rose-water. Stir the mixture until it cools, and perfume it with 1 part of oil of bergamot, or $\frac{1}{5}$ part of oil of rose.

By adding umber or lamp-black, the mass may be coloured brown or black.

Bay Rum (artificial):—

Tincture of bay leaves (1 of bay leaves, 10 of alcohol.)	6 ozs.
Oil of bay	60 grains.
Borax	1 oz.
Carbonate of ammonium	1 oz.
Rose-water	1 quart.

* 'Year-Book of Pharmacy,' 1875, page 559.
† From *New Remedies*, February, 1883.

Extrait Végétal:—

Essence of vanilla (1 of vanilla, 30 of alcohol.)	2 parts.
Extract of orange flowers	1 part.
„ jasmine	1 „
„ rose	1 „
„ tuberose	1 „
Alcohol	16 parts.
Rose-water	20 „

Amandine (for softening and beautifying the skin).—Make a syrup from 1 part of sugar and $\frac{1}{2}$ part of water. Mix 8 parts of the syrup with 2 parts of almond soap cream, until a homogeneous mass is obtained, to which is to be added, under constant stirring, 200 parts of almond oil, previously perfumed with 2 parts of oil of bitter almonds, 2 parts of oil of bergamot and 1 part of oil of cloves.

The mixture of the almond oil with the syrupy mass requires some practice and, particularly towards the end, when the mass becomes stiffer, a considerable expenditure of force.

Almond Soap Cream is prepared by melting 250 parts of pure lard and mixing with the melted fat 100 parts of solution containing 25 per cent. of caustic potash. The latter must be added very slowly, and under constant stirring. When all is added it is gradually allowed to cool, the stirring being continued. It is then transferred to a mortar, and triturated with addition of 6 parts of alcohol and $\frac{1}{2}$ part of oil of bitter almonds, until it is creamy and homogeneous.

Olivine.—4 parts of powdered gum arabic and 12 parts of honey are intimately mixed, and the mixture triturated with 6 parts of Castile soap and with two yolks of egg for every ounce of gum arabic used. To this is gradually added, under continued trituration, a previously prepared mixture of 60 parts of finest olive oil, 2 parts of oil of sesame, 2 parts of oil of bergamot, 2 parts of oil of lemon, 1 of oil of cloves, $\frac{1}{5}$ of oil of thyme and $\frac{1}{5}$ of oil of cinnamon, and the whole thoroughly triturated until a homogeneous mass results.

Almond Paste.—16 parts of blanched bitter almonds are rubbed to a fine paste, and this is gradually added to an intimate mixture of 30 parts of honey, 15 parts of yolk of egg, 30 parts of almond oil, $\frac{1}{2}$ part of oil of bergamot and $\frac{1}{2}$ part of oil of cloves.

Rose Milk (Lait de Rose).—1 part of finely rasped Castile soap is dissolved, with a very gentle heat, in 4 parts of rose-water; 1 part of white wax and 1 part of spermaceti are next added and, when they are melted, a strained almond mixture is added, prepared from 16 parts of blanched sweet almonds and 1000 parts of water. The addition must be made gradually and under continuous stirring. Finally, 150 parts of alcohol and 8 parts of oil of rose are thoroughly incorporated with the mixture.

Frangipanni Sachet Powder.

Orris root, powdered	1500 parts.
Vetiver, powdered	120 „
Sandal wood, powdered	120 „
Oil of neroli	2 „
„ rose	2 „
„ sandal wood	2 „
Musk bag, powdered	20 „
Civet	5 „

Heliotrope Sachet Powder.

Orris root, powdered	1000 parts.
Rose leaves, powdered	500 „
Tonka bean, powdered	250 „
Vanilla, powdered	120 „
Musk	4 „
Oil of bitter almond	3 „

The Pharmaceutical Journal.

SATURDAY, MARCH 24, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE DRAFT PHARMACY BILL.

IN the discussion of the Pharmacy Act Amendment Bill by several correspondents and at the various meetings which have been held throughout the country, it appears that there is a tendency to dwell upon the desirability of having the articles proposed to be sold with the label "poisonous" added to the second part of the existing schedule of poisons, rather than dealt with as is proposed in the Bill. Those who advocate this course seem, however, to overlook the circumstance that a special recommendation to that effect has already been made by the Council of the Pharmaceutical Society and that the Privy Council has distinctly refused to sanction such a step. To repeat such a recommendation would, therefore, be futile in itself and calculated, moreover, to injure the prospect of obtaining an amendment of the Act in other respects, since the Government is not inclined to look with favour upon any measure which comprises interference with general trade.

In regard to the particular article which Mr. LEAROYD referred to at the Sheffield meeting, as belonging more properly to the schedule of poisons, we have reason for stating that it was precisely the one which the advisers of the Privy Council most strongly objected to interfering with. It is true that numerous accidents have happened with carbolic acid, in consequence of its misuse or from carelessness, and this has been the case even in hospitals. But with all due regard for the desirability of preventing such accidents as far as possible, it must also be remembered that carbolic acid is an article of great utility as a disinfectant and in constant demand for some purpose connected with sanitation. It is for this reason considered to be unwise to place restrictions upon the supply of this article which would make the procuring of it in some cases difficult or impossible.

Though we have already explained the circumstances which led to the introduction of the second clause of the Bill, and have pointed out that from the view taken by the Privy Council it is an essential feature of the Bill, it is evident that this aspect of the matter has not met with that attention which it demands; for, if that were the case, we should not hear so much of resolutions to expunge this clause from the Bill. As it is probable that members of local associations may exert themselves by communication on the subject with their parliamentary representatives, it seems very necessary to point out the danger that might be incurred if they were solicited to use their influence in a direction at variance with the views of the Government, and also if they were called upon to use that influence in such a way as to show that there was a serious want of agreement among the members of the class seeking amendment of the law.

Another point, in regard to which some difference of opinion exists, is the provision that the seller of a patent medicine insufficiently labelled is to be liable to a penalty, and it has been urged that the manufacturer should more justly be sued in the first instance. Whatever plausibility there may be in this view at first sight, it will we think be found to disappear very completely on further consideration, and especially if it be attempted to formulate the means by which the manufacturer is to be reached. Moreover, some regard must be had to the fact that the chemist is not to be looked upon as selling, like the grocer or oilman, articles of whose nature he does not pretend to have any knowledge. Just as the propriety of limiting to the chemist the sale of patent medicines containing poison can be advocated on the ground that he possesses higher qualifications than the general dealer, so can the duty of carefulness in regard to the sale of such articles be expected from him no less for his own protection than for the public safety. It would be within his power to insist upon a proper observance of the law, and as he would be the only legitimate vendor of such articles there would be little difficulty in securing the observance of it by the manufacturers whose goods he sold. We are glad to observe that these considerations met with recognition at the meetings held at Sheffield and Leeds and that the general result in both cases was approval of the Bill as a useful and desirable means of satisfying public demands and promoting the advancement of pharmacy.

ELECTRICAL TRANSMISSION AND STORAGE OF POWER.

ANOTHER of the very interesting series of lectures on the applications of electricity, now in course of delivery at the Institute of Civil Engineers, was given on the 15th inst., by Dr. C. W. SIEMENS, who took for his subject the "Electrical Transmission and Storage of Power." Referring to the previous lectures, wherein electricity had appeared as a swift and subtle agency by which signals produced by mechanical means or the voice are flashed almost instantaneously to great distances, Dr. SIEMENS said he now introduced electric energy under another aspect, in which it proved capable of rivalling the steam engine in the accomplishment of actual work. After tracing the steps by which the present methods of converting mechanical power into electric energy have been developed, Dr. Siemens proceeded to describe the conditions upon which the working of a well-conceived dynamo machine must depend, and demonstrated that when losses through unnecessary wire resistance, Foucault currents, and induced currents in the rotating armature, are avoided, at least 90 per cent. of the power communicated to the machine could be realized in the form of electric energy, and that this electric energy could be reconverted into mechanical energy with a similarly small loss. By means of two such machines, therefore, at a moderate distance apart, nearly 80 per cent. of the power imparted to the one machine could be again yielded by the other in the mechanical form. Practically the best condition of working consists in giving to the primary machine such conditions as to produce a current of the same magnitude, but of 50 per cent. greater electromotive force than the secondary, and with such an arrangement as much as 50 per cent. of the power imparted to the primary machine can be practically received from the secondary one at a distance of several miles.

But besides the means for converting mechanical power into electric energy, and reconverting it after transmission, the medium for conducting it from one place to another with the least amount of loss has been the subject of much patient investigation. Six years ago Dr. Siemens expressed an opinion that a copper rod six inches in diameter would be found capable of transmitting through a distance of thirty miles 1000 horse-power, or an amount sufficient to supply one quarter of a million candle-power, which would suffice to light a moderately-sized town. This suggestion was much criticized at the time, but it bears the test of recent results; for M. Marcel Deprez has lately succeeded in transmitting 3 horse-power a distance of twenty-five miles through a pair of ordinary telegraph wires, 4 mm. in diameter, and calculating from the relative conductivity of this iron wire and the 6-inch copper wire proposed by Dr. Siemens, the amount of power that could be transmitted through the latter would be 4000 horse-power. Moreover, M. Deprez employed a motor-dynamo of 2000 volts, and was contented with a yield of 32 per cent. of the power imparted to the primary machine, whilst Dr. Siemens had calculated upon an electromotive force of only 500 volts, with a return of at least 40 per cent. of the energy imparted. By 1878 Dr. Siemens had conceived the possibility of employing a current of at least 1000 volts, and then expressed an opinion that a 2-inch copper rod could be made to accomplish the object intended, whilst Sir William Thomson, enlarging on this idea, soon afterwards told the Parliamentary Committee on Electric Lighting that through a copper wire of only ½-inch diameter, 21,000 horse-power might be conveyed to a distance of three hundred miles with a current of an intensity of 80,000 volts. But Dr. Siemens is of opinion that although the time may come when such a current, having a striking distance of about two feet in air, can be dealt with, a fundamental law as to the economical transmission of electricity will probably then be violated, and he is on the whole inclined to abide by his original choice of a 3-inch copper wire.

The application of the electrical transmission of power to railways is perhaps the form in which it has created most public interest. This was first accomplished by Dr. Werner Siemens in 1879, in connection with the Berlin Exhibition, and led to the opening of the Lichterfelde line, 2500 yards in length, which has been in daily operation since May, 1881, and is worked by two dynamos, developing an aggregate of 9000 Watts, or equal to 12 horse-power. In 1881, too, Dr. C. W. Siemens established a short line, in connection with the Electric Exhibition in Paris, on which 95,000 passengers were carried within seven weeks. An electric tramway, six miles in length, has just been opened in the north of Ireland, connecting Portrush with Bush Mills. This is at present worked by power produced by a steam engine at Portrush, giving motion to a shunt-wound dynamo of 15,000 Watts (=12 horse-power); but turbines are in course of erection at Bush Mills for the utilization of a waterfall of sufficient power. In the opinion of the lecturer, the electric system of propulsion is already sufficiently advanced to assure practical success under suitable circumstances, as, for instance, suburban tramways, elevated lines, and especially lines through tunnels, such as the Metropolitan and District Railways, the advantages being the saving of the weight of the engine and perfect freedom from products of combustion. For tramways within populous districts the insulated conductor would involve a serious difficulty, and for these it would be more advantageous to resort to secondary batteries carried in the car itself.

The subject of secondary batteries was treated much less fully by the lecturer, who, however, pointed out that it is only since the dynamo machine has become an accomplished fact that this mode of storing energy has become of practical importance, and he gave great credit to Messrs. Faure, Sellon and Volckman for putting this valuable addition to practical science into available forms. Fears have been expressed that the permanence of secondary batteries will be affected by their active surfaces becoming coated with sulphate of lead; but the investigations of Mesrs. Frankland, Gladstone and Tribe have shown that the action of the secondary battery depends essentially upon the alternate formation and decomposition of sulphate of lead, and that, therefore, this compound is not an enemy, but the best friend to its continued action.

THE ANNUAL DINNER.

THE meeting referred to last week was held at the Society's house, on Wednesday, when a considerable number of gentlemen having expressed their willingness to become Stewards, it was resolved that the Twelfth Annual Dinner of the Members of the Pharmaceutical Society and their friends shall be held at WILLIS's Rooms, on Tuesday, May 22, and that the price of the tickets, which are to be obtainable only from the Honorary Secretary, shall be one guinea each. It will be remembered that for the past few years the extra expenses in connection with the Dinner have been met by charging the higher sum of thirty shillings for each ticket; but it having been now determined to revert to the earlier charge of one guinea, the extra expenses will this year be defrayed by the Stewards, as formerly. This alteration is calculated to meet the views of many who have objected to the higher charge, and it is to be hoped that in view of the present necessity for exchange of opinions in respect to prospective legislation this opportunity for personal intercourse will not be neglected.

A Committee, consisting of the President, Vice-President and Treasurer of the Pharmaceutical Society, and Messrs. ATTFIELD, F. BARRON, BUTT, GREENISH, W. HILLS and PAUL, was requested by the meeting to carry out the necessary arrangements, and Mr. RICHARD BREMRIDGE was appointed Honorary Secretary. As, probably, many gentlemen who would like to support the Committee have not yet sent in their names, it has been decided not to close the list of Stewards for publication until Wednesday, the 4th of April. All communications upon the subject should be addressed to the Honorary Secretary, Mr. RICHARD BREMRIDGE, 17, Bloomsbury Square, W.C.

The last number of *L'Orosi* contains an interesting statistical table, based upon the last census, showing the relative proportion of pharmacists to the population in the different provinces in Italy. From this we learn that with a gross population of 28,951,374, the number of pharmacists in Italy is 11,572 or 1 in 2502. The proportion of pharmacists is, however, by no means constant in respect to the different provinces, since it ranges from 1 in 1396 in Avellino to 1 in 7241 in Cagliari.

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According to the Pharmaceutical Register of New Zealand, a copy of which has just been received, there were at the commencement of the year 256 "pharmaceutical chemists" in virtue of registration effected under the Colonial Act of 1880.

*   *   *

According to Consul-General Blunt the cultivation of the poppy in Macedonia, where it was introduced from Asia Minor in 1866, is being carried on most successfully. The yield of opium in 1881 amounted to 135,000 lbs., most of which was exported to this country at prices ranging from 12*s*. 6*d*. to 14*s*. per lb. The Macedonian opium, especially that produced in the district of Istip, is said to be of very good quality and to contain about 11 per cent. of morphia.

*   *   *

The *Utica Herald* reports the proceedings in an action in which a physician sought to recover damages from a chemist for having dispensed a drachm of podophyllin instead of a grain, and thereby endangered the life of a patient. The defence was that "one drachm" was the quantity ordered in the prescription; but the doctor averred that he wrote "one grain," and that an alteration had been made by the chemist to cover his mistake. The prescription was submitted for examination to two experts, who reported that no alteration had been made, and the jury returned a verdict for the defendant. Incidentally, the question was raised whether a chemist is justified in putting up a prescription ordering a dangerous excess of any ingredient, concerning which the judge ruled that if the prescription of a regular practising physician is dispensed as written the dispenser is not responsible.

*   *   *

According to a recent decision of the Appeal Court at Poitiers, the law which in France prevents pharmaceutical compounds, or remedies of any kind, from becoming the subjects of letters patent extends also to such preparations when intended solely for veterinary purposes.

*   *   *

A weekly contemporary has furnished a good specimen of "penny-a-lining" *à propos* of the recent explosion. It gravely informs its readers of the remarkable coincidence that Sir Frederick Bramwell was lecturing at the Institute of Civil Engineers upon "the powerful effect of dynamite and the dynamo machine," and had just explained that "so many pounds of zinc would, under certain conditions, produce an explosion of terrific magnitude," when his audience was startled and panic stricken by the effects of the explosion at the offices of the Local Government Board. In the presence of so much that is "remarkable," the fact that Sir Frederick Bramwell was not lecturing at the Institute on that evening is, perhaps, hardly worth mentioning.

*   *   *

A "Bill for better securing the purity of Beer," which has been brought into the House of Commons, provides that every person who sells or exposes for sale, by wholesale or retail, any beer brewed from or containing any ingredients other than hops and malt from barley, shall post conspicuously in the same place a legible notice stating what other ingredients are contained in it, under a penalty of twenty pounds for a first offence. "Beer" is defined as "beer (other than black or spruce beer), ale and porter."

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A meeting of the School of Pharmacy Students' Association will be held on Thursday, March 29, when a paper will be read on "Vortmann's Method for the Separation of Chlorides, Bromides and Iodides," by Mr. J. B. Barnes. A Report on Botany will be made by Mr. J. O. Braithwaite, the subject being "Plant Movement."

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A paper on "Phosphorus, and a new Method of Exhibiting it in Pill Form," by Mr. Millhouse, will be read at the next meeting of the Chemists' Assistants' Association, on Wednesday the 28th inst.

Provincial Transactions.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

A meeting of the above Association was held at Burlington Chambers, New Street, Birmingham, on Wednesday evening, March 14, Mr. Joseph Lucas, President, in the chair.

A paper was read by Mr. David Hooper, F.C.S., on the "Chemistry of British Coinage." The author introduced the subject by remarking on the necessity for a chemical knowledge in the art of fabricating money, and gave some interesting particulars, under the head of "Historical Remarks," of the composition and the fluctuation in the composition of the British coinage from an early period. In dealing with the Mint processes some peculiarities connected with the melting and annealing were referred to and explained, and some of the methods adopted for refining standard gold and silver were discussed, especially the removal of arsenic and antimony by the chlorine process. The parting assays of gold and silver were then described, and the operations of "quartation" and "cupellation" were explained in detail. Some interesting reference was made on the subject of counterfeit coining and methods for its detection were shown. The paper was illustrated throughout by diagrams, specimens of fraudulent coinage, and several tests and experiments.

After a discussion, in which most of the members present joined, a vote of thanks to Mr. Hooper for his interesting and instructive paper was proposed by Mr. Barclay and seconded by Mr. Charles Thompson.

It was then moved that arrangements should be made for monthly meetings of the Association, when papers could be read, and matters of pharmaceutical interest could be brought forward and discussed.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The Annual General Meeting was held in the Society's Rooms, on Wednesday evening, February 21. Mr. Preston, the President, in the chair.

The Secretary, having read the minutes of the previous meeting, which were confirmed, announced that the following donations had been received during the year:—The *Pharmaceutical Journal*, 'The Calendar of the Pharmaceutical Society,' 'The Register of Chemists and Druggists,' from the Pharmaceutical Society of Great Britain; 'The Year-Book of Pharmacy,' from the British Pharmaceutical Conference; and the *Chemists' Journal*, from the Editor.

It was moved by Mr. Ward, and seconded by Mr. Fox, that the best thanks of the Society be given to the respective donors for their kindness in forwarding the same, which was carried unanimously.

The Annual Report was then read by the Secretary. It stated that during the year ten general meetings and seven Council meetings had been held to further the interests of the Society, and for the benefit of the trade generally. The financial condition of the Society was as follows: — Receipts for the current year had been £10 11*s.* 11*d.* This, with the balance in hand of £29 6*s.* 8*d.* from last year, made a total of £39 18*s.* 7*d.* The expenditure for the year had been—Donation to the Trade Association, £10; Rent, £5 10*s.*; Secretarial expenses, £6 0*s.* 5*d.*, making a total of £21 10*s.* 5*d.*, thus leaving a balance in hand at the present moment of £18 8*s.* 2*d.* This showed that the expenditure had been a little in excess of the income, which was accounted for by the cost incurred in removal from one room to another. The Council confidently trusted that the funds of the Society would be augmented by a still further increase in the number of members and associates. The election of delegates to the Trade Association had resulted in Messrs. Jervis and Ellinor being sent to represent their district. In the early part of the year a "Question Box" had been inaugurated, which had proved a source of pleasure and instruction to many members and associates. During the year several papers had been read, and discussions held thereon, on various matters connected with the trade. The Council had pleasure in stating that its efforts in this direction had met with success, the attendance at the meetings having been fairly good. The curriculum as proposed by the Pharmaceutical Society had been discussed at one meeting, and a resolution had been passed supporting the action of the Society. The Council had held a meeting to discuss the proceedings of a person representing a Copying Apparatus Company—the result being that notices were sent out cautioning the trade to be on their guard. It had reason to think that this action in the matter prevented many vexatious proceedings, not only in Sheffield, but throughout the country. The subject of education had not been overlooked during the past year, but as yet nothing definite has been arranged. It was, however, hoped that during the coming year some arrangement might be made with the Firth College authorities as to a course of lectures on Chemistry, Botany, Pharmacy, etc.

It was unanimously resolved—"That the report be adopted and that it be printed and copies be sent to the members of the Society."

The election of officers then took place, the following being elected for the ensuing year:—President; Mr. J. Preston (re-elected); Vice-Presidents, Mr. G. Carr (re-elected), and Mr. J. M. Turner; Hon. Secretary, Mr. G. T. W. Newsholme (re-elected); Treasurer, Mr. W. Jervis; Auditor, Mr. G. A. Cubley; Council, Messrs. Cubley, Ellinor, Fox, Jepson, Learoyd, Mayor, W. Ward, F.C.S., and Watts. Mr. R. Watts was appointed Librarian *pro tem.*

Mr. Ward, in proposing that Mr. Preston be again elected to the Presidential Chair, referred in eulogistic terms to the manner in which he had filled the chair during the past year and said he thought no one was more fit to occupy it during the coming year, when so many matters of importance would come before the Society. Mr. E. R. Learoyd seconded the motion and it was carried unanimously.

Mr. Preston, in thanking the members for the honour they had done him in again electing him President, mentioned several of the more important matters which would come before the Society during the coming year, and said that he felt sure that he should have the support of the members during his second year of office.

The other officers having returned thanks for their election, and votes of thanks having been passed to the retiring officers for their services during the past year, the proceedings terminated.

OLDHAM CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A very interesting paper was read before the members of the above Association, on Thursday evening, March 8, 1883, by Mr. Smith, on the subject of "Light." The lecturer spoke of reflection and refraction of light, described the eye and the manner in which sight was produced, and explained other phenomena pertaining to the subject.

A vote of thanks to the essayist brought the meeting to a close.

Mr. A. E. Martin, President, occupied the chair.

ABERDEEN CHEMISTS AND DRUGGISTS' ASSOCIATION.

The annual assembly of the chemists and druggists in this neighbourhood was held in St. Katherine's Hall, on Friday, February 9, 1883.

The attendance of the local chemists and their friends was, as hitherto, of the most gratifying nature. This social gathering has now taken root from the oldest member in the trade to the youngest apprentice, and is looked upon by all as the social desideratum of the season.

LEEDS CHEMISTS' ASSOCIATION.

A lecture was delivered before the members and associates of the Leeds Chemists' Association, on Tuesday evening, February 27, by Mr. Alfred Denny, of the Yorkshire College, "On the Chemistry of Plant Life." The President, Mr. S. Taylor, in the chair.

The lecturer first dealt with the primary elements which chemical analysis shows to exist in every vegetable structure hitherto investigated, and which are absolutely necessary for the life and growth of plants. Of the first importance amongst these indispensable food materials are the elements, carbon, hydrogen, oxygen, nitrogen and sulphur, which the plant obtains from various sources, and by a process of synthesis converts into organic matter. The elements, potassium, calcium, magnesium, iron and phosphorus are also invariably present, and all investigations on the nutrition of plants have established the fact that if one of these substances is absent growth is impossible. The presence of chlorine has been shown to be essential for nutrition in one instance, the buckwheat. Sodium, manganese, silicon are often present in the ash, and in marine plants iodine and bromine. Other elements as aluminium, copper, zinc, barium, etc., are found in rare cases, but their absence does not appear to impair the nourishment of the plant, and it is therefore inferred that they are present rather by accident than otherwise. The sources of the essential food elements, and the mode by which the plant obtains them were next considered. The most important is carbon, which is a constituent of every organic compound and forms nearly one-half of the dry weight of the entire mass of vegetation which clothes our planet. Up to a recent period it was the opinion of botanists that plants obtained their carbon from the carbonaceous substances in the soil, *i.e.*, vegetable mould or humus, etc.; this theory was exploded about forty years ago, when the subject was taken up by agricultural chemists both in this country and on the continent. Many striking arguments were put forward against this theory, perhaps one of the most conclusive being from experiments of Messrs. Lawes and Gilbert, which proved that soil after producing crops for twenty successive years showed little or no decrease of carbon, a fact which alone was enough to crush the humus theory; for in such a case, where the crops were removed as produced, a very inconsiderable amount of carbon could be returned to the soil in the form of decaying tissues as is the case in a state of nature. The carbon dioxide of the atmosphere was next thought of as a possible source of the carbon of vegetable structures, and all investigations from that time to the present have proved beyond all doubt that this is the case. This property of obtaining carbon from the carbon dioxide of the air is possessed by plants only, and only by such plants as contain chlorophyll, the substance which gives to all green plants their colour; chlorophyll only has this power of decomposing carbon dioxide in presence of sunlight. Fungi, and all other plants which do not contain chlorophyll, in common with all animals, are thus unable to appropriate the carbon of the atmosphere and on this account are quite dependent, either directly or indirectly, on green plants for their food, being incapable of producing organic matter from inorganic substances for themselves. Plants obtain their nitrogen from ammonia and certain nitrates in the soil, having no power whatever of making use of the free nitrogen of the atmosphere. Mayer has shown that plants absorb ammonia from the atmosphere, but still if the root supply is cut off they do not thrive. Insectivorous plants obtain nitrogen from animal substances by a process of digestion, similar to digestion in the bodies of animals. Hydrogen and oxygen are obtained chiefly by the decomposition of water absorbed by the roots. Hydrogen may also be appropriated from ammonia and a certain amount of the oxygen resulting from the decomposition of carbon dioxide by the green leaves is also retained for the use of the plant. A small quantity of iron in the soil is indespensable for the production of chlorophyll in exposed parts, and potassium is as essential for the activity of chlorophyll as iron is for its production. The sources of the other materials were also considered. The transformation of these inorganic materials into organic substances is termed assimilation and this property is possessed only by green plants. Starch is usually the first product of assimilation, and is the raw material from which the other organic substances are produced, Starch appears as grains in the chlorophyll corpuscles, but is only formed under the influence of light and within certain limits of temperature. All the after processes which result in the transformation of the products of assimilation, are termed products of "metastasis" or "metabolism." The chief products of metastasis were then considered and also certain bye-products of metastatis termed "products of degradation" which appear to originate as the inevitable results of certain processes, but which have generally no further use in the economy of the plant. The various gums and resins, tannin, colouring matters, alkaloids, acids, volatile oils, etc., and almost all vegetable products that are most useful to man are degradation products.

The Draft Pharmacy Bill.

A meeting of members of the Leeds Chemists' Association and other registered chemists and druggists of Leeds was held at the Church Institute, on Wednesday, March 14, 1883. There was an attendance of between twenty and thirty members of the trade. Mr. Samuel Taylor, President of the Association, was called to the chair.

The Chairman explained that the Committee of the Chemists' Association had felt that the issue by the Council of the Pharmaceutical Society of a draft Pharmacy Act Amendment Bill was a matter of so great interest to all chemists and druggists that it was desirable to take this opportunity for considering and expressing any opinions which might be the result of such consideration. He thought it would be most consistent with the position in which they had been pleased to put him as Chairman of the meeting, that he should not at that time offer his own opinions upon the subject. He would therefore ask Mr. Reynolds to introduce the question by an explanatory statement.

Mr. R. Reynolds then gave an account of the origin of the present measure in the appointment some years since by the Council of the Pharmaceutical Society of a Committee entrusted with the duty of preparing amendments to the existing Pharmacy Act. The communications which have taken place with the Medical Department of the Privy Council were alluded to, and the interchange of views on the subject of regulating the sale of certain poisonous articles, notably the strong mineral acids, which the Privy Council refused to add to the existing Poisons Schedule, but which they regarded as demanding cautionary labels. The numerous accidents which have followed the incautious or ignorant use of patent medicines containing powerful remedies, as morphia and chloral hydrate, had clearly produced an impression on the mind of the Government that something should be done to check the evil. The draft Bill dealt with both these questions in a manner which it was believed had the approval of the Government, and in its whole scope it was calculated to stay those infringements of the intentions of the Act of 1868 which unqualified men acting as companies had been able to commit with impunity. It would have been seen in the newspapers that Mr. Mundella, replying to a question from Mr. Warton, had informed the House of Commons that the

Government would introduce a Bill this session to amend the law on the sale of poisons and also dealing with the question of patent medicines. Hence legislation was imminent, and as practical men they had to consider how far they could agree with the proposals which might commend themselves to the Government, and which evidently had the best chance of being carried.

The clauses of the draft Bill were then considered.

Clause 2 was fully debated.

Some members expressed a wish to see the "poisonous" articles of the Schedule dealt with by the Schedule of the existing Act, the Chairman stating his feeling in favour of such a course, if practicable. Some members thought that the proposed Bill would encourage the public idea that the sale of "poisons" was not confined to registered chemists. It was replied that this could not enable them to make purchases of scheduled "poisons" otherwise than at present, provided the existing Act was enforced, and the recent prosecutions and convictions for breaches of this enactment were cited in proof of the vigilance of those entrusted with the working of the Pharmacy Act.

In the discussion on clause 4, Mr. James Abbott objected strongly to the responsibility placed upon a retailer of any patent medicine found to contain a legal poison, and urged that the maker alone should be responsible. In reply, it was shown that the act of sale was that which constituted an offence, and that the responsibility of the retailer was the principle of existing legislation of an analogous kind, as in the Food and Drugs Act. The power of claiming indemnity from the wholesale dealer was contended to be a very solid protection to the retailer.

At the conclusion of the consideration of the clauses the following resolution was proposed by Mr. Reynolds, seconded by Mr. Smeeton, and carried unanimously:—"That this meeting of members of the Leeds Chemists' Association and other registered chemists and druggists of Leeds has considered the draft Pharmacy Acts Amendment Bill proposed by the Council of the Pharmaceutical Society, and records its cordial approval of the same; those present will use their best endeavours to promote the passing of the Bill by Parliament."

It was then moved by Mr. Chadwick, seconded by Mr. Fawcett, and carried unanimously:—"That the Council of the Pharmaceutical Society be requested to use its best efforts to extend to all chemists and druggists exemption from jury service."

A vote of thanks to the Chairman brought the proceedings to a close.

LIVERPOOL CHEMISTS' ASSOCIATION.

The ninth general meeting of the above Association, was held at the Royal Institution, on Thursday, February 15.

The Secretary announced that he had received a letter from the President, in which that gentleman expressed his regret that he would, owing to illness, be unable to preside. In the absence of the Vice-President, Dr. Symes was, on the motion of Mr. M. Conroy, seconded by Mr. A. H. Samuel, voted to the chair.

The minutes of the last meeting were read and confirmed, and the following donations announced:—The *Pharmaceutical Journal*, from the Society; the *Canadian Pharmaceutical Journal*, from the Editor; the 'Calendar of the Pharmaceutical Society,' from the Society.

Mr. T. F. Abraham then moved that, as owing to the unavoidable absence of several gentlemen, the meeting was unusually small, it be adjourned until a more favourable opportunity.

This arrangement being agreeable to the members present and to Mr. Samuel, the proceedings terminated.

The tenth general meeting was held at the Royal Institution, on Thursday, March 1.

In the absence of the President through illness, and in the absence of the Vice-President and Treasurer, Dr. Symes moved that Mr. John Shaw do take the chair. This was carried.

The minutes of the previous meeting were read and confirmed, and the following donations announced:—The *Pharmaceutical Journal* and specimens of the following drugs, from the Pharmaceutical Society:—*Ammomum aromaticum*, *Scopolia japonica*, Caramana gum, *Aconitum Fischeri*, *Empleurum serrulatum*, *Pimpinella anisatum*, Calumba wood, *Illicium religiosum.*

Dr. Symes showed some new filter papers from which the ash is removed by means of hydrochloric and hydrofluoric acids, the smallest size containing only $\frac{1}{25}$ of a milligram of ash.

Mr. Astrup Carus was then called upon to read a paper upon "Contrivances for the Economy of Fuel and the Abatement of Smoke."

The author, after dealing with the mischief caused by smoke and the great quantity of so-called ashes which the authorities of such a town as Liverpool had annually to remove, showed how both nuisances might be very considerably abated.

A discussion ensued and a vote of thanks having been passed to Mr. Carus, the proceedings terminated.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on March 1, Dr. Gilbert, President, in the chair.

The following certificates were read for the first time:—J. A. Baxter, E. C. Hemming, J. B. Coleman.

The full list of Officers and Council was read from the chair. The changes contemplated are given in the report of the meeting on February 15; in that report the name of Professor Dittmar was, however, inserted instead of H. T. Brown, as a proposed member of the Council.

During the evening a ballot was held, and the Scrutators, Dr. Hodgkinson and Mr. Howard, declared the following gentlemen duly elected Fellows:—A. C. Abraham, G. Board, C. N. Betts, E. Bevan, F. J. Cox, A. Collenette, S. Dyson, W. T. Elliott, H. B. Fulton, C. G. Grenfell, B. F. Halford, W. D. Hogg, D. Hooper, J. J. Knight, H. F. Lowe, T. H. Leeming, J. E. Marsh, W. Newton, C. Rumble, F. Scudder, J. O'Sullivan, S. A. Vasey, T. D. Watson, R. M. Walmsley, C. S. S. Webster, F. Watts.

The following papers were read:—

On some Derivatives of the Isomeric $C_{10}H_{14}O_7$ Phenols. By H. E. Armstrong and E. H. Rennie.—Lallemand stated (*Ann. Chem. Ph.*, 101, 119) that by the action of a mixture of strong nitric and sulphuric acids on dinitrothymol a trinitrothymol was obtained. The authors have repeated this reaction and find that a trinitro body is produced, but that it is trinitrometacresol, the propyl group being displaced. The authors were unable to trace this reaction. On comparing carvacrol with thymol it is seen that the only difference is in the relative positions of the methyl and propyl groups. Only a dinitro derivative could be obtained from carvacrol; no trinitro body could be formed. An attempt was made to introduce the NO_2 group into the unoccupied ortho-position in thymol sulphonic acid, but without success, as the sulpho-group is displaced by NO_2, and paranitrothymol is formed. When bromothymol sulphonic acid is oxidized by chromic acid a quinone is formed; with permanganate no formation of quinone takes place, but some amorphous, probably condensation products are produced. Dibromthymol with cold nitric acid forms a colourless substance, probably a nitroso body. The authors have also investigated the nitro bodies formed from isobutyl phenol.

Dr. Japp suggested that the propyl group which was displaced by NO_2 might be eliminated as propylen, which was then polymerized by sulphuric acid.

The Secretary then read a paper entitled—

Chemico-Microscopical Researches on the Cell-contents of Certain Plants. By A. B. GRIFFITHS.—The author has contrasted the growth of some savoy cabbages grown in a soil to which no iron was added with that of plants grown with the addition of ferrous sulphate. The weight of the latter plants was about twice that of the former, and the ash contained notable quantities of iron; in one case the stalk contained 3·521 per cent. Fe_2O_3 and the leaves 12·29 per cent. Fe_2O_3. Microscopical sections of the leaves exhibited minute crystals in some of the cells. On running potassium ferricyanide under the cover glass, these crystals became blue, and after the addition of barium chloride a cloudiness was observed; the crystals also were monoclinic, so the author concludes that they were crystals of $FeSO_4 + 7H_2O$.

The following communication was read by the Secretary:—

The Phenates of Amidobases. By R. S. DALE and C. SCHORLEMMER.—The authors could not isolate any compounds intermediate between aurin and pararosanilin, and have concluded, after many experiments, that when aurin is heated with aqueous or alcoholic ammonia, the action proceeds at once to the formation of rosanilin. When equal molecules of aurin and common rosanilin were heated with alcohol, a solution was soon formed and on concentration a crystalline powder, with dark-green lustre, separated, which proved to be rosanilin aurinate. Similarly, when equal molecules of anilin and phenol were heated for some hours to the boiling point, anilin phenate C_6H_7N,C_6H_6O was obtained in glistening plates, melting at 29·5°, boiling at 184·5°; this substance has a faint phenol-like odour. A rosanilin phenate has been prepared by Mr. G. Dyson. Red alkaline solutions of aurin sometimes turn brown. On acidifying such a brown solution a smeary mass is precipitated from which a body was isolated in colourless crystals; it proved to be dioxyphenylketone $CO(C_6H_4OH)_2$.

The Society then adjourned to March 15.

A meeting of this Society was held on March 15, Dr. Gilbert, President, in the chair.

The following certificates were read for the first time: —T. L. Briggs, E. C. Conrad, C. Gillett, L. Levy, A. Ness, V. S. Schopoff and A. E. Wilson.

Dr. Gilbert announced that the anniversary meeting would take place on Friday, March 30, and that he had decided, after much deliberation, to resign the office of President; the Council proposed that Dr. W. H. Perkin should fill the vacancy thus created, and that Mr. J. Millar Thomson should be Secretary.

Mr. MATTHEWS then read a paper—

On some Condensation Products of Aldehydes with Aceto-Acetic Ether, and with substituted Aceto-Acetic Ethers.—The author has studied the following reactions, condensations of acetic ether with isobutylic aldehydes, with valeric aldehyde, with chloral, with furfurol and with acrolein; benzoic aldehyde with acetodiethyl acetic ether, with acetodichloracetic ether, with acetobenzylidenacetic ether, and with acetomonoethylacetic ether. He concludes that acetoacetic ether is capable of condensing with aldehydes of all descriptions, and that the condensation takes place only in the methylene group, but with the greatest ease; that mono and disubstituted acetoacetic ethers, with the exception of the dichlor ether, are capable of condensing with benzoic aldehyde, but the condensation is very much more difficult to effect and it takes place only in the methyl group.

Mr. R. Warington communicated a paper entitled—

Contribution to the Chemistry of "Fairy Rings." By Sir J. B. LAWES, J. H. GILBERT and R. WARINGTON.—The circles of dark-green grass which frequently occur on pasture land, and which have been long known by the name of "fairy rings," have attracted much attention from botanists and vegetable physiologists. Professor Way, in 1846, explained this phenomenon as follows:—"A fungus is developed on a single spot of ground, sheds its seed and dies. On the spot where it grew it leaves a valuable manuring of phosphoric acid and alkalies, etc., the ground then becomes occupied by a vigorous crop of grass rising like a phœnix on the ashes of its predecessor; the grass crop is then removed and with it the greater part of the inorganic materials the fungus had collected." Professor Way, therefore, attributed the effect chiefly to the inorganic elements. Many experiments were made on the subject at Rothamsted, and in 1851 (*Journ. Royal Agricultural Society*, vol. xii., 32), it was stated that the manuring action was due to the nitrogen collected by the fungus rather than to the ash constituents. The source of the nitrogen was at that time supposed to be the atmosphere. Since that time, however, much evidence has been acquired as to the sources of the nitrogen of green-leaved plants, and grave doubts have arisen as to the nitrogen being derived from the atmosphere. In 1874 an attempt was made to obtain direct experimental data on the subject. Samples of soil were taken, of the soil inside a fairy ring, from the ring and outside. The quantity of organic carbon and nitrogen was carefully estimated; the mean results obtained were nitrogen within the ring 0·247 per cent., on the ring 0·266 per cent., outside 0·281 per cent.; carbon within 2·78 per cent., on the ring 2·99 per cent., outside 3·30 per cent. The percentage of nitrogen and carbon is therefore highest in the soil outside the ring and lowest within the ring, whilst the quantities found in the soil from the ring have an intermediate value. It is obvious, therefore, that the growth of the fungus and the subsequent increased growth and removal of the associated herbage are accompanied by a considerable reduction in the amount of the organic carbon and nitrogen in the soil, and that fungi have taken up organic carbon and nitrogen from the soil which was not available to the previously established vegetation. Five series of experiments were made and the investigation would have been continued, but owing probably to the late wet seasons the fairy rings have disappeared from Rothamsted. The soil of the ring always contained more nitrates than the soil either within or without.

Dr. Gilbert said that the point of interest in the paper was the source of the nitrogen. These rings usually occurred on very poor pastures, and it was at first natural to suppose that the fungi must draw the nitrogen from another source, as the previous vegetation could not obtain it from the soil, and although we have no evidence that green-leaved plants can obtain nitrogen from the atmosphere it was thought that with fungi, of which the growth is so different, it might be otherwise. Direct evidence that the nitrogen comes from the soil is still wanting, but there is a great deal less evidence that the nitrogen is furnished by the atmosphere, so that on the whole the balance of evidence points to the soil as the source of the nitrogen.

The Secretary then read a paper—

On Lines of no Chemical Change. By E. J. MILLS and W. Mc. D. MACKEY.—The authors considered it of great interest to determine in certain cases the origin of chemical change, such origin being obviously identifiable in many instances with a line of no chemical change. In the present paper they have studied the reaction between sulphuric acid and zinc brought into contact under definite conditions as regards temperature, strength of acid, etc. The hydrogen evolved was taken as the index of the extent of the reaction. The results are represented in tables, and are plotted on a curve. The nature of the reaction is shown to be of a very complicated character. The law of the relation of temperature to chemical change requires an equation of the second degree. The authors state that their investigations place temperature on the footing of an ordinary chemical reagent. They intend to resume this investigation.

The Secretary then read a paper—

On Homologous Spectra. By W. N. HARTLEY.—In June, 1881, the author published (*Chem. Soc. Journ.*, 134

84) a note on certain photographs of the ultra-violet spectra of elementary bodies, and attention was directed to the extraordinary similarity between the groupings of lines in the spectra of magnesium, zinc and cadmium, copper and silver, iron, cobalt and nickel. It was thus made evident that the spectra of elements of the same homologous series present either homologous spectra or homologous groups of lines in their spectra; but it was remarked "it will be hopeless to determine whether there are numerical relations between the wave lengths of different groups of lines until the spectra have been reproduced on an enlarged scale, and the wave lengths for the principal lines of the different elements calculated." Ciamician has remarked that almost every element has a number of feeble lines which bear the same relation to the chief line or lines that the overtones in music bear to the fundamental note. These observations, however, refer only to the visible rays or about one octave of the spectrum; photographs of the ultra-violet region can easily be extended to more than two octaves. The conclusions of Ciamician are completely confirmed by such extended photographs. The three hydrogen lines N, F and C have been shown to be the thirty-second, twenty-seventh and twentieth harmonies of a fundamental vibration whose wave length is 0·01313 mm. There is evidently a harmonic relation between the lines in the spectra of magnesium, zinc, cadmium, aluminium and in those of calcium, strontium and barium when two octaves of the spectra are examined. The fundamental vibrations appear to be all in the infra-red region. The author originally intended to bring forward an extended series of observations on the constitution of the spectra of the elements, but as it appears that Liveing and Dewar are engaged in a similar research, the author wishes to publish such facts as he has already obtained. In order that harmonic relations between lines and groups of lines may be rendered apparent it is necessary to map spectra according to their "oscillation frequencies," instead of wave lengths. The author has thus mapped the wave frequencies in one millimetre of the chief rays in the spectra of magnesium, zinc, cadmium, copper, silver, silicon, boron and aluminium. The data thus obtained present a considerable addition to the body of evidence in support of the view that elements whose atomic weights differ by a constant quantity and whose chemical character is similar are truly homologues, or in other words are the same kind of matter in different states of condensation. The probability of the fundamental vibrations of the simpler elements being found in the infra-red region will doubtless be soon tested, since Captain Abney has enabled us to photograph this region, and with the help of Rowland's exquisite concave ruled specula, etc., has now a range of four octaves of the spectrum.

The Society then adjourned to April 5, when a paper, "On the Estimation of Hydrogen Sulphide and Carbonic Anhydride in Coal Gas," by L. T. Wright, will be read. The anniversary meeting is on Friday, March 30.

ROYAL INSTITUTION.

The Primæval Ancestors of Existing Vegetation and their Bearing on the Doctrine of Evolution.

BY PROFESSOR C. W. WILLIAMSON.

The fifth lecture of this course was delivered on Tuesday, February 6. The following is an abstract:—

The Cellular Cryptogams, as their name implies, are wholly devoid of fibro-vascular bundles, though in some forms, as in some seaweeds, the fronds appear to have a district midrib which, on a superficial glance, might be supposed to be a vascular bundle, but more minute examination shows to be merely composed of one or more linear series of elongated, square-ended cells. The most highly differentiated of these cryptogams are probably the mosses of which the spores develop a branching creeping Prothallus, called the Protonema, that gives off root hairs, and seeds that develop into the aerial shoots. Some of these latter bear the sexual reproductive organs in the shape of Antheridia and Archegonia; the entire vegetative organism may be regarded as a Prothallus. The Anatheridia and Archegonia are sometimes found on the same and sometimes on different plants; functionally these organs correspond with those seen on the vascular cryptogams. The fertilized cell occupying the base of the Archegonium develops into a Sporogonium or spore-bearing structure. The most important part in this structure, which consists of several parts, is the Theca or urn; a hollow capsule, supported on a slender stalk, within which the spores are found and from which they are liberated, when ripe, by the detachment of a small lid, or aperculum. Though this sporogonium remains attached to the vegetative portions of the moss, it nevertheless represents a distinct generation; since, though supported by the leaf-bearing Prothallus, it has no true organic connection with it. Hence, even in these mosses we have a distinct alteration of generation, a sexual, followed by a non-sexual one.

Though at the present day mosses are so numerous and widely distributed over the earth, from the Tropics to the Artic circle and from the Equatorial sea-level to the snow-line of our mountain ranges, we find no traces of them in a fossil state in rocks older than the Tertiary strata. That they are capable of fossilization is shown by the circumstance that a considerable number of such have been preserved in these more recent beds and in the amber met with in many localities. But no trace of an indisputable moss has been met with in the Cretaceous or more ancient strata,—a remarkable fact suggesting a modern origin of the entire group. These remarks apply equally to the nearly allied group of the Jungermanniæ. Many of these have a very moss-like habit, but differ chiefly from the mosses in the characteristic features of their Sporogonia, of which the organization is much simpler than is the case with those of the mosses. They are yet further distinguished by the mechanism by which the spore-containing capsule is burst open to liberate the spores. This capsule is only partially filled with spores, which have intermingled with them a number of cells, each of which contains a spiral thread. Non-elastic so long as not ripe, when it becomes so it is highly elastic; reaching this state it expands the cell in which it is contained, all acting more or less simultaneously. These "Elaters" burst the capsule, separating it into four valves, and thus setting the spores free. In the lower true Jungermanniæ and the Marchantiæ, or Liver-worts, the vegetative structure is less moss-like, and assumes much of the appearance of a gigantic fern—Prothallus; the resemblance being made the more obvious by the fact that this Prothalloid organism bears the Antheridia and Archegonia, from the latter of which are developed sporangia containing spores, and which represent a simple form of sporogonial generation. These Jungermanniæ and Marchantiæ also occur in a fossil state in the Tertiary rocks. The Characeæ constitutes another highly distinct group of cellular plants of aquatic habits, remarkable for the large size of their elongated cells. Here, again, we find Antheridia and Archegonia assuming very distinctive forms, these being severally known by the names of *Globule* and *Nucule*. The latter, also known as the Carpogonium, is the female organism, and is readily distinguished by five broad and distinct bands wound spirally around the central cavity containing the spore. These carpogonia, the fossil states of which have long been known as Gyrogonites, are found abundantly, not only in the Tertiary strata of Fresh-water origin, but also in the Cretaceous and Oolitic rocks, and, according to Schimper, they have also been discovered near Moscow in the bed of Triassic age, known as the Keuper. Hence these plants have evidently not only existed at an early period of the world's history, but have undergone but little change between what seems to have been the age in which they originated and the present time.

There can be no doubt but that some forms of marine vegetation must have existed at least as far back as the period when animal life first made its appearance on the earth; since plants alone have the power of converting mineral matter into an organic form, and the earliest animals must have required pre-existing vegetable matter on which to subsist. But the identification of these Protophytes is not easy. Myriads of objects exist in a fossil state, which have been called "Fucoids"; but many of these have been portions of plants of higher organization, all details of which have disappeared. Some of these have been identified as belonging even to the Conifers; others to Ferns, etc. Then, again, M. Natharst, of Stockholm, has shown that many supposed marine plants are merely casts of the tracks left by marine animals when crawling over a muddy sea-bottom. There is, however, no question respecting the *Fucoid* character of many forms existing in the Tertiary and Oolitic strata, whilst resemblances of form suggest that yet older and less distinct objects may have been of the same nature. But in most cases proofs that such has been the case are unattainable; hence these objects cannot be relied upon in framing a genealogical tree of vegetable life. On the other hand the group of Fungi is represented in strata of various ages, and very distinctly so in some of the older Carboniferous rocks. The latter consist wholly of some of those lower Fungoid forms known as moulds, five examples of which have been found in the Lower Coal Measures of Halifax, in Yorkshire.

Having thus, in this course of lectures, reviewed some of the more distinctive types of vegetable life found in the Palæozoic rocks, and endeavoured to trace the links connecting these ancient types with their living representatives, we may ask, how far does the order of their succession correspond with what the doctrine of Evolution would presuppose to be probable.

If we examine the living plants only, we have no difficulty in following a succession of graduated forms which might well suggest a continuous line of descent from the simplest to the most highly organized types of Plant-life; but such would not necessarily be the actual ancestral line. We have seen how long the Cryptogams and Gymnosperms existed before any of the Angiosperms or higher flowering plants made their appearance. Dealing with special types, we have seen that the lowly organized Hymenophylloid Ferns were amongst the earliest of which traces have been discovered. In the same way the most ancient cone-bearing plants, as the Cycads and Conifers, but especially the latter, only assumed their modern characteristics by slow degrees and after long periods of time; yet testing these Gymnosperms by their flowers we see that the most ancient ones belonged to the least complex of known groups, whilst the higher types came into existence during more recent times. On the other hand the most ancient Lycopods and Equisetums burst upon us in the Devonian age, almost, if not absolutely, in the state of their most glorious culmination whether of size or organization. They did so in contemporary association with Conifers (Dadoxylons), which occupy a high rank even compared with the vascular Cryptograms along with which they grew; how much higher therefore are they than the simple unicellular specks of Protoplasm from which we assume them all to have primarily originated. It is obvious from these and numerous similar facts that whilst the study of fossil plants gives a general support to the Doctrine of Evolution, that support does not and cannot at present extend beyond a limited measure. There must have been a protracted duration of time antecedent to that of the Devonian rocks, during which vegetation developed from its lowest and simplest state to that of the noblest Dadoxylons, Lepidodendra, Calamites and Tree ferns which existed in the Devonian and Carboniferous ages. Of that Predevonian vegetation we have yet obtained but the faintest glimpses. We can only hope that ere long more will be discovered, but until such discoveries are made all attempts to frame a genealogical tree of the vegetable world must be useless and vain.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the Association held on Wednesday, March 14, Mr. W. A. Wrenn in the chair, a paper on "Porcelain, its Manufacture and Composition," was read by Mr. H. Cracknell.

Mr. Cracknell first alluded to the antiquity of the potter's art. He mentioned that the Portuguese were the first to import Chinese porcelain into Europe about 1518, but it was not for more than two hundred years after that soft porcelain was manufactured in France. He then alluded to Böttcher as being one of the first to investigate the subject of porcelain manufacture. Next he pointed out the difficulties met with in early days, due principally to the want of a knowledge of chemical analysis and mineralogy. The author then proceeded to describe the difference between hard and soft porcelain, and the glazes used for them, and gave a short account of the manufacture of true hard porcelain, Sèvres porcelain and Viennese porcelain. Lastly he gave a detailed account of the manufacture of porcelain at Worcester, dealing especially with fine porcelain, mentioning the grinding of the materials, and the kneading and beating required to make the paste tough; after which he proceeded to describe the potter's wheel and its use. The process of firing and glazing having been fully dealt with, an account was given of painting and gilding on porcelain, mentioning the salts used for the colours and also describing the preparation of the gold for the workmen. He then mentioned a few of the marks which appear on Worcester porcelain, but he cautioned those who might be collectors not to be led astray, inasmuch as marks which were considered valuable and much sought after were freely manufactured both at home and abroad. The paper was illustrated with diagrams, and tables of the composition of the various clays used in the manufacture of porcelain, as well as of the composition of the various glazes, were also shown.

A discussion took place in which the President, Messrs Alcock, Cooper, Millhouse and Woods took part.

Obituary.

Notice has been received of the death of the following:—

On the 31st of January, Mr. Charles Farrant Webber, Chemist and Druggist, Market Place, Sidmouth. Aged 41 years.

On the 4th of February, Mr. William Bray, Chemist and Druggist, Buntingford, Herts. Aged 55 years.

On the 17th of February, Mr. Paris Anderson Huggard, Chemist and Druggist, Church Street, Alpha Road, London. Aged 73 years.

On the 22nd of February, at Bishop's Castle, Shropshire, Mr. Albert Brown Hollway, Chemist and Druggist, Aged 44 years. Mr. Hollway had been an Associate in Business of the Pharmaceutical Society since 1869, and was formerly Local Secretary for Cardiff.

On the 25th of February, Mr. Lewis Michael Wibmer, Pharmaceutical Chemist, Tunbridge. Aged 70 years. Mr. Wibmer had been a Member of the Pharmaceutical Society since 1853.

On the 28th of February, Mr. Charles Edmund Hitchcock, Pharmaceutical Chemist, High Street, Oxford. Aged 66 years. Mr. Hitchcock had been a Member of the Pharmaceutical Society since 1842.

On the 1st of March, Mr. Matthew Pound, Pharmaceutical Chemist, Leather Lane, London. Aged 71 years. Mr. Pound was one of the Founders of the Pharmaceutical Society.

On the 3rd of March, Mr. William Field, Pharmaceutical Chemist, Brompton Road, London. Aged 82 years. Mr. Field also was one of the Founders of the Pharmaceutical Society.

On the 3rd of March, Mr. Henry Woodhead Hewitt, Chemist and Druggist, Wood Bank, Sheffield. Aged 65 years.

On the 3rd of March, Mr. George Godden, Chemist and Druggist, Plumstead. Aged 87 years.

On the 6th of March, Mr. John Woodman Bowring, Pharmaceutical Chemist, Ringwood, Hants. Aged 63 years. Mr. Bowring was one of the Founders of the Pharmaceutical Society.

On the 9th of March, at Glasgow, Mr. William Hatrick, Pharmaceutical Chemist, Gilmour Street, Paisley. Mr. Hatrick had been a Member of the Pharmaceutical Society since 1853, and at the time of his death was Local Secretary for Paisley.

On the 12th of March, Mr. John Davies, Chemist and Druggist, Pontypridd. Aged 44 years.

On the 13th of March, Mr. George Jarman, Chemist and Druggist, Bolton Street, Bury, Lancs. Aged 76 years.

On the 16th of March, Mr. Joshua Henthorn, Pharmaceutical Chemist, Lees Road, Oldham. Aged 57 years. Mr. Henthorn had been a Member of the Pharmaceutical Society since 1853.

BOOKS RECEIVED.

Physical Optics. By R. T. Glazebrook, M.A., F.R.S. London: Longmans, Green and Co. 1883. [Text-Books of Science.] From the Publishers.

The Intermediate Text-Book of Physical Science. By F. H. Bowman, D.Sc., etc. London: Cassell, Petter, Galpin and Co. 1882. From the Publishers.

Photometry and Gas Analysis. Compiled and Edited by J. T. Brown, F.C.S. London: The Scientific Publishing Company. From the Publishers.

A Pharmacopœia of Selected Remedies, with Therapeutic Annotations. By Edmund A. Kirby, M.D., etc. Sixth Edition. London: H. K. Lewis. 1883. From the Author.

Syllabus of Materia Medica for the Use of Students, Teachers and Practitioners. By Alexander Harvey, M.D., and Alexander Dyce Davidson, M.D. Sixth Edition. London: H. K. Lewis. 1882. From the Publisher.

St. Bartholomew's Hospital Reports. Edited by W. S. Church, M.D., and John Langton, F.R.C.S. Vol. XVIII. London: Smith, Elder and Co. 1882.

The Philosophy of Advertising and Newspaper Register. By Henry Sell. London: H. Sell. 1883.

Dental Vade Mecum. Concise Notes on Anatomy, Physiology, Surgery and Chemistry. Fourth Edition. By James Hardie. Glasgow: W. Collins and Co. 1882. From the Author.

Sid Evans.—Such an appointment would be outside the scope of the Bill.

A. J. W.—See the Preface to the British Pharmacopœia, p. xiii.

Botanist.—The Editor of the *Journal of Botany* is Mr. James Britten, 3, Gumley Row, Isleworth.

Major.—The circumstance you mention has not been overlooked, and on reference to the terms of the clause in question, you will find that they are not by any means one-sided. The consideration of the claims of existing managers may well be deferred until the occasion for it is more pressing.

A.P.S.—An answer to your question was given on p. 660, under the initials *F.S.S.* An examination of the compound there referred to would probably well repay the trouble.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Fertilization of the Papaveraceæ.

Sir,—When reading over the order Papaveraceæ I came across a statement that some inquisitive botanist had amused himself in counting the number of seeds contained in the capsule of a poppy, viz., 32,000. A question occurred to me at the time, I having been previously reading the subject of "Fertilization." A pollen grain falling on the apex of the ovary (stigma) forms a long tube which penetrates the style when present, enters through the micropyle to the oosphere, which is in consequence fertilized. Now the question is, "Does it require a pollen grain for each of the seeds produced?" If so, no less than 32,000 pollen grains would have to fall on the stigmas of one poppy, and the same number of tubes to penetrate the ovary. If not, then each pollen grain can form more than one embryo and be the father of many plants. From analogy we find that it requires in mammalia a spermatozoa for the fertilization of each ovum; if two enter the same ovum and each thrives, then a monster is the product, and it is impossible for one spermatozoa to enter more than one ovum. Will some reader kindly throw light on it, giving quotation of authors. If not explained anywhere I think it is a worthy subject for investigation.

Morris J. Williams.

St. Bartholomew's Hospital, E.C.

Aromatic Spirit of Ammonia.

Sir,—In reply to Dr. Thresh and Mr. Tanner (pp. 700 and 776 of this volume), allow me to refute the error imputed to me and to quote Dr. Thresh again:—"Taking the official quantities, the ammoniæ carbonas refuses to dissolve in the requisite amount of water and solution of ammonia without the aid of heat." The plain-English of the requisite amount of water, I take to be the quantity required to make the preparation. Dr. Thresh now says, he means the quantity contained in the finished product. I respectfully submit the above quotation will not bear this construction, although Mr. Tanner goes further than I did, and says, that a solution can be made in the cold even with this quantity of water, which is one-sixth the requisite amount of the B.P. process.

10, *New Cavendish Street, London, W.* Wm. Martindale.

[*** As it is evident that our correspondents hold distinctly different opinions as to what should be understood as the meaning of the words "requisite amount of water," it will serve no useful purpose to continue the correspondence.—Ed. Ph. Journ.]

T. Evans.—Godfrey's 'Diseases of the Hair' (Churchills).

W. D. Haydon.—We have received your circular, but cannot perceive that it contains anything of sufficient interest to call for its publication.

Country Major.—You appear to have overlooked the fact that the recommendation you suggest has been submitted and has met with a distinct refusal. We do not think that further recommendations of the same nature are likely to meet with a satisfactory reception.

Wanting Help (who should have sent his name and address).—We think enough has been said for the present upon the subject of "golden ointment."

Novice.—No special qualification is necessary. See a communication on "Pharmacy in South Africa" in the *Pharm. Journal* for July 2, 1881, p. 19.

T. D.—The case you refer to is provided for in the Bill.

Troubadour.—Your letter has been received, but the immunity spoken of is certainly not in accord with our own experience.

Communications, Letters, etc., have been received from Dr. Mallez, Messrs. Illingworth, Brown, Long, J. O. Smith, Storey, Evans, R. H., Veritas Vincit, Outon.

"THE MONTH."

The cold blustering north-east winds have not been without their effect on vegetation, the season, in spite of the sunshine, being more backward than last year. Even in the sunny South, icicles two feet long were observed on Good Friday in the Isle of Wight, although in warm nooks the *Arum maculatum* and *Sarothamnus Scoparius* were met with in flower, and in sheltered spots, the cherry laurel, *Prunus Lauro-Cerasus*, and the true laurel of the ancients, *Laurus nobilis*, were seen covered with bursting flower-buds. The pretty little *Corydalis claviculata* and *Adoxa moschatellina* were observed in blossom, but the *Oxalis Acetosella* had not opened its delicate pencilled and pensile flowers. In cottage gardens the rosemary is coming into blossom, and on chalk downs the Pasque flower, *Anemone Pulsatilla*, is raising its dull bluish bells among the short grass. The yew, the elm, the dandelion and scurvy grass may be found in bloom in the country, and the almond will soon be in full beauty in the London gardens. Several rare British plants also flower at this time of year. *Trichonema columnæ*, at Dawlish Warren, and *Knappia agrostidea*, near Llyn Coron, in Anglesea, are probably often missed by botanists through flowering so early. *Carex ericetorum*, *C. clandestina* and *Lathræa squamaria* may also usually be found in blossom about Eastertide.

According to the *Gardeners' Chronicle* (March 3, p. 282), the cultivation of the rose-leaf geranium (*Pelargonium capitatum*) has been attempted in this country, and it is said with some success. From plants grown in the open air an essential oil has been obtained, which has been reported equal, if not superior, to the oils imported into this country under the name of geranium oils. It is said that with proper care plants, grown at the rate of about 3000 to an acre, will yield sufficient oil during their free growth in the summer, so that, after cuttings are taken (in September), the ground can be utilized with vegetables or other profitable crops. The statements, however, that rose-leaf geranium is grown to a large extent in Turkey is open to question, as is also the remark that oil of genuine rose-leaf geranium fetches about 3*s.* per ounce, while that of andropogon, with which it is often adulterated, is not worth more than that sum per pound.

At a meeting of the Edinburgh Botanical Society on February 8, Professor Dickson called attention to a donation to the Museum of the Royal Botanical Gardens of a foxglove, 10 feet high, and of another from the Bridge of Allan, 8 feet 1 inch high. A branch of the *Eucalyptus globulus* grown in a cool conservatory at Carlowrie, Linlithgowshire, was also shown, taken from a tree which grew at the rate of 4 feet in a year, being now nine years old (*Gardeners' Chronicle*, Feb. 26, p. 255).

The pretty yellow fungus, *Æthalium septicum*, commonly called flowers of tan, and which sometimes does much mischief where that substance is used in propagating houses, has been analysed by M. Bergmann and found to contain acetic and formic acids (*Gard. Chron.*, March 7, p. 344). This fact suggests the possibility that the fungus might be utilized as a ferment in promoting certain chemical changes.

Messrs. Dehérain and Breal, following up the researches of M. Bœhm, have ascertained that the presence of lime is beneficial in germinating seeds, and particularly when combined with ulmic acid (*Gard. Chron.*, March 7, p. 344), especially as regards the development of the root.

In the *Répertoire de Pharmacie* (p. 112), M. Stanislas Martin gives an account of the seeds of *Dolichos urens*, commonly known as the ass's eye bean, which is used in medicine in Tropical America in the form of a decoction, to alleviate the pain of hæmorrhoids; the pulp of the seed being employed as a topical application for cleansing and healing wounds. M. Martin found the seed to contain tannin, fixed and volatile oils, and mucilage like that of *Plantago Psyllium* and a brown extractive matter. He attributes the effect of the drug to the tannin and mucilage, the former of which is present in considerable quantity. As, however, the bean is used as a diuretic in the West Indies it seems probable that it may contain some other active principle.

Dr. J. M. Gibbs, New Zealand, recommends (*Lancet*, February 24, p. 316) the use in diphtheria of an inhalation of steam impregnated with *Eucalyptus globulus*. In thirty-seven cases, in which the treatment was carried out, the patients recovered without a bad symptom. He found it especially useful in those cases in which the larynx was affected and where the patches in consequence could only be reached by steam. In influenza and laryngeal phthisis it was found equally useful. His mode of procedure is to pour boiling water on blue gum leaves and change the infusion every half hour. The leaves as procurable in this country would doubtless be less rich in volatile oil and the substitution of the oil would therefore be likely to prove more generally useful.

In the *British Medical Journal* (March 10, p. 449) Dr. Marion Sims gives an interesting account of the permanent cure of syphilis by the native Indians, the chief agent in the remedy being *Stillingia sylvatica*. The formula recommended is:—Fl. ext. *Smilax sarsaparilla*; fl. ext. *Lappa minor*; fl. ext. *Phytolacca decandra*, āā ℥ij; tincture of *Xanthoxylon Carolinianum*, ℥j; M. Take a teaspoonful three times a day before meals and gradually increase the quantity to a tablespoonful. The *Stillingia* root is said to lose much of its activity when kept for a long time.

In the *Medical Record* (Feb. 3, 1883) Dr. C. J. Macguire states that he has found subnitrate of bismuth very valuable in cancrum oris, curing the disease in twenty out of twenty-four cases. The powder was topically applied every three hours, after cleansing the mouth with a disinfecting solution.

Dr. E. A. Whiteley, of Duffield, points out (*Lancet*, March 10, p. 437) that the external application of salicylate of soda affords speedy relief when applied to painful joints in cases of acute rheumatism. The strength of solution used is 20 grains to the ounce of water.

As the result of an experimental investigation into the action of opium, chloral and bromide of potassium, Drs. Ringer and Sainsbury (*Brit. Med. Journ.*, March 24, p. 556) express the opinion that a salt now used rather extensively in America, viz., bromide of sodium, might probably be substituted with advantage for the last two, the salts of potassium being about ten times as poisonous as those of sodium, with regard to their action on the heart, and the bromide of sodium ranking far ahead of bromide of potassium, chloral or opium, as to innocuousness.

A substance called ichthyol, obtained by R. Schroter, by the distillation of bituminous substances and treatment with concentrated sulphuric acid, has been recently experimented with by Dr. P. G. Unna, of Hamburg. It is tarlike in appearance and has a peculiar and disagreeable odour, but does not resemble any known wood or coal tar in its chemical and physical properties. In consistence it resembles vaseline, and its emulsion with water is easily washed off the skin, whilst it may be mixed in any proportions with lard, oil or vaseline. Ichthyol is said to contain about 10 per cent. of sulphur and a small quantity of phosphorus, as well as carbon, hydrogen and oxygen, the sulphur, however, being in a state of combination which is not decomposed by preparations of lead and mercury. It is alleged to soothe pain and itching, and is considered a fairly good remedy in psoriasis and acne, and is useful as a parasiticide. In eczema it has been used with great benefit, the plan found most successful being to begin with a moderately strong preparation, or to reduce the strength gradually. For moist eczema 20 to 30 per cent. preparations reduced to 10 per cent., and for the papular condition 50 per cent. reduced to 20 per cent., are used. For obstinate eczema of the hand, the following formula has been found very efficacious:—Litharge, 10 parts, boiled with 30 parts of vinegar, to 20 parts; olive oil or lard, 10 parts; ichthyol, 10 parts. Any strength from a 5 per cent. to a 40 or 50 per cent. preparation may be used with safety undiluted. A stronger application may be used to the hands than to the face and stronger for children than adults.

At a meeting of the Medical Society of London on March 12 (*Lancet*, March 24, p. 500), a case of poisoning by citrate of caffeine was mentioned by Dr. Routh, in which the drug had been prescribed in drachm doses three times a day for the relief of severe headache in a man under treatment for debility. The report states that Bishop's effervescing preparation was intended, but the pure salt was sent. The difference in dose of an effervescent preparation and of the pure drug, which it is intended to exhibit in this way, should be more widely known than would seem to be the case, if one may judge from this instance.

Professor J. F. Eykman, in his research on the poisonous and other constituents of *Andromeda japonica*, Thunb., has found in the residuary liquid left after the separation of asebotoxin a crystalline substance which he calls "asebotin" (*New Rem.*, March, p. 66). It forms colourless needles easily soluble in hot or boiling water, but only slightly soluble in cold water, the solution having a very bitter taste. It is also soluble in dilute alkalies, the solution acquiring a brownish-yellow colour on exposure to the air. It has a neutral reaction and does not appear to be poisonous when injected hypodermically in doses of $\frac{1}{12}$ grain. When boiled with a dilute mineral acid asebotin splits up into asebogenin and apparently glucose. Asebogenin forms fine colourless needles, insoluble, or nearly so, in both cold and hot water; in absolute alcohol and ether and also in alkalies it is quite soluble. Asebotin differs from arbutin merely by the elements of water H_2O, its formula being $C_{24}H_{28}O_{12}$, but the two substances are not identical, the crystals of asebotin assuming a red-brown colour in a moist ammoniacal atmosphere, while those of arbutin assume a sky-blue colour under similar circumstances.

In Brazil the root and leaves of *Franciscea uniflora*, a scrophulariaceous plant, popularly known as "manaca," have long had a reputation in the treatment of syphilitic complaints, and have been called for this reason "vegetable mercury." Under the name of "manaca," the drug has been introduced in the United States as an alterative and as useful in the treatment of rheumatism. A specimen having been submitted to Professor Dragendorff for examination he reports (*Ther. Ger.*, iv., 63) that the presence of an alkaloid has been recognized, which acts energetically upon frogs in milligram doses, the respiration being at first accelerated, then retarded, followed still later by gradual diminution of the activity of the heart. The separation of the alkaloid in perfect purity is attended with great difficulty, since it cannot be isolated by shaking it out of aqueous solutions, neither can it be separated undecomposed by precipitation with potassio-mercuric iodide. It is worth mentioning that another drug had been previously received at Dorpat under the same name, which had decidedly different external characters and apparently had had another botanical origin.

"Jamaica dogwood" (*Piscidia erythrina*) is another "new remedy" that has been put forward in the United States, it being recommended as "a positive anodyne in the more purely idiopathic neuralgic affections," and a narcotic and calmative in insomnia arising from mental worry. A liquid extract of this drug has been recently examined by Dr. E. Hart, of the Chemical Department, Lafayette College, who reports (*Ther. Gaz.*, iv., 97) that he has isolated the active principle, which he has named "piscidin," by intimately mixing the liquid with a milk of lime, allowing the mixture to stand half-an-hour in a warm place, filtering and pressing, and adding water to the filtrate until it becomes slightly turbid. After standing a few days the piscidin crystallized out in prisms, and were obtained pure by recrystallization from alcohol. Piscidin is represented by the formula $C_{29}H_{24}O_8$. It is described as being insoluble in water, slightly soluble in cold alcohol and ether, much more soluble in hot alcohol, and freely soluble in petroleum spirit and chloroform. The alcoholic solution is neutral to test paper, and no separation of sugar is caused by boiling with dilute or strong acids. It does not appear what part was used in the preparation of this liquid extract; but according to some notes appended to the paper, the bark, when examined in the laboratory of Messrs. Parke, Davis and Co. yielded two resins, one acid and the other indifferent, minute quantities of a volatile oil, and indications of a volatile alkaloid.

The leaves of *Myrtus Chekan*, which were recommended some two years since by Dr. Murrell as a remedy in winter cough, have been submitted to analysis by Mr. J. Hoehn, who reports (*Weekly Drug News and Am. Pharm.*, vi., 238) that he has recognized the presence of three kinds of glucosides, (1) soluble in benzol and not in water, (2) soluble in benzol and in water, and (3) insoluble in benzol and soluble in alcohol. The leaves also yielded 4·2 per cent. of a tannic acid, and 3·7 per cent. of the volatile oil resembling oil of bay, first noticed by Mr. Hutchinson (*Pharm. Journ.*, [3], ix., 653).

In a recent trade circular, Herr Haensel, of Pirna, mentions that he had received from a mercantile house in Columbia, South America, a quantity of dried flowers derived from a plant described under the name "*Sulamita vitulus*," which grows abundantly on the eastern spurs of the Cordilleras and is used as a remedy in neuralgic affections. The flowers are said to possess in the fresh state a delicious aroma of such intensity that a single fresh flower laid amongst clothes is sufficient to impart to them a permanent perfume. Distillation of the dried flowers did not give results so favourable as was expected, the yield in essential oil not exceeding one-half per cent., which may have been due to loss occurring during the long journey. The oil was heavier than water, and in its odour markedly resembled salicylate of methyl, which is the principal constituent of oil of wintergreen and also sinks in water. The flowers sent, however, came from a Melastomaceous and not an Ericaceous plant.

At the suggestion of Professor Hegen, of Freiburg, Herr Merck has prepared a phosphate of codeine, which is believed to obviate the difficulty attending the use subcutaneously of the sulphate and hydrochlorate of this alkaloid, in consequence of their comparative insolubility. The phosphate of codeine is described as being soluble in 4 parts of water and containing 70 per cent. of codeine. The same firm prepares a hydrochlorate of cocaine (the alkaloid of *Erythroxylon Coca*), which is soluble in water in all proportions, whilst pure cocaine is only soluble with difficulty in water.

Mr. R. S. Christiani, in the *Oil, Paint and Drug Reporter,* gives a further account of "American musk." He remarks that for soaps and sachets and even for the musk lozenges sold by confectioners it answers well, but that for toilet waters and perfumes its use will be limited, for the odour, though strong, is not sufficiently delicate for a refined taste. The removal of the fatty matter, which seems to be liable to become rancid, would probably render the odour more agreeable. In consequence of the present scarcity of good musk and the consequent high price and scarcity of *Abelmoschus moschatus* it seems probable that the American musk may find a market here, especially as the musk rat (*Fiber zibethicus*), from which it is derived, frequents the marshes of most of the States of North America.

Ten samples of willow bark examined by Mr. Gessler (*Weekl. Dr. News,* vi., 182), with the object of ascertaining the yield of salicin, gave results varying from 1·06 to 3·13 per cent., but usually lying between 2·2 and 2·5 per cent.

It is well known that occasionally very unpleasant results follow the use of a preparation of arnica, which have been sometimes attributed to idiosyncrasy. So far as the tincture of the flowers is concerned Dr. Stieren is of opinion (*Ther. Gaz.*, iv., 9) that the inflammation noticed occurs only when a defective preparation is used, it being due to the non-removal by filtration of minute hooks, derived from the disk florets, which become imbedded in the flesh and cause irritation.

Various samples of commercial "veratrine," entirely soluble in ether and corresponding with the requirements of the German Pharmacopœia, have been the subject of an investigation by Herr E. Bosetti (*Archiv*, xxi., 81). They proved to consist of a very intimate apparently amorphous mixture of two probably isomeric alkaloids, represented by the formula $C_{32}H_{49}NO_9$, one of which is crystallizable and almost insoluble in water ("crystalline veratrine," the "cevadin" of Wright and Luff), whilst the other is not crystallizable, but is soluble in water ("veratridine," the "soluble veratrine" of Weigelin, Schmidt and Köppen). Relatively small quantities of the former suffice to render the latter insoluble in water, whilst a small proportion of the latter will prevent the crystallization of the former. When boiled with an alcoholic solution of barium hydrate, crystallizable veratrine splits up into amorphous "cevidin" ($C_{27}H_{45}NO_9$) and angelic acid; whilst the amorphous "veratridine" splits up into another amorphous base, veratroïne ($C_{55}H_{92}N_2O_{16}$) and veratric acid.

Dr. S. Zeisel reports (*Monatshefte*, iv., 162) that he has obtained from a solution of colchicine in chloroform a well-crystallized compound; but at present he is uncertain whether some chloroform, which persistently clings to the crystals, is only mechanically adherent or in chemical combination. The chloroform can, however, be easily removed by dissolving the crystals in water, and the aqueous solution gives all the essential reactions of colchicine. He also states that in converting colchicine into colchiceine by the action of very dilute sulphuric or hydrochloric acid he obtains as a bye-product the hydrochlorate or sulphate of a new votatile base, which he has named "apocolchiceine," and which is produced in larger quantity, together with methyl chloride, upon heating colchiceine with hydrochloric acid. If this heating of colchiceine be prolonged the apocolchiceine at first formed is converted into another substance, which has the properties of an acid. Colchicine, colchiceine and apocolchiceine are all altered by nascent hydrogen.

In the United States Pharmacopœia both strychnine and the sulphate of that alkaloid are official, the sulphate being described as a neutral salt, containing seven molecules of water of crystallization, and soluble in ten parts of water at 15° C. It having been recently stated (*Berichte*, xv., 1231) that strychnine sulphate of German manufacture, as met with in commerce, is an acid salt with only two molecules of water, Mr. Coleman has examined samples of the commercial salt of American manufacture in order to see how far they correspond with the official description. He reports (*Amer. Journ. Phar.*, xiii., 113) that as manufactured in the United States strychnine sulphate corresponds with the Pharmacopœia requirements in being a neutral salt,—or distrychnine sulphate,—but that it contains only six molecules of water of crystallization, and requires for its solution from 42 to 43 parts of water at 15° C.

In a note read recently before the Philadelphia Society (*Amer. Journ. Phar.*, xiii., 145) Mr. Lehman stated that in preparing the United States official tincture of iodine, which is a solution of 8 parts of iodine in 92 parts of 94 per cent. alcohol, the iodine can be rendered readily soluble, without trituration, by the addition of a little sodium chloride. Professor Maisch pointed out that considering the slight solubility of sodium chloride in strong alcohol this action was rather remarkable.

The *Pistia Stratiotes*, or "tropical duckweed," is a common tropical water-weed, occurring on pools of stagnant water in most parts of India, and having much the appearance of half-grown lettuce plants, to which it owes its West Indian name of "water lettuce." In some parts of India the mature plant is dried, incinerated, and lixiviated, and under the name of "páná salt" the saline product is used for medicinal purposes as a domestic remedy. Specimens of the plant and of the "salt" have been examined by Surgeon-Major Warden, who reports (*Chem. News*, March 23, p. 133) that the weed dried at 130° C. and carbonized yielded 31 per cent. of total ash, of which 6 per cent. was soluble. The sample of "salt" was slightly deliquescent, alkaline in reaction, and had the appearance of dirty common salt. Dried at 130° it yielded 73 per cent. of potassic chloride, 22·6 per cent. of potassic sulphate, and minute quantities of potassic carbonate, sodic chloride, calcic sulphate, magnesic sulphate, and ferric, aluminic and silicic oxides. According to Colonel Drury ('Useful Plants of India,' p. 34) the plant is cooling and demulcent and is given in dysuria, whilst poultices of the leaves are applied to hæmorrhoids. In Jamaica, in the hot dry weather, the *Pistia Stratiotes* is said to impregnate the water in which it grows with its particles to such an extent as to give rise to the bloody flux.

In an account of an investigation into the manner of formation of compound ethers, which was recently laid before the Société Industrielle de Mulhouse (*Chem. Zeit.*, vii., 321), Herr Pabst states that when alcohol, sulphuric acid and acetic acid are heated together, the formation of acetic ether takes place in three stages in a manner analogous to the formation of ordinary ether. In the first place there is a production of ethylsulphuric acid and water:—

$$C_2H_5OH + HO{\cdot}SO_2OH = C_2H_5O{\cdot}SO_2OH + H_2O.$$

In the second stage ethyl acetate is formed, whilst sulphuric acid is reformed and acts upon a fresh quantity of alcohol to convert it into ethylsulphuric acid:—

$$C_2H_5O{\cdot}SO_2OH + C_2H_3O{\cdot}OH = C_2H_5O{\cdot}C_2H_3O + HO{\cdot}SO_2OH.$$

Herr Pabst confirmed this by allowing methylsulphuric acid to act upon a mixture of acetic acid and ethylic alcohol, when he obtained methyl acetate and ethylsulphuric acid, the latter reacting with the remaining alcohol and acetic acid, yielding ethyl acetate; upon suspending the operation scarcely any methylsulphuric acid was found. Herr Pabst recommends as a practical method of preparing acetic ether the addition of equal molecules of strong alcohol and glacial acetic acid to ethylsulphuric acid heated to 135° to 140° C.

Herr Rammelsberg (*Ber.*, xvi., 273) describes a sesquicarbonate of potassium which had been produced by the evaporation of a large quantity of solution of bicarbonate of potassium in Struve's mineral water manufactory. The crystals, which belonged to the rhombic system, were represented by the formula ($2K_2CO_3,H_2CO_3.3H_2O$). The conditions under which they were formed are not understood, as all attempts at their reproduction failed. When a solution of potassium bicarbonate was exposed for a fortnight over caustic potash and sulphuric acid, so that half the carbonic acid was withdrawn, potassium carbonate was formed. By heating a solution of potassium bicarbonate until half the carbonic acid has been expelled, potassium carbonate was formed in the solution, whereas in order to obtain the sesquicarbonate it is theoretically necessary to expel three-fourths of the carbonic acid.

In the same number of the *Berichte*, Professor Spring describes some more chemical compounds which he has produced by submitting the elements in a fine state of division to a pressure of 6500 atmospheres. In this way the arsenides of zinc, lead, tin, cadmium, copper and silver were obtained and behaved normally under the influence of chemical reagents.

Messrs. Kelbe and Lwoff (*Ber.*, xvi., 351) have found methyl alcohol among the numerous products yielded by the destructive distillation of resin (colophony). It occurs in the aqueous portion of the distillate, together with acetic acid and the higher acids of the same series. One hundred and fifty kilograms of the commercial product yielded about 50 grams of pure methyl alcohol.

The recently issued Report by the Medical Officer to the Local Government Board contains an account of some observations of Dr. Klein upon septic bacteria, which have an interesting bearing upon the "attenuation" theories of M. Pasteur. Dr. Klein finds that the specific bacillus of a disease, such as anthrax, undergoes in the course of its own proper life remarkable changes in its powers. For instance, as a consequence of the formation of spores in the bacilli the material containing them appears to acquire a new virulence; it is, therefore, important to know that the formation or non-formation of these spores is largely a matter of definable circumstance and condition. Further, after several weeks of growth in any of the cultivation materials used by Dr. Klein the anthrax bacillus was found to undergo degeneration, but apparently through exhaustion of pabulum. This alteration, however, was not of the nature of "attenuation," since, if any effects were produced by inoculation with the liquid they were of the same fatal nature as before the alteration, and the change was in the number of active bacilli and not in the potency of those who remained active. Dr. Klein has not been able to discover any indication of such a loss of intensity during successive cultivations as would allow of the material of a late cultivation being introduced into the body of an animal as a protection against the disease, or without killing or doing the animal serious injury. Therefore, whilst Dr. Klein guards himself from throwing doubt on the discovery by M. Pasteur of a material protective against fatal anthrax in sheep, he says that something more is required for the production of an "attenuated" virus than the recognized method of successive cultivations in organic liquids at 42° C., and that these conditions have not transpired from M. Pasteur's laboratory.

Professors Liveing and Dewar have been working on the reversal of the principal lines of hydrogen, and their results are embodied in a paper read before the Royal Society on March 8, entitled "Spectroscopic Experiments with the Arc." They find that when a short induction spark is taken between electrodes of aluminium or magnesium in hydrogen at atmospheric pressure, a large leyden jar being in the secondary circuit, no reversal is obtained; but on increasing the pressure by half an atmosphere, the lines expand, and a fine dark line may be seen in the middle of the F line. As the pressure is increased the dark line becomes stronger, so that at two atmospheres it is very decided. As the F line expands the dark line expands too and becomes a band. It is best seen when the pressure is between two and three atmospheres; at higher pressures it becomes diffuse and at five atmospheres it can hardly be traced. No definite reversal of the C line is observed with the dispersion of a one-prism spectroscope. By using greater dispersion than this, however, the reversal of both C and F lines was observed at lower pressures. The authors find that both the C and F lines of hydrogen are visible in the arc of a De Meritens machine taken in hydrogen, but in the arc of a Siemens machine the C line can only be detected at the moment of breaking the arc, the F line hardly at all. If instead of taking the arc in hydrogen, small drops of water are allowed to fall from a fine pipette into the arc taken in air inside a lime crucible, each drop, as it falls into the arc, produces an explosive outburst of the hydrogen lines. Generally the outburst is only momentary, but occasionally a sort of flickering arc is maintained for a second or two and the hydrogen line C is visible all the time. The lines C and F are usually much expanded, but are frequently very unequally wide in different parts of the line. F is weaker, more diffuse, and more difficult to see than C and is visible for a shorter time. There is no sign of reversal. In the explosive character of the outburst and the irregularity in the width of the lines, the effect resembles that of an outburst of hydrogen in the solar atmosphere.

Mr. W. H. Preece has contributed an elaborate and valuable paper to the Royal Society on "The Effects of Temperature on the Electromotive Force and Resistance of Batteries." The author concludes from his very numerous experiments that changes of temperature do not practically affect electromotive force, but that they materially affect the internal resistance of cells; also, that of the various forms of batteries in practical use, the Daniel is the most seriously influenced by variations of temperature, and that in all experiments with that battery, either the temperature must be kept constant or frequent measurements should be taken of its internal resistance, and allowances made for the variation.

It is reported that a test of a telephone between New York and Chicago, a distance of one thousand miles, has proved a great success. The result is attributed principally to a novelty in the conductor, which consisted of a steel wire core, copper plated, the electrical resistance of which through this distance was only 1522 ohms, instead of upwards of 15,000 ohms, which would represent the average resistance of ordinary telephonic wire.

Herr Pringsheim has contributed (*Annalen*, 1883, No. 1, *Phil. Mag.*, Feb.) an exhaustive paper detailing experiments made to exactly determine the cause of radiometer motion. In a perfectly simple radiometer, freed from needless complications of technical construction, there are three essential parts, all or each of which might conceivably affect motion: the glass case, the enclosed gas, and the vanes. A radiometer was therefore constructed which excluded as far as possible the introduction of conditions other than these. It consisted of a tube having a bulb at one end and a stopper fitting airtight at the other; on the end of a long glass thread suspended from the stopper was cemented a very thin microscope covering glass, silvered at the back, which thus formed a mirror; to the back of this was affixed one side of a small rectangular disk of mica, which acted the part of the vane in an ordinary radiometer. The apparatus was then exhausted by means of parallel arms let in just below the stopper. The readings were taken in the ordinary way by reflection to a graduated scale. The first experiments were made to determine the part played by the glass case. To eliminate the difference in temperature of the two sides of the vane, which occurs when one side of a thick plate is heated, an extremely thin mica plate was used, and thus also the absorptive power was reduced to a minimum. When the glass case was heated by a Bunsen burner upon that side which was nearest to the vane, powerful repulsion occurred; that is to say, the mica plate receded from the source of heat. If it be assumed that the sides of the mica vane are of the same temperature, this effect would be due to the heating of the glass tube. This was actually proved by a later experiment, when the side of the glass case which was farthest from the vane was heated, the vane itself being at the same time shaded so that it was outside the cone of heat, and yet repulsion occurred, though, of course, not to the same extent as in the first experiment. In fact, it was subsequently shown that the whole of the repulsive effect was produced by the heating of the portion of the glass case immediately opposite the mica vane. Under the above conditions, where the vane is not directly heated, the result is unaffected by the nature of the vane; a mica vane, blackened on one side and hence possessing absorptive power in the highest degree, gave practically the same result, when each side was alternately shaded and the glass case alone heated, both sides of the vane being repelled to the same extent. Hence the repulsion is a direct effect of the heat communicated by the glass case through the particles of residual gas to the vane suspended in front, and not a secondary one due to the absorption by the vane of heat radiated from the case; thus the amount of this motion is not affected by the nature of the vane. Having thus determined the action of the glass case, it remained to investigate that of the residual gas and of the vanes. The residual gas was found in no way to directly concern the phenomena. When the vanes were made of different substances and directly heated some interesting facts were observed. When a mica plate was blackened on one side and heated on the clear side, first attraction occurred, then oscillation, followed by repulsion. This was due to the conduction of the heat through the thin mica plate to the lampblack, hence the apparent attraction; then the slow heating of the mica plate, when the normal repulsion occurred. The results of these experiments and of others with metallic vanes showed that conduction of heat from one side of the vane to the other is one of the most important factors in radiometric motion. The results of all the experiments upon radiometer motion are summed up in the following general statement or law. A surface element (vane) at which heat enters or leaves the rarefied air undergoes a repulsion of which the amount is proportional to the intensity of the heat current. The author adopts the kinetic theory to explain radiometer motion; the air molecules are heated by the glass case and then rebound to the vane and thus repulsion occurs.

The increased range of rifled arms, involving the exposure of troops to the effects of firing at greater distances, has rendered it very important that for active service, at least, a uniform should be adopted which is as little conspicuous as possible, and a "Colour Committee" appointed to experiment and advise the Government as to the comparative visibility of different colours suitable for military uniform has just presented its report on the subject. The experiments, which were under the immediate superintendence of Professors Abel and Stokes, were carried out under varying conditions of weather, atmosphere, surroundings and background, and the general result was to eliminate all the colours at present used in the dress of the regular army. It is reported that under ordinary circumstances white is much the most conspicuous, and black, with which the dark green and dark blue of the service are practically identical, is also extremely conspicuous. The scarlet of the service is, as might be expected, very conspicuous, but its relative rank depends upon the amount of light; in a bright light it is more conspicuous than black, though not equal to white, but on a dull day and at a considerable distance scarlet and black are almost equal, whilst in a failing light black would be the more conspicuous. Red and crimson are a little less conspicuous than scarlet. The nearest approach to invisibility is attained by the use of neutral or nearly neutral tints, such as are met with among the service colours of the volunteers, and it depends far more on a proper depth of shade than on what the tint may be. Of course the conditions of invisibility on the sky line are very different.

CULTIVATION OF CINCHONA IN JAMAICA.*

Notes on Specimens of Cinchona sent to the Pharmaceutical Society of Great Britain from the Government Plantations.

BY D. MORRIS, M.A.,

Director of Public Gardens and Plantations in Jamaica.

No. 1. *Cinchona officinalis*, of the ordinary type of the Government plantations, Jamaica. Specimens of leaves, flowers, fruit and seed. Three kinds of bark, viz., root, stem and twigs. All the specimens with the exception of the seeds (in a separate packet) have been taken from the same tree, so that botanical specimens as well as samples of bark, are exactly identical.

With reference to this species of cinchona in Jamaica the following extract from official reports and letters from Mr. John Eliot Howard, F.R.S., on similar specimens will be of interest.

"*Cinchona officinalis* of the Jamaica plantations.—The average price per pound on all qualities, viz.: root, stem and branch bark, 6*s*. 7*d*.; highest price realized, 10*s*. 1*d*. per pound for root bark; lowest price realized, 2*s*. 3*d*. per pound for twig bark."

The tree from which the specimens were taken was about nine years old, and growing at an elevation of 5500 feet. Mr. Howard's analysis of the trunk bark is as follows:—

Quinine alkaloid	5·18	= Quinine Sulphate	6·95
Cinchonidine	0·22		
Cinchonine	0·01		
Quinidine	0·15		

Mr. Howard adds:—"This bark does not require many observations, as the price per pound agrees with the appearance of the bark and with the analysis in showing that it is good *Cinchona officinalis*, perhaps of slightly varying forms."

No. 2. *Cinchona succirubra*, of the ordinary type of the Government plantations, Jamaica. Specimens of leaves, flowers, fruit, seed and three kinds of bark, viz., root, stem and twigs; all the specimens have been taken from the same tree.

"*Cinchona succirubra* of Jamaica plantations. Average price per pound on all qualities, viz., root, stem, and branch bark, 4*s*.; highest price realized 5*s*. 7*d*. per pound for root bark; lowest price realized 1*s*. 3*d*. per pound for twig bark." Specimens sent from trees nine years old, growing at an elevation of 5000 feet. Mr. Howard reports on this bark as follows:—"Very good and true *Cinchona succirubra*, agreeing well with my specimens from South America. It is a *sub-pubescent* form."

No. 3. *Cinchona hybrid* of the Government plantations, Jamaica. Specimens of leaves, flowers, fruit, seed and three kinds of bark, viz., root, stem and twigs. All the specimens have been taken from the same tree. Supposed to be a hybrid form between *Cinchona succirubra* and *Cinchona officinalis*. Up to 1879 it was considered by Mr. Thompson to be *Cinchona Calisaya*. Average price per pound on all qualities, viz., root, stem and branch bark, 6*s*. 1⅝*d*.; highest price realized 7*s*. 9*d*. per pound for trunk bark; lowest price realized 4*s*. 6*d*. per pound also for trunk bark. The specimens taken from a tree nine years old, growing at an elevation of 5300 feet. Mr. Howard's analysis of trunk bark is as follows:—

Quinine alkaloid	6·00	= Quinine sulphate	8·00
Cinchonidine	0·73		
Cinchonine	0·10		
Quinidine	0·03		

Mr. Howard adds "What proof is there that this is a hybrid? What connection with Calisaya? It is an excellent bark, resembles true *Cinchona officinalis*, var. *Uritusinga*." In another communication Mr. Howard remarks, "It is evident that the so-called 'hybrid' No. 4, if only it is a free grower, must be about the most valuable of all the sorts. The price obtained in commerce does not seem proportional to its value; but possibly, as remarked before, it may be an exceptionally fine specimen. So far as I can judge by the botanical specimens it is a true form of *Cinchona officinalis*."

With regard to the above remarks on this "hybrid" form, I would mention that although in single specimens of leaves, flowers, etc., it is almost impossible to decide its hybridity, yet on the plantations, where all gradations may be distinguished from among these trees, from almost the pure *succirubra* type to almost the pure *officinalis*, there can be no doubt of their origin. Again, when seed of this kind was sent to Kew the seedlings and plants were pronounced of a decidedly "hybrid" character; and, lastly, although following Mr. Thompson's classification, I shipped the bark at first to the London market as "Calisaya?", the brokers in their report drew my attention to it and remarked, "It is not pure yellow bark, but supposed to be a hybrid with *succirubra*." It is nevertheless gratifying to find that this bark is of so valuable a character, and as it is a free grower at lower elevations, steps are being taken to propagate it for general distribution. According to the analysis of the specimen bark sent to Mr. Howard its market value would not fall far short of 14*s*. per pound.

No. 4. *Cinchona Calisaya* of the Government

* Read at an Evening Meeting of the Pharmaceutical Society, March 7, 1883.

Plantations, Jamaica. Specimens of leaves, flowers, fruit, seed and three kinds of bark, viz., root, stem and twigs. All the specimens have been taken from the same tree. These trees are about 9 or 10 feet high at five or six years old; they were formerly included under *Cinchona officinalis.* Their compact hardy habit and early maturing render them very suitable for steep slopes. Mr. Howard's analysis of trunk bark is as follows:—

Quinine alkaloid	3·70 =	Quinine sulphate	4·93
Cinchonidine	0·60		
Cinchonine	·35		
Quinidine	·05		

Mr. Howard adds "these trees appear to me to be true to the Calisaya type and form a valuable portion of the plantations. I should not think they belong to either the Josephiana or the Ledgeriana form, but that the exact variety is perhaps not yet published. In the meantime it might be well to call them *Cinchona Calisaya* simply. There is no appearance of 'hybridity' nor any resemblance to the Loxa (officinalis) barks."

No. 5. *Cinchona Ledgeriana.* Specimens of the leaves and flowers from one of three plants (the broad leaved form) of this species sent out by Mr. John Eliot Howard, F.R.S., through the Royal Gardens, Kew, in 1880. For description and plate of the original of these plants, see *Gardeners' Chronicle*, 1880, vol. 12, p. 457. The plant from which the specimens were taken was 6 feet high: some trunk bark is sent herewith.

No. 6. Specimens of leaves and flowers of a tree supposed to be *Cinchona micrantha*, not determined.

SECONDARY BATTERIES.*

BY H. ALLEN, B.SC.

I have thought that a brief account of the latest improvements in secondary batteries, accumulators, or storage cells, as they are variously called, as well as of recent investigations touching the chemistry and general behaviour of the same, might be of interest to the members of this Association. And since the ideas of the general public, and even of students, on the subject of electricity are apt to be more extended than precise, I propose to introduce the subject by a few remarks on the nature of the voltaic cell, and of storage cells in particular.

The voltaic cell may be defined as an arrangement for transforming chemical energy into a current of electricity. To produce a current of given energy for a given time a definite amount of chemical energy has to disappear. The energy of such current can be stored up, or converted into motion, or may pass immediately into the form of heat and its availability be thereby diminished or lost.

The materials generally used in the cell for the production of the current are two different elementary solids and one or more compound bodies, one at least liquid, separating them.

When a plate of copper and a plate of zinc are placed in contact, a difference of potential or electro-motive force is produced, the zinc becoming positive and the copper negative. This difference of potential corresponds to difference of level in the case of water or to difference of pressure in the case of gases. Suppose two such plates touching at two points, a current tends to flow in the copper towards both points of contact, but such tendency is at one and the same time in opposite directions so that no actual current is produced, but only a certain amount of something analogous to strain. If, now the plates still touching at one point be separated at the other by a liquid, such as dilute sulphuric acid, this "strain" is relieved by the chemical action of the acid upon the zinc and the current is free to flow throughout the circuit from copper to zinc through the external contact and from zinc to copper within the liquid, or electrolyte, and this current will continue as long as the requisite energy is supplied by the combustion of the zinc.

The strength of the current (C) in any circuit varies (1) directly as the electro-motive force (E) of the producing cell, which depends solely upon the materials employed, and (2) inversely as the total resistance (R) of the circuit and cell, that of cell depending on the size of the plates, their distance apart and the nature of the electrolyte separating them. If then E and R be known, C is immediately determined without any reference to what is vaguely known as the size of the cell. *The size does not enter as a separate factor into the determination of the current producible by any cell,* any more than the quantity of water in an elevated cistern determines the rate at which it can be drawn off by a given pipe or the pressure which it is capable of exerting.

The energy of the current, *i.e*, the work it is capable of doing, is equal to the product of E and C. If E be expressed in volts and C in ampères and t be put for time of duration of current in minutes, then work done by cell $= E \times C \times t \times 44{\cdot}25$ foot lbs. This energy may be spent entirely in heating the cell and circuit, the heating effect in any part varying with its resistance, or it can be stored up or converted into motion.

A simple analogy may be of use in explaining what has been stated. Suppose a closed circuit of water pipes with a force-pump at some point of it worked by a spring. The pump will produce a continuous current in the circuit, the amount of water circulating in a given time depending partly on the pressure of the pump-piston, and partly on the size of the pump and pipes. The energy imparted to the water may be spent entirely in friction against the pump and pipes, the friction and consequent heating effect being greatest where there is the greatest resistance to the flow. But the water might be made to work a second pump and thereby wind up a second spring. In this case the energy of one spring is transferred by means of the water to the other spring, but of course there is no storage of water. Lastly, if water were continually supplied to the pump from a cistern, it could be raised to a higher cistern and there stored up.

The energy of the voltaic cell can be stored up in two ways somewhat analogous to the above. The electricity produced by chemical action in the cell can be stored up *as such* in a Leyden jar, just as the water in the pump just mentioned might be stored in a cistern. But it can also be transformed again into chemical energy and retained as such for future use, the current being merely used as a carrier of the energy, just as the water was the means used for transferring energy from one spring to the other. An arrangement for effecting this object is called a secondary battery, or a storage cell. *Such cell does not store electricity.* In fact there is no more electricity in it than in a pound of zinc or a quart of acid, but it contains bodies capable of acting chemically on each other and thus supplying the requisite energy for the production of a current of electricity. It differs from an ordinary cell merely in the fact that the materials used are manufactured in the cell itself instead of being put in ready made.

A storage cell, then, may be defined as an arrangement for transforming the energy of a current of electricity into chemical energy and retaining the same available for the reproduction of the current. The following experiment illustrates the mode of action. One form of Daniell's cell consists of a plate of copper immersed in

* Paper read before the School of Pharmacy Students' Association.

solution of copper sulphate and a zinc plate immersed in solution of zinc sulphate, the direction of the current being from zinc to copper within the cell. The energy of the current is supplied by the combustion of the zinc, $ZnZnZnSO_4CuSO_4Cu$ becoming $ZnZnSO_4ZnSO_4CuCu$. If a current from two such cells be sent through a third cell consisting of two copper plates immersed in solution of zinc sulphate, zinc is deposited on one plate and copper taken off the other, $CuZnSO_4ZnSO_4CuCu$ becoming $CuZnZnSO_4CuSO_4Cu$. The current flows through this cell from copper to zinc, *i.e.*, to the plate which has become coated with zinc, and the cell has become, in fact, a Daniell's cell ready to produce a current in the direction opposite to that of the forming current.

If the above be clearly understood, the theory of the storage cell is known It will be at once seen that the E. M. F. of the charging battery or machine must exceed that of the cell to be charged, but it is not necessary or desirable that it should exceed it by a large amount. The strength of the charging current will generally exercise an effect on the nature of the products formed, and, therefore on the E. M. F. of the cell. Thus the E. M. F. of a gas battery (a form of secondary battery) varies from 1·49 to 3·57, according to the mode of formation.

Various forms of storage cells have been devised since the original cell of M. Planté. Planté's battery and Faure's accumulator are well known. Cells embodying the latest improvements in the latter of these are now being supplied, under the name of Faure-Sellon-Volckmar accumulators, by the Electrical Power Storage Co., Limited, of Great Winchester Buildings, E.C., who have kindly sent a few of these cells for exhibition and have supplied me with information as to their construction, etc. Each cell consists of a number of lead plates cast in the form of window frames, the apertures being square of about ¼ inch side. The positive plate, corresponding to the zinc plate of a Daniell's cell, has its apertures filled up with litharge made into a paste with dilute sulphuric acid, and the negative plate is filled in with a paste of red lead and acid. There is no felt or other such material to separate the plates, but they are just kept apart by india-rubber bands. The advantages of this arrangement are—(1) that the red lead is prevented from falling away from the plates; (2) that there is less chance of short circuiting than where felt or canvas is employed.

The plates, alternately + and –, are immersed in sulphuric acid of sp. gr. 1·25 (about 27 per cent.). The resistance of the small cells is about ·003 ohm and the E. M. F. 2·15 volts.

Sutton's cell has been already described in these pages, but I not aware that it possesses any particular advantages. Swan has found that a pair of lead plates that have been used as negative plates in a Sutton's cell can be advantageously employed in the construction of a Planté cell.

A storage-cell when made has to be "formed," *i.e.*, got into working condition. This, which was a most tedious process in Planté's cell, is accomplished in Faure's cell by one charging with a powerful current, and occupies fewer hours than the former required weeks.

For a particular cell there will be an economic rate of charge and discharge; thus, for what is termed a 1 horse-power cell (weighing about 30 lbs.), *i.e.*, a cell that will yield as much energy as a horse-power or 33,000 foot lbs. per minute continued for one hour, that is 1,980,000 foot lbs., the rate of charge recommended is 20 to 25 ampères, and that of discharge is 30 to 40 ampères. If these conditions be observed the cell should yield over 90 per cent. of the energy put into it, the loss being due to the heating of the cell during charge and discharge, which heating it is impossible altogether to avoid, though it may be diminished indefinitely by keeping the E. M. F. of the charging battery or machine as little as possible above that of the storage-cell. By so doing, however, the rate of charging is diminished, so that practically a sensible amount of loss must be submitted to. If E, R, be the E. M. F. and resistance of the charging cell and e, r, that of the storage cell—

the total work spent in charging $= \dfrac{(E-e)E}{R+r}$

the loss by heat in both cells $= \dfrac{(E-e)r}{R+r}$

the energy stored $= \dfrac{(E-e)e}{R+r}$

Hence it follows that the greatest economy is obtained by increasing both E and e, while their difference is kept as small as practicable, *i.e.*, a number of cells should be charged in series from a powerful machine, with just sufficient E. M. F. to send a current through them.

In conclusion, I wish to call your attention to a few points connected with the chemistry of the cell, with especial reference to the investigations of Messrs. Gladstone and Tribe, published in *Nature* last year. When dilute sulphuric acid is electrolysed between lead plates by a powerful current, the oxygen formed becomes partially ozonized and forms peroxide of lead on the plate at which the current enters, the first action being $PbH_2SO_4PbPb = PbH_2PbSO_4Pb$; then the ozone formed by further action attacks the sulphate which adheres to the plate, forming peroxide of lead (PbO_2) and reproducing the acid. This action occurs in Planté's cell. When the cell is at rest after charging, the lead with its coat of peroxide is gradually attacked by the acid, hydrogen is evolved and lead sulphate formed again. This local action, as it is termed, is well known in other cases, particularly in the zinc and copper couple, which is capable of decomposing water, and is violently attacked by dilute acid. In the case of lead, however, the action is delayed by the insoluble nature of the sulphate formed, and to this insolubility is probably due the practicability of the Faure cells. In Planté's cell, after a rest, the current was reversed, when the peroxide or sulphate previously formed became reduced to spongy metal and the other plate in turn became peroxidized. By repeating this process, both plates became coated more and more thickly, the one with spongy metal, the other with peroxide.

Let us now consider the case of the latest modification of the Faure cell. Here starting with $Pb3PbO\ Pb_3O_4$ Pb, neglecting the acid, we obtain by charging $Pb3Pb$ $3PbO_2Pb + O$; in the presence of acid part of both oxides is converted into sulphate, forming $Pb,3PbSO_4$ $2PbSO_4,PbO_2,Pb$, and the sulphate is reduced and oxidized in the same way as the oxide. The reduction of the latter part of the sulphate appears to be effected with considerable difficulty, hence the oxidizing action is completed first, unless the quantity of litharge used be proportionally less than that of the red lead. During the charging the local action above referred to occurs continuously, so that the oxidation of the sulphate will never be quite complete. In the discharge reverse actions occur, the spongy lead being oxidized and the peroxide reduced, but as there is always a considerable quantity of each of these left, mixed with the sulphate, the appearance of a discharged cell differs little from that of a charged one. If discharged very rapidly the E. M. F. sinks almost to *nil*, and the current falls off. This, according to Messrs. Gladstone and Tribe, is due to the formation of a film of peroxide on the spongy metal of the positive plate, whereby both plates become alike. On leaving the cell at rest for a short time this peroxide is reduced, and the E. M. F. and current rise to their previous amount. This action is of the same nature as that which occurs in ordinary single fluid cells, and is known as polarization.

When a storage cell is at rest the local action above-mentioned goes on continuously, and hence the energy of the cell gradually runs down.

The Pharmaceutical Journal.

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CULTIVATION OF CINCHONAS.

THE very interesting series of Jamaica cinchona barks, accompanied by leaves, flowers, fruits and seeds of the plants from which they had been taken, which attracted the attention of visitors to the last Evening Meeting of the Pharmaceutical Society, supplemented as it has since been by an even more extensive series from the Indian Government plantations at Ootacamund, which will be shown on Wednesday evening next, will contribute to a realization of the great importance that the experiments in cinchona cultivation in different parts of the world are now assuming towards pharmacists or consumers of bark. It is indeed a matter for congratulation that the authorities at the Indian and Colonial Offices have complied so liberally with the request of the Council of the Pharmaceutical Society, that typical specimens grown in the Government plantations should be made accessible to the inspection of British pharmacists by being placed in the Society's Museum, especially as they are accompanied by useful information as to their history and characters, such as has been furnished by Mr. MORRIS, and appears on another page of this number of the Journal. Whilst the subject is thus somewhat prominently under notice, it will be opportune to quote from two official reports that have just been issued some statements bearing upon cinchona cultivation in India and Jamaica.

From the new Report on the Trade of British India we learn that the exports of cinchona bark from that country during the year 1881–82 showed a considerable decline as compared with the previous year, the quantity being only 428,497 pounds against 699,258 pounds in the previous year, the fall in value being from Rs. 7,24,705 to Rs. 4,58,340. This decline, however, does not appear to be attributable to any decrease in the production of the plantations, but to the fall of price in the European market caused by the enormous importations of cuprea bark from South America. Indeed the Collector of Customs at Calcutta expressly states that, if necessary, there could have been larger shipments made than in the preceding year, the trees not having been barked in consequence of the lowness of price. It must not be assumed, however, that the figure reached was therefore one below the point at which cinchona cultivation can be carried on in India profitably; for the bark was simply withheld in expectation of a rise in the market. But should the decline in value prove permanent, the Report says there can be no reason to doubt that the industry is one which has a very hopeful future, notwithstanding it may have to compete with importations from South America. The bark is exported almost exclusively from Calcutta and Madras, a very small quantity being sent from British Burmah. The quantity exported from Calcutta, which is said to represent almost entirely the exports of one company in the Darjeeling district, amounted in 1881–82 to 249,694 pounds, valued at Rs. 1,86,795; the exports from Madras amounted to 178,467 pounds, valued at Rs. 2,71,195. These figures show that the average price of the bark shipped from Calcutta was very much below that shipped from Madras.

It is interesting to observe in the face of the foregoing figures, suggesting an accumulation of bark in the country, that the imports of quinine rose during the same time enormously, having amounted to 10,615 pounds, valued at Rs. 9,98,631, in 1881–82, against 3964 pounds, valued at Rs. 4,29,515, in 1880–81. As these figures show that the large increase in the quantity of quinine imported was accompanied by a considerable fall in price, it is probable that both the decrease in exports of bark and the increase in imports of quinine were to a considerable extent due to the disturbing influence of the enormous supply of cuprea bark thrown upon the market as raw material. The figures, however, have a further significance, since they show that a low-priced quinine is capable of driving all its competitors out of the field. In the previous report it had been remarked that the "cinchona alkaloid" had been largely used in preference to quinine, and to this preference was attributed some falling off in the imports of quinine; but the larger consumption of the mixed alkaloids would now appear to have been based rather upon economical considerations. The increased demand for quinine may, however, have been due to some extent to the fact that although the general health of the country was fairly good during the year, there were severe outbreaks of malarious fever in certain districts in Bengal; whilst in parts of Northern India also fever was more than usually prevalent.

A Supplement to the *Jamaica Gazette* of the 22nd ult. contains the report of the Director of Public Gardens and Plantations in Jamaica for the year ending September 30, 1882. In this Report Mr. MORRIS states definitely that the purpose of the Government in establishing cinchona plantations in Jamaica,—namely, to show that cinchona barks of good quality could be produced in the island, and that cinchona planting, as an enterprise in private hands, possesses all the elements of a remunerative industry,—has been attained, these points having been demonstrated by the returns from the sale of Jamaica-grown barks during the last three years. It is therefore proposed henceforth to devote the chief attention in the Government plantations to the introduction and cultivation, on a small scale, of all new and rich kinds of cinchonas, with a view to establishing them as far as possible in the island, and to carrying on experimental and scientific work in connection with the industry, such as is not likely at present to be undertaken by private individuals. The extent to which Mr. Morris has succeeded in impressing upon others his conviction as to the remunerativeness of cinchona cultivation is shown by the fact that during the year the sales from the Government nurseries to private planters amounted to 372 ounces of seeds, 77,961 plants and 362,250 seedlings of various species of cinchona, *C. officinalis* appearing to be the one most in demand. One shipment only of bark to Europe was made during the year, and this consisted for the most part of "thinnings" or "prunings" from two plantations, rendered necessary by the too abundant growth of established trees and self-sown seedlings. Notwithstanding, however, that the consignment, amounting to 21,512 pounds, consisted consequently principally of twig and broken bark, and the somewhat unfavourable condition of the market, the results were very satisfactory, the net amount realized being £2419 5*s.* 7*d.*, the prospective estimate having only been £2000. As compared with consignments from other countries the prices obtained for this Jamaica-grown bark were very encouraging. The highest price, 8*s.* per pound, was paid for 248 pounds of root bark of *C. officinalis*, taken from trees eight or nine years old, whilst a large package of stem bark realized 4*s.* 11*d.* per pound. The largest parcels were 7844 pounds of "small branch" bark which fetched 3*s.* per pound, and 6151 pounds of twig bark, derived from young shoots and saplings, probably not more than a year and a half old, which realized 1*s.* 5*d.* per pound. Since the actual cost of barking, curing and shipping amounted to only about 7½*d.* per pound, it is evident that even these young growths yielded a fair margin of profit.

PHARMACY IN VICTORIA.

The receipt of the Second Triennial Report of the Pharmacy Board of Victoria enables us to take a brief glance at the results following legislation in restriction of the practice of pharmacy in one of the most important of British colonies. At the end of six years after the passing of the colonial Act, the Pharmaceutical Register of Victoria contains 669 names, showing an increase of 62 during the period covered by the Report. Registration is obtainable as a "pharmaceutical chemist" under this Act either in virtue of having had a certain status at the time of the passing of the Act, possessing the qualification of the Pharmaceutical Society of Great Britain or some recognized examining board, or passing one of two examinations—the Major or the Modified—before the Victoria Pharmacy Board. It will, therefore, be interesting to notice to what extent a qualification which it has been suggested should be made interchangeable with the English one is being conferred as the result of passing an examination test. The Major examination is open only to persons who have served not less than four years' apprenticeship and attended one course of lectures and passed an examination at a recognized school in materia medica and medical botany, and in practical chemistry, besides having passed an examination before the Board in practical pharmacy. Three of these examinations have been held in the three years, at which there have been five candidates, all of whom passed. The Modified examination is open to persons who have served more than three years' apprenticeship, the apprenticeship having commenced three months before the passing of the Act. There have been twelve of these examinations held in the course of the three years, at which there have been 36 candidates, of whom 26 passed. As during the same period there were 99 registrations effected, it follows that 58 persons became entitled to call themselves "pharmaceutical chemists" without having undergone examination, against 41 who passed either the Major or the Modified.

The Preliminary examinations appear to give promise of a larger number of candidates for the Major in future years, twelve examinations having been held, at which there were 112 candidates, of whom 68 passed. We notice with satisfaction that, in virtue of powers conferred upon the Board, a regulation has been passed making it compulsory for every person, before entering into articles of agreement to be an apprentice within the meaning of the Act, to pass the Preliminary examination. A further provision also makes it compulsory to register the apprenticeship indentures within three months of their execution.

A number of prosecutions under the Victoria Pharmacy Act have been instituted during the last three years, and one of them deserves especial mention. It was in respect to a "pharmaceutical chemist" who had been tried and convicted for manslaughter. The Board thereupon took proceedings against him under the section of the Act relating to erasure for improper conduct, on the charge of "practising surgery other than in accordance with the rights and privileges of chemists and druggists in their open shops." The defendant, being convicted, was sentenced to three months' imprisonment and fined one shilling, and on the recommendation of the Board, his Excellency the Governor in Council approved of his name being erased from the Register.

The Pharmacy Board of Victoria is also entrusted with the administration of the colonial "Sale and

Use of Poisons Act," and upon urgent representations that "poisons" were being sold by grocers, ironmongers, and others, as "vermin killers," without restriction, it took action and instituted prosecutions in upwards of fifty cases. The results were, however, hardly satisfactory, since although convictions were obtained the penalties imposed by the magistrates were not such as to warrant the Board in continuing to bring forward fresh cases. In concluding its Report the Board expresses an opinion that the Act at present in operation regulating the sale of poisons is imperfect in many respects, and a hope that at no distant date an amendment of the Act may be brought under the consideration of the colonial legislature.

EVENING MEETING.

THE last Evening Meeting of the Pharmaceutical Society for the present session will be held on Wednesday evening next, at half-past Eight o'clock, when the following papers will be read:—"The Bitter Principle of *Hymenodictyon excelsum*," by W. A H. NAYLOR, F.C.S.; and "Remarks on Medicinal Plants of Ceylon," by W. C. ONDAATJE, F.L.S., Colonial Surgeon of Ceylon. As mentioned on another page, a complete series of barks and herbarium specimens, illustrating the varieties of cinchona plants cultivated at Ootacamund, have been received for the Society's Museum through the Secretary of State for India. These will be placed on the table and will no doubt add greatly to the interest of the meeting.

If original research is really to be fostered by subsidies, sanitary science ought to make considerable progress under the influence of the liberality of the Grocers' Company. This guild has announced its intention to establish three Research Scholarships, each of £250 a year, the holders of which are to devote themselves to researches as to the causes of important diseases and the means by which these causes may be prevented or obviated. Besides these Scholarships there is to be a Discovery Prize of £1000, to be awarded once in four years as a reward for original investigation that shall have resulted in important additions to exact knowledge in specified sections of sanitary science. Two of the appointments to Scholarships are to be made and the first subject for the Discovery Prize is to be announced in the coming month of May, and the third Scholarship is to be filled in May, 1884.

* * *

In an interesting report on the petroleum trade of Báku, on the Caspian, Mr. Consul Lovett mentions that in the refineries the distillation of the crude product is now carried on with plant of the most approved construction, under the superintendence of trained chemists (mostly Germans), who receive about £25 per month. The Consul speaks of as many as 115 separate products being obtained from the Báku oil, and it is claimed that although its illuminating power does not equal that of American oil, the value of the residuum is greater.

* * *

In the same report it is mentioned incidentally, that in the year 1858 the Russian Government farmed the monopoly of salt and naphtha at Báku for £300 a year, whilst it is estimated that the yield of oil alone last year brought the pit-owners and refiners a clear profit of £500,000.

Some time since reference was made in "The Month" to the "extra strong essential oils," which Mr. Heansel, of Pirna, prepares by fractional distillation, and which he claims to consist of the finest and most aromatic parts of the ordinary oil. These oils have given rise to a law suit in the United States, the customs officials having insisted upon collecting a duty of 50 per cent. *ad valorem* upon them, as artificial oils, instead of 50 cents per lb., the duty leviable upon essential oils. The sum in dispute was about one thousand dollars, and judgment was given against the customs authorities.

* * *

The *Tropical Agriculturist* states that a beetle which infests *Cinchona succirubra* trees in Ceylon that have been "shaved" has been identified as the male of a species of *Lucanus*, greatly resembling the common European stag beetle. The insect appears to pierce the new bark and feed upon the resinous juice which exudes through the wound.

* * *

The results of some agricultural experiments made on the Shevaroy Hills have been communicated to the *Madras Times*, from which it appears that a plot of ground 22½ by 32 feet planted with *Maranta arundinacea* produced 430 lbs. of corms, yielding 65 lbs. of "arrow root;" and another plot, 29 by 43 feet, planted with 145 plants of *Jatropha Manihot*, produced 255 lbs. of roots yielding 30 lbs. of tapioca.

* * *

According to the *St. Louis Druggist*, an Illinois "doctor," having sent a bottle to a patient labelled "Calmel—pizen," has been cited to appear before the County Medical Society to show cause why he should not be expelled.

* * *

The present arrangements for the Friday evening discourses at the Royal Institution include the following subjects:—April 20, "The Island of Socotra and its Recent Revelations," by Professor Bayley Balfour; April 27, "Some of the Questions involved in Solar Physics," by Dr. C. W. Siemens; May 4, "Weather Knowledge in 1883," by Mr. Robert H. Scott; May 11, "Oysters and the Oyster Question," by Professsor Huxley; May 25, "Whales, Present and Past, and their Probable Origin," by Professor Flower; and June 8, a discourse by Professor Dewar.

* * *

On Tuesday next, at the Royal Institution, Professor J. G. McKendrick will commence a course of ten lectures on "Physiological Discovery," in which the progress of physiological research will be traced from the beginning of the sixteenth century, with the aim of showing how physiology has attempted to solve some of its problems by the methods of physics and chemistry and has thus become a branch of experimental science.

* * *

At the meeting of the Chemical Society, on Thursday next, April 5, a paper will be read on "The Elimination of Hydrogen Sulphide and Carbonic Anhydride in Coal Gas," by Mr. Lewis Wright.

* * *

On Tuesday next, April 3, at 8.30, Mr. R. W. Giles will read a paper on "Pharmaceutical Politics," before the Chemists' Assistants' Association, at the rooms, University Chambers, Conduit Street.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.
EVENING MEETING.

The fifth meeting of the present session was held in the rooms of the Society, George Street, Edinburgh, on Wednesday, March 14, at 9 p.m.

Mr. Alexander Napier, President of the Branch, in the chair.

The minutes of the former meeting were read and confirmed.

The following donations to the museum were then intimated:—

Specimen of Fresh Bael Fruit.
From Messrs. W. and F. FERGUSSON, Liverpool.

Hyracium (large piece.)
From Mr. ALEXANDER CLEGHORN, Cape Town.

Fine Crystals of Piperin.
From Messrs. T. and H. SMITH and Co., Edinburgh.

Cinnamic Acid, prepared from Tolu Balsam.
From Mr. D. GORRIE, Edinburgh.

Specimens of Malted and Unmalted Grain, and of Impure and Rectified Spirit.
From Mr. JAMES McGLASHAN, Edinburgh.

Specimens illustrating Pyrites roasting and the manufacture of Sulphuric Acid.
From Mr. JOHN R. HILL, Edinburgh.

Pure Chloral. From Mr. WILLIAM PIRIE, Edinburgh.

The Secretary of the Branch having made a few remarks on the specimens, the President moved a vote of thanks to the donors, which was cordially responded to.

The Secretary then read a—

DESCRIPTIVE NOTE OF A NEW HOT-AIR CHAMBER SUITABLE FOR PHARMACEUTICAL PURPOSES.

BY THOMAS MABEN.

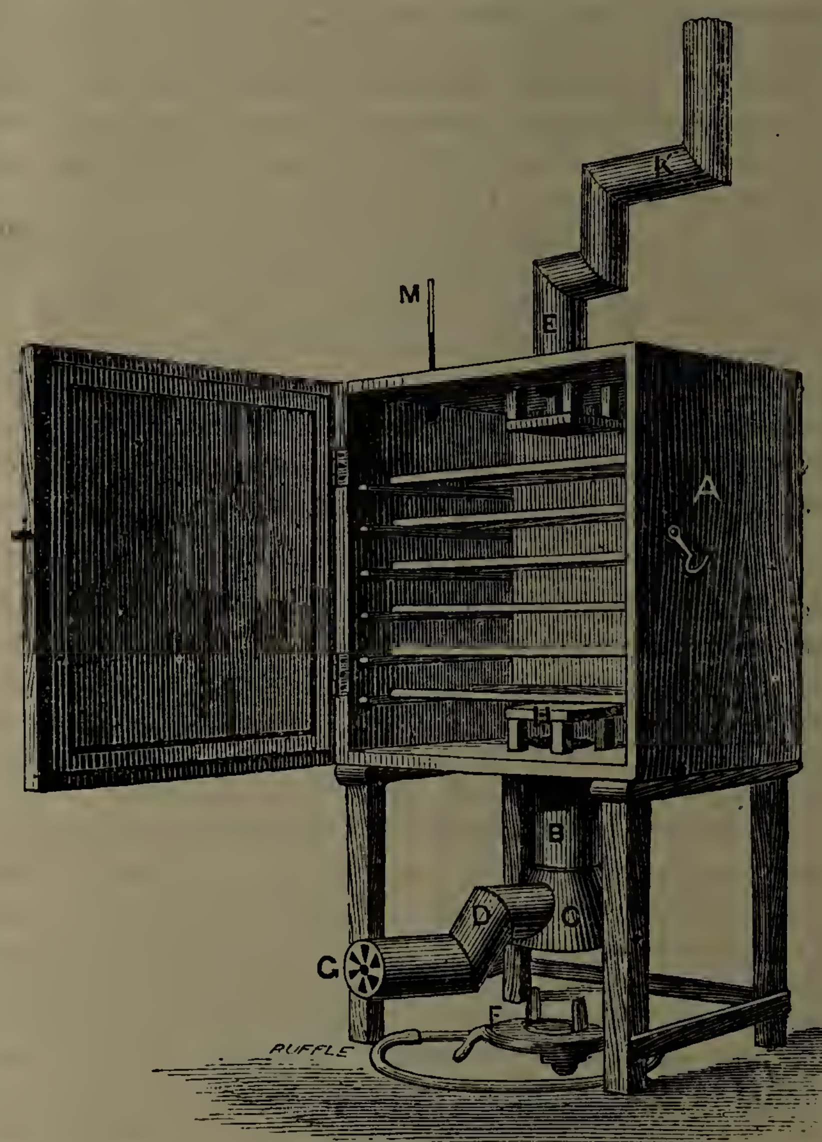
The ordinary steam or hot-air chambers for laboratory use, although meeting the most of the requirements for which they are designed, have the disadvantage of being more adapted for experimental than manufacturing purposes, and are, moreover, of such a price as to exclude their use in small pharmacies. The want of a cheap and convenient apparatus has induced me to bring under your notice the one on the table. I may remark that the design is due to Mr. Hislop, one of my apprentices, who intended it for drying photographic gelatine plates, but by slight modifications of the interior I find it perfectly adapted for the purposes of my own laboratory.

The chamber consists of a strong wooden box (A), 18 inches high by 18 inches wide, and 14 inches deep. To the front a door is attached, hinged in this instance, but a vertical sliding movement would be more convenient. To the two sides of the box are fixed wooden supports which serve to receive teak spars for supporting drying trays or evaporating dishes. The bottom of the box has a perforation of 3 inches diameter into which a zinc cylinder (B) is securely fitted and to this is soldered the upper end of a copper cone (C) with a flat bottom, while into this latter a bent tube (D), diameter $2\frac{1}{2}$ inches, and 9 inches total length, is securely inserted in the manner shown. A corresponding perforation is made in the top for receiving a tube to answer the purposes of a chimney.

Using a Bunsen burner or a spirit lamp as the source of heat, the flame is directed to the bottom of the cone (C) with the result that the heated air ascends into the chamber, being diffused by means of a dispersion board (H) about 4 inches square, which is placed over the orifice. At the end of the tube (D) there is fitted a "hit and miss" regulator (G), which consists of a series of triangle-shaped holes with a revolving disc behind so that the size of the apertures can be increased or diminished, thus enabling the amount of air entering to be under partial control. The highest temperature to which the air in the chamber has been raised is 180° F., which is sufficiently high for most pharmaceutical operations. If a uniform temperature of say 100° F. be required, the admission of air must be regulated accordingly by means of the regulator (G), accuracy being ensured by the insertion of a thermometer (M) into a perforated cork fitted into a half-inch aperture on the top of the chamber. By this means there is no difficulty in keeping within 2·5 degrees less or more of the desired temperature.

If a rapid current of warm air is desired, this can be had by placing an angular tube (K) on the top of the chimney (E), and by heating the angle of the tube a draught is quickly created.

It is desirable in some cases to filter the admitted air; this can be done by stretching a piece of lint or other suitable material between the regulator (G) and the tube (D) by which means dust particles are effectually excluded.



Maben's Hot-Air Chamber.

The metal parts of the apparatus being made to screw off and on, they can be detached at will, so that we can thus have a series of wooden chambers suited to different purposes. In this instance, the chamber being intended for drying gelatine plates, it was of course constructed so that the light would be effectually shut out, but it is obvious that a small glass window would add greatly to its value for laboratory purposes.

The advantages of this chamber are its simplicity, its perfect security against over heating and its small cost,—it can be made for a few shillings. It is light and easily handled and is always ready for work, a current of pure hot air being obtained in a very few minutes after the application of the Bunsen flame.

I find it specially adaptable in the preparation of granular and scale compounds, for drying precipitates, hardening pills previous to coating, and in other operations requiring a current of hot air.

The President in moving a vote of thanks to Mr.

Maben, for bringing the design under the notice of the meeting, said that the chamber seemed to be well adapted to the purposes for which it was intended. It was certainly very commodious, and the readiness with which it could be rendered available for use was a strong argument in its favour.

Mr. Gilmour supported the motion. He did not think that the chamber would be suitable for all purposes for which such apparatus was required, but when a current of hot air was desired it certainly would give that very readily. Several remarks regarding the apparatus having been replied to, a paper was read on—

"Acetic Ether: its Trade Composition, Manufacture and Specific Gravity."

BY WILLIAM INGLIS CLARK, D.SC.

The paper was printed in last week's issue, p. 777.

Upon proceeding to read the paper the author asked the indulgence of the meeting for presenting a communication of so great length and so much complexity on an article which could scarcely be said to be in common use. The subject had grown in his hands, and he preferred to detail the various steps taken, so that the audience might follow the line of argument, and this he hoped to make more clear by reference to the series of diagrams which had been prepared for him.

The President of the Branch in returning the thanks of the meeting to the author of the paper said that the investigations detailed were beyond all praise as mere investigations in themselves, while the communication was an example of thoroughness of work which would not be lost on young investigators. The substance was not extensively used in medicine, but it had been proposed as a solvent in the preparation of certain alkaloids; for this reason it was desirable that the commercial articles should be as pure as possible, and, moreover, it was highly necessary that the pharmacopœial formula should be accurate: this it did not appear to be so far as the purification was concerned. On this point he might remark that magnesia had been recommended as a desiccator, and he might ask Dr. Clark if he had any experience of its use.

Dr. Clark: Magnesia is open to the same objections as caustic lime.

Continuing, the President said that he was sure that the meeting would join with him in admiration of the manner in which the subject had been presented to them.

Mr. Gilmour said that he had great pleasure in seconding the vote of thanks. Owing to the lateness of the hour he would not venture upon any detailed comment on the subject, but he might remark that he was not prepared to find so much and so serious variation in the commercial article as had been pointed out. A more serious matter was the unsatisfactory product obtained by the Pharmacopœia process; if there were an official process at all it certainly should be a perfect process. On this point future compilers should be careful to ensure correctness, and Dr. Clark's work would favour this greatly.

Mr. Dott said, that on the spur of the moment, he would not attempt anything like a complete criticism of such an exhaustive paper. There were one or two points which were referred to, which brought to his recollection something connected with his own work two or three years ago. At that time he was engaged in the same work, and he remembered that he found the gravity given in some text books to be quite different from anything he could prepare, which as far as he could recollect was very near ·900. Regarding the use of chloride of calcium as a dehydrating agent, it ought of course to be neutral, that was to say, the granular and not the fused salt should be used. With reference to the greater solubility of ethyl acetate in water at zero than at 15° C., and the reverse in the case of water in ethyl acetate, it was not really understood why it should be so; water had a greater attraction for itself at a low temperature than at a higher, while the reverse was the case with acetic ether. Probably this would explain the circumstance. He might ask Dr. Clark if anhydrous sulphate of copper would not have been admissible in getting rid of the water from the acetic ether.

Mr. MacEwan then said that the presence of water in commercial acetic ether was easily detected, and in most cases indicated the presence of impurity; but of course a sample containing only alcohol might be very impure and yet contain no water. However it was apparent from Dr Clark's statements that in most cases water was present, and there was a ready means of detecting its presence in anhydrous copper sulphate, which became blue when hydrated, while carbonate of potash shaken up with a portion of a suspected sample would become pasty or syrupy according as the quantity was small or great. Hitherto some reliance had been placed on the specific gravity of the compound, and should a sample be within a few units of ·900 it was considered a fair sample; but Dr Clark stated that this was not at all a reliable basis. Now on that point as well as on others which had been treated, there was at least one pharmacist, Mr. Umney, who had made investigations and got results differing somewhat from Dr. Clark's. Mr. Umney's results were given in an article on the Pharmacopœia "Additions;" in it he stated that the official process was satisfactory, and in a subsequent discussion recommended purification with chloride of calcium and free alkali, the resulting product having a lower specific gravity than that given by Dr. Clark. Knowing the important work which had been done by Mr. Umney, he (the speaker) would like to ask Dr. Clark if he had read Mr. Umney's paper, and if so, it would be satisfactory to hear from him any comment he had to make thereon.

Mr. Young said that he did not rise to criticize the excellent paper to which they had all listened, he was sure, with pleasure. Acetic ether was not an article of great importance, but it might be by-and-by. It was a curious circumstance that recent investigators had differed so much, and this would lead him to expect that Dr. Clark's paper would not be allowed to pass without outside criticism, which he felt that he (the author) would be perfectly prepared to meet.

Mr. Stephenson said that he was unwilling to let the discussion close without supporting what had been said regarding the merit of the paper. On one point he differed from Dr. Clark, namely in the "parts" of sulphuric acid and alcohol being taken by measure. Probably, the writer of the formula had the continental system in his mind's eye when writing the vague formula; however that might be, if the sulphuric acid were taken by weight, it would very nearly approach the theoretical quantity stated in the "model formula."

Mr. Gorrie having made some remarks regarding the specific heat of acetic ether, and several questions having been asked —

Dr. Clark said, in reply, that many of the points which had been referred to were already fully treated in the paper, so that he would only refer to the more important objections and statements. With reference to Mr. Dott's remark, regarding the use of chloride of calcium, he had no doubt that the use of the neutral salt would obviate decomposition of the ethyl acetate; but there was still the fact remaining that the salt absorbs more than one-half of the ether, so that no advantage was to be gained by its use. He then repeated his remarks on the use of anhydrous copper sulphate as a dehydrating agent and afterwards answered Mr. Stephenson's remarks on the meaning of "parts" in the Pharmacopœia directions. (See postscript). Reference had been made to Mr. Umney's paper on "Acetic Ether." He had read the article, and regarding the statements contained therein he had to say that if the parts in the B.P. were all to be taken by weight, then Mr. Umney's statement that the process was satisfactory could not be gainsayed, and it seemed probable that Mr. Umney had adopted this view. He (the speaker) had already shown that if a different interpretation of the B.P. were taken then the process was utterly faulty. Mr. Umney only took exception to the B.P. process because it did not include rectification over carbonated alkali, or some provision for neutralizing the free acid, and he suspected that a sample rectified in the B.P. manner would contain much acetic acid. In the subsequent discussion he (Mr. Umney) again referred to this, but in his (Dr. Clark's) own experiments the pure acetic acid (after treatment with calcium chloride) only amounted to 1·56 per cent, not a large quantity but one which he quite agreed should be removed. The main objection, namely, the enormous loss, was never referred to in the aforesaid discussion. Mr. Umney had said that the more anhydrous the materials the better the yield. This was certainly the case as far as the acetate of soda was concerned, but Putullo and others have shown that a little water rather assists in etherification, and he (Dr. Clark) had already shown that absolute alcohol is unnecessary. He did not think that the boiling point could be used as a certain indication of purity, since alcohol and water raised it. The sample prepared by himself (99·7 per cent. ethyl acetate) boiled at 74·3–74·80 C. with barometer about 29·7 inches.

Mr. Gilmour here remarked that Mr. Williams, as well as Mr. Umney, had experimented with acetic ether and found the specific gravity to be ·880. Considering the care which Mr. Williams had always shown in his work, he thought that some regard should be shown for his results.

Dr. Clark, continuing, said that on the specific gravity he could place no reliance, for, although he believed the pure article, on the ground previously given, to be sp. gr. ·9004 to ·9012 at 60° F., it was no proof of purity that a sample agreed with this. It must be remembered that a mere mixture of alcohol and water could be made to give the same specific gravity. If the boiling point remained practically constant, if the specific gravity were about ·901, and, on analysis, the liquid contained 99 per cent. of ethyl acetate, then, he thought, some reliance might be placed on the sample; but Messrs. Williams and Umney did not publish any such statements; on the contrary Mr. Umney prepared his sample, which he considered to be very nearly pure, sp. gr. ·8956, by digestion with chloride of calcium and a small quantity of caustic lime, the latter would undoubtedly cause decomposition. Mr. Williams, on the other hand, believed ·890 to be correct.

The President then closed the discussion, and the meeting adjourned.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The tenth meeting of this Association was held in the Pharmaceutical Society's rooms, on the evening of the 21st instant. Mr. Peter Boa, President, in the chair.

The minutes of the previous meeting having been read and confirmed, the President called upon Mr. W. Scott Turnbull, to read a paper on the "Alimentary Canal."

The author began by giving a brief outline of the course and structure of the alimentary canal and the position occupied by the various organs in connection with it. He then took up the consideration of these organs separately so as to bring out clearly the several processes of digestion and described the constituents of saliva, gastric, pancreatic, and intestinal juices, and bile, the action of these upon amyloids, fats and proteids being shown. He then entered into the consideration of the pharmaceutical aspect of the subject, alluding to the artificially prepared digestive fluids and their method of preparation; thus the methods for preparing vinum pepsinæ, liquor pepticus, liquor pancreaticus, pepsin, and other medicaments of a like nature were given and the extent of their action discussed. Finally he showed how the digested food is carried into the blood circulation, and how the various kinds of food influence the growth of the body.

The paper was a highly interesting one and was well received by a good audience, and on the motion of the President a hearty vote of thanks was accorded to Mr. Turnbull.

A discussion followed the reading of the paper.

Thereafter, Mr. Turnbull initiated a discussion on the motion of which he had given notice at the previous meeting, held on March 7, and already printed in this Journal. In a short speech he endeavoured to prove that a universal title is desirable for all who carry on the practice of pharmacy; this title he thought should be "Pharmaceutical Chemist" as being the most appropriate, while those who had already acquired that title by examination should receive a purely honorary title, showing that it was one of distinction.

Mr. J. D. Robertson seconded the motion.

Mr. Peter MacEwan then proposed as an amendment, the following counter-resolution:—"Resolved that this Association give its cordial support to the Pharmacy Acts Amendment Bill, and in the event of the measure being enacted, respectfully urge the Council of the Pharmaceutical Society to make provision whereby the present Major examination may be continued for a reasonable time after 1886, so that those who may at that time be qualified by the Minor examination may have an opportunity of becoming pharmaceutical chemists if they so desire."

Mr. Robertson objected to the counter-resolution as not being a direct amendment to the motion; but the President ruled that the amendment was in order.

Mr. MacEwan then replied to the remarks of Messrs. Turnbull and Robertson and showed how the counter-resolution would meet any apparent hardships which might arise.

Mr. John R. Hill seconded the amendment and criticized the unjust principle of the motion; and he was supported by Messrs. Adamson, Aitkin, Crowden and Henry.

Mr. Turnbull having replied, the amendment was put to the meeting when 16 voted for it. Three afterwards voted for the motion. The counter-resolution was therefore adopted.

The President then intimated that the last scientific meeting of the session would be held on March 28, when a paper on "Photography—Dry Process," would be read by Mr. William Aitkin.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The usual monthly meeting was held on Wednesday evening, March 21, at the George Hotel, when opportunity was taken to present a handsome testimonial to the President, Mr. R. Fitzhugh, consisting of a case of silver dessert knives and forks, a liquor stand, and a beautifully illuminated address, which ran as follows:—"Presented to Richard Fitzhugh, F.C.S., by the members of the Nottingham and Notts Chemists' Association, together with a liquor stand and a case of dessert knives and forks, as a mark of the high personal esteem and respect in which he is held by them, and in recognition of his energetic and valuable services to the Association since its foundation, during which time he has successively filled the offices of Hon. Secretary, Vice-President, and for seven years that of President, with unvarying courtesy and kindness. They sincerely hope he may be blessed with happiness and prosperity, and that he may for many years continue to preside over the Association for which he has laboured so long and with so much success. Signed on behalf of the Association, Roberts Jackson, Vice-President; W. H. Parker, Treasurer; C. W. Warriner, Hon. Secretary."

The presentation was made by the Vice-President, who occupied the chair for the time, in a brief speech, in which he referred to the work done by the President, and the esteem and respect in which he is held by the whole trade.

Mr. Fitzhugh responded in a feeling manner, thanking the members for their most unexpected and handsome present, and assuring them that the sight of it would be an incentive to greater personal interest and work, if it were possible.

The healths of the Vice-President, Treasurer, and Honorary Secretary were drunk, and the remainder of the evening was spent in a social manner.

Proceedings of Scientific Societies.

SOCIETY OF CHEMICAL INDUSTRY.

The Present Condition of the Soda Industry.

BY WALTER WELDON, F.R.S.

(*Concluded from page* 699.)

As regards the demand for free sulphur, the latest returns published by the Italian Government show that the average annual production of sulphur in Sicily and Italy, during the five years, 1875 to 1879 inclusive, was 282,000 tons, of which 216,000 tons were exported. The total quantity of sulphur that could be produced from English alkali-waste does not exceed two-thirds of this latter quantity. The world thus consumes much more sulphur than the English alkali-makers could produce, and although to sell all that they could produce they must drive much of the Sicilian sulphur out of the market, in the present "struggle for existence" somebody must go down, and English Leblanc soda-makers may be pardoned for preferring that it should be producers of Sicilian sulphur who have to do so, rather than themselves.

The actual cost of Sicilian sulphur, delivered at Marseilles,—transported in the cheapest way, in bulk, at the purchasers' risk,—is about £5 per ton. To become masters of the sulphur market, and at the same time to gain by recovered sulphur the required 2*s*. per cwt., English soda-makers must thus be able to recover sulphur at a cost not exceeding, say, about £2 per ton. They will hardly be able to do that at first, but I think that eventually they will be able to do it. If so, and if chlorine products should again command, as I think they will again command, a reasonable price,—for a price which scarcely pays their cost is, of course, not a reasonable price,—the Leblanc process will at least be able to hold its own, even without that other resource to which I have referred, and which I will now proceed to indicate.

There has come to me from Newcastle a very bold but, I venture to think, quite practical suggestion, the result of which can hardly fail to be of enormous importance, not only to the soda industry, but to almost all industries whatever. That suggestion is that the soda-maker should entirely cease to use raw coal as fuel, but should convert all his coal into coke, collecting for sale the oil and ammonia evolved during its conversion into coke, and himself using for heating purposes the gases evolved during the coking operation and the coke itself. It is believed that, in the Newcastle district at any rate, by this mode of proceeding the soda-maker would obtain his fuel virtually for nothing. In that district there is produced per annum some 2,000,000 of tons of very small coal or "duff," which is almost a waste product, and which, singularly enough, yields more oil than the more costly kinds of Newcastle coal, while at the same time yielding a very fair coke, sufficiently good, at any rate, for use in the furnaces of chemical works, especially when its combustion is assisted by that of the gases from the ovens in which the coke is produced; and the value of the oil and ammonia obtained when this "duff" is coked in ovens to which the Jameson system is applied is greater than the cost of the "duff," *plus* the cost of coking it. And it is probable that improved condensing arrangements will render the yield, if not of oil, at any rate of ammonia, so much greater than the yield hitherto actually realized as to enable the same result to be obtained in the case of ordinary steam coal, not only in the Newcastle district, but in the Lancashire district also. If so, the cost of producing Leblanc soda in both districts will be diminished by almost the total amount of the present cost of Leblanc soda for fuel. I say "almost," because, so far as one can see, the use of raw coal for "mixing" in the black-ash process must still be continued.

And it seems to me that this idea cannot but be as applicable to almost all other industries as to the soda industry: while the result to the material well-being of mankind of its general application, it is utterly beyond the power of any imagination adequately to conceive. This idea means, among other things, cheaper fuel for all purposes, an enormously increased supply of agricultural produce, and the entire suppression of smoke even in the busiest centres of industry. It means that manufacturing towns, by-and-by, shall no longer deserve such names as that which Mr. Matthew Arnold recently applied to St. Helens, and may even become tolerable in the sight of Mr. Ruskin.

And for my own part I venture to think that the same idea might be applied even to the fuel required for domestic purposes, rendering London absolutely free from smoke, and pea-soup fogs things only of tradition. I think that the time will come when our gasworks will be replaced, at least to a large extent, by establishments in which coal will be treated for the production of coke, illuminating oils, ammonia, and heating gases: the coke to be burnt in our domestic fire-places, the oils to be used for lighting the interiors of our houses, the ammonia to be employed in agriculture, to cheapen and render more abundant our supplies of food, and the gases to be burnt for raising steam for driving dynamos for lighting our streets by the electric arc.

Coming back to soda: if the suggestion in question will enable makers of Leblanc soda in certain districts to obtain their fuel for nothing, it will, of course, enable makers of ammonia soda, in similar districts, to do the same. How, then, will it help the Leblanc soda makers? While the quantity of fuel consumed in the ammonia process is only 150 per cent. on the soda produced, the quantity consumed in the Leblanc process is about 350 per cent. on the soda produced. This lower consumption of coal in the ammonia process than in the Leblanc process has hitherto been one of the chief advantages of the ammonia process; but fuel for nothing will so far convert this advantage into a disadvantage, that it will reduce the cost of ammonia soda per ton only by the cost of one and a half tons of fuel, while it will reduce the cost of Leblanc soda, per ton, by the cost of fully twice that quantity of fuel. No doubt, this result will be accompanied by some diminution in that heavy item in the cost of ammonia soda which is due to loss of ammonia; but still I think that the balance of advantage will be on the side of the Leblanc process. It can only fail to be so by reason of ammonia falling to one-half of its present price. The price of ammonia unquestionably will fall; but I think that increased use of ammonia in agriculture will prevent its price falling to anything like that extent.

Besides, then, being certain of getting his sulphur, by-and-by, at half its present price, the English Leblanc soda-maker has thus before him the proverbial "three courses": only, he must not choose between them, but must adopt them all. He must turn his hydrochloric acid to more uses than he does at present; he must recover and sell his sulphur; and he must distil most of his coal. He will then, I believe, be able, not only to hold his own against the ammonia process, but even to incline the balance in his favour.

It is said that "sweet are the uses of adversity;" and those uses, if not "sweet" in any ordinary sense, are at least usually wholesome. One of the results of the conditions under which Leblanc soda-makers have had to work of late years has been to lead them to do their utmost to economize fuel and labour in all possible ways, and of the extent to which this has been done some figures which have been supplied to me by one our leading English manufacturers afford a striking example. They are figures for the ten years, 1872 to 1882. In 1872, in the work to which these figures refer, per 100 tons of total products manufactured, 336 tons of coals were consumed and £256 paid in wages; while in 1882, per 100 tons of total products manufactured, only 216 tons of coals were consumed, and only £144 paid in wages: the coal consumption in 1882 being thus only 64 per cent., and the wages in 1882 only 56 per cent., of what they were, upon the same quantity of total products, in 1872. How much more it may yet be possible to do in the way of economizing fuel, and in adopting labour-saving machinery, I cannot judge; but I venture to think that there are a number of little ways in which economies remain to be effected, and of these I will ask permission to give just one example.

I would venture to suggest that the English Leblanc soda-maker, who has taught the Continental Leblanc soda-maker so very much, might, in return, learn just one or two things from the latter. There can be no doubt that on the Continent, as a rule, and especially in Germany, the Leblanc soda-maker performs to a far less extent than the English Leblanc soda-maker usually does, that useless and costly series of operations which consists in buying salt, transforming it into sodium sulphate, converting that sodium sulphate into carbonate, then converting that carbonate back again into sulphate, and finally giving the sulphate away to his customers, and paying out of his own pocket for casks to put it in. Without entering on the question of the relative proportions of sodium sulphide in English and in German vat-liquors respectively, the ordinary English method of evaporating the vat-liquors and treating the resulting "salts" obviously involves losses of soda which the method of procedure now adopted by all the best German makers wholly avoids. In England, not invariably, but for the most part, the soda-liquors are evaporated by products of combustion passing over their surface, and the resulting "black salts," as they are called, are then "calcined" by products of combustion playing upon and through them. Alike during the evaporation of the liquors, and during the subsequent calcination of the "salts," SO_2 from the products of combustion is absorbed, with the ultimate result that an equivalent of what was soda in the liquors becomes in the final product sodium sulphate. How much soda is habitually lost in this way in England I do not know; but the only careful experiment on the subject with which I am acquainted brought out the loss due to this cause as over 2 per cent. I cannot think that it averages so much as that; but even if it averages only 1 per cent., it would be worth avoiding, providing that the cost of avoiding it were not greater than the value of the soda saved. The best German makers do now avoid all loss of soda from absorption of SO_2, and they believe that they gain other important advantages at the same time. They evaporate their soda liquors in pans heated from below; from these pans they fish by automatic mechanical means perfectly white salts; and then, instead of calcining these salts, either in contact with products of combustion or otherwise, they simply dry them in closed iron vessels heated externally, and now usually furnished with mechanical appliances for crushing the soda as it dries, and automatically feeding it into casks. They believe that by these means they effect an appreciable economy, not only of soda, but of fuel and labour too. The mechanical evaporating and fishing pan which they employ,—known, from the name of its inventor, as the Thelen pan,—has been adopted in one work in this country, by Messrs. J. C. Gamble and Sons, of St. Helens; but the Thelen apparatus for drying fished salts and delivering the products into casks has not yet been tried in this country at all.

Of course, the product obtained by merely drying fished salts has not the crystalline brilliancy of soda ash which has been calcined at a high temperature, and is, moreover, probably slightly more bulky that the latter. Bulkiness is objectionable, because it means more casks; but a preference for mere appearance, apart from actual quality, I think consumers could, if it were worth while, be easily educated out of. When the late Karl von Kulmitz founded the chemical works of Saarau, in Silesia, he did so with a view to supplying soda to the soap-makers of Breslau, who at that time were getting all their soda from England. The soda they were supplied with from England was very red, and the first soda made at Saarau was nice and white. When, however, samples of this white soda were sent to Breslau, the soap-makers there would have nothing to do with it. They said that to make good soap they must have *red* soda ash; and, for a time, Herr Kulmitz was obliged, in order to make his soda saleable, to mix with it a little oxide of iron. He managed after a while to educate his customers out of the habit of requiring that their soda should be red, just as some Continental makers of ammonia soda have had to educate many of their customers out of requiring that their soda should be very weak. A little similar education of some of the clients of some of the English Leblanc soda-makers might perhaps put an end to the irrational custom of the latter of adding salt to their soda after they have made it. They have to pay for that salt, they get nothing for it (the mixture being sold at so much per alkali metric degree), and it increases the cost of their product both for casks and for carriage. As in Lancashire, where this custom of reducing by salt chiefly prevails, a hundredweight of salt costs only about 5*d.*,—though extra cost for casks and carriage raise that 5*d.* to at least 1*s.*, or to fully 1 per cent. on the present selling price of 48 per cent. ash,—the matter may be considered too small to be worthy of mention; but in the alkali trade the present is a day of small things, when even pence per ton must be economized at every possible point, and when 1*s.* a ton may mean all the difference between an actual loss and a small profit. Moreover, it so happens that it is my lot nowadays to visit Continental alkali works much oftener than English alkali works, and when I have made a round among the former, and have found every foreign manufacturer whom I have visited eagerly intent, not only on economizing to the uttermost fuel, labour, and raw materials, but also upon making his soda as rich and as pure as possible, in order that it may compete with ammonia soda, and when I then, on getting home, write to an English alkali-maker to ask what a ton of soda now costs him, in order that I may compare his figures with figures which have been given me abroad, and on receipt of his figures I find that he charges each ton of soda with "1 cwt. of salt for reducing,"—while I know that in some sense or other it must be all right, since my friend of course knows his business very much better than I do, I nevertheless cannot help feeling that there is something here which is behind the times—I cannot help feeling that that ignorance on the part of the customer which makes dilution with salt all right for the moment is not going to last, and that if I were an alkali-maker I should do my best to become one of the first in the new state of things which is fast coming, by beginning at once to take such steps as I have seen Continental ammonia soda-makers take to persuade my customers to take my soda as rich as I make it, and not to require me to increase its cost by adding to it what is of no advantage to them.

Here the present paper might very well have ended, but I know that it is expected by some of the members present that I should say something on the present state of the sulphur recovery question; and I have, therefore, to ask permission to go on a little longer, in order to do so.

The question of the cost of sulphur recovery is one which I do not propose to go into, for the reason, among others, that Mr. Alexander Chance will before long deal with that question before the Liverpool section of our Society. The experimental plant for the Schaffner and Helbig process which Messrs. Chance Brothers had in operation at their works at Oldbury this time last year, and which continued in operation till June or July, was then stopped, in order to the erection of a new plant, intended to deal with 300 tons of waste per week. This new plant has been recently got to work, and a little later on Mr. Alexander Chance intends to give at Liverpool a full account of its results, and especially of those of them bearing on the commercial aspect of the process. All I will say of it now, therefore, is, that into this new plant the Messrs. Chance have introduced several important improvements which greatly facilitate the working of the process, and that with the results yielded by it, so far, they are perfectly content.

In order to render intelligible some interesting results, relating in some degree to the commercial side of the Schaffner and Helbig process, which were obtained at Oldbury in the autumn, and which I have permission to report this evening, allow me to remind you that the two main operations of that process consist: firstly, in decomposing the calcium sulphide contained in alkali-waste by heating the waste with solution of magnesium chloride, whereby there is obtained, on the one hand, H_2S, and, on the other, solution of calcium chloride holding magnesium hydrate in suspension; and, secondly, in regenerating magnesium chloride for use again by treating that mixture of magnesium hydrate and solution of chloride of calcium by CO_2:—

First Operation.

$$CaS + MgCl_2 + 2H_2O = H_2S + CaCl_2 + MgH_2O_2.$$

Second Operation.

$$CaCl_2 + MgH_2O_2 + CO_2 = MgCl_2 + CaCO_3 + H_2O.$$

During the construction of their new plant, Messrs. Chance Brothers made a series of quantitative experiments, upon a scale of half a ton of waste per operation, mainly with a view to determining quantitatively the loss of magnesia involved in the process. These experiments were conducted by Mr. Frederick Chance,—a young member of the firm, who has only to fulfil the promise of his youth to take a very high rank among industrial chemists,—and their results are interesting and to a certain extent important. By making a number of successive operations without adding any fresh magnesia or magnesium chloride, and comparing the quantity of magnesium chloride which he had at the end of the series of operations with the quantity which he had at the beginning, Mr. Frederick Chance found that the average loss of magnesia corresponded to 1·05 parts of MgO per 100 parts of waste treated. Now, while in the waste produced at Oldbury there is no magnesia to speak of, a very pure limestone being used there for making black-ash, there is reason to believe that the waste produced in the Newcastle district,—the limestone of which district is all more or less magnesian,—contains fully enough magnesia to make up this amount of loss, without the addition of any magnesium compound specially for that purpose. All that should be needed, therefore, in the case of Newcastle waste, should be to add from time to time the quantity of calcium chloride necessary to convert into magnesium chloride, by the aid of CO_2, the magnesia actually existing in the waste itself. In other cases, the loss of magnesia in the Schaffner and Helbig process might be made up by replacing 2 or 3 per cent. of the limestone used for making black-ash by dolomite. This is supposing, of course, that the calcium carbonate recovered in the process is not used again in black-ash making. In proportion as this recovered carbonate can be used again for making black-ash, there will be no loss of magnesia, the magnesia "lost" in one operation coming round again in the next.

The experiments of Mr. Frederick Chance further brought out the important fact that the reaction by which magnesium chloride and calcium carbonate are recovered takes place,—at any rate under the conditions under which he operated, *i.e.*, under a pressure of 20 pounds per square inch,—quite as readily when the mixture treated by CO_2 is hot as when that mixture is cold. It has been supposed that that reaction depends upon the formation of bicarbonate of magnesia, in which case the mixture in question would have required to be cooled before being treated by CO_2, and so to cool it would have been at least troublesome. It seems, however, that the reaction in question is really a reaction between $CaCl_2$ and $MgCO_3$. This result is confirmed by the result obtained by Dr. Hewitt by simply mixing with solution of $CaCl_2$ an equivalent of the carbonate of magnesia of the shops. He obtained in that way a decomposition of about 80 per cent. of his calcium chloride, and it is probable that the carbonate of magnesia he employed did not contain more than that percentage of $MgCO_3$.

Mr. Frederick Chance further lighted upon a very curious fact, which is valuable as affording to the workmen a simple and ready indication of the moment at which the regeneration of the magnesium chloride has become complete. In the mixture operated upon there is always a little ferrous sulphide. This ferrous sulphide is not acted upon by CO_2 so long as there is any free magnesia present, but it is attacked so soon as all magnesia present has become carbonated, with the result of sending iron into solution as acid ferrous carbonate. The presence of the iron which thus comes into solution can be very readily detected, and the moment it appears the workmen in charge know that it is time to stop injecting CO_2.

In the South of France, experiments are now being made, at my instance, with a modification of the Schaffner and Helbig process. The first time I visited Cornwall, now very many years ago, I was on one occasion at a dinner-table at which I was asked to name "the four Cornish minerals." To name two of them was not difficult, but my endeavours to name the other two only created most Homeric laughter. At length I was informed that "the four Cornish minerals" are "fish, copper, potatoes, and tin." Cornwall being a mining county, for a Cornishman every natural production which he turns to useful account is a "mineral." At a banquet given by him at Giraud, in May last, to the members of the "Société de l'Industrie Minérale,"—the French "Iron and Steel Institute,"—M. Pechiney, addressing miners and metallurgists, similarly spoke of sea-water as "notre minérai à nous;" and the object of the modification in question is to turn to account in two ways one of the constituents of that extremely complex liquid ore, namely, its magnesium chloride. Most of those in France who make salt from sea-water content themselves with obtaining therefrom only common salt, but M. Pechiney treats the mother-liquors from which as much NaCl as possible has been crystallized out for the further obtainment from them of sodium sulphate, magnesium sulphate, and potassium chloride, and his final residue is a saturated solution of magnesium chloride, containing no other body except magnesium bromide. It has seemed to me that this magnesium chloride might be utilized at once for the recovery of sulphur from soda-waste, and as a source of magnesia for sale as such. When alkali-waste, however, is treated directly by solution of magnesium chloride, the magnesium hydrate, which is one of the products of the reaction which takes place, is obtained in admixture with all the numerous bodies other than calcium sulphide which were contained in the waste treated. When the magnesium hydrate is to be employed for the regeneration of magnesium chloride, this presence with it of foreign bodies does not matter; but in cases in which regeneration of the magnesium chloride used is not necessary, while it is desired to obtain magnesium hydrate for sale, the presence of foreign bodies with the magnesium hydrate must be avoided. I propose to avoid it by taking advantage of a reaction which is known as Kraushaar's, from its having been first published, in *Dingler's Journal* for 1877, by Dr. Kraushaar, of Thann, but which was really first discovered by Mr. Helbig, at Aussig, and turned by him to practical account there as early as 1874. This is the reaction which takes place when alkali waste is heated with water under pressure. It is a reaction of two of water upon two of calcium sulphide, giving one of calcium hydrate and one of calcium sulphydrate. The calcium sulphydrate is obtained in solution, and if this solution be separated from the calcium hydrate and other bodies which it at first holds in suspension, on then running into it solution of magnesium chloride there is obtained, on the one hand, H_2S, and on the other, magnesium hydrate, almost chemically pure. And it is to be noted that, whereas when alkali-waste is treated directly with solution of magnesium chloride only one of H_2S is obtained for each equivalent of $MgCl_2$ which enters into reaction, by first getting the sulphur of the waste into the state of calcium sulphydrate two equivalents of H_2S are obtained for each equivalent of magnesium chloride decomposed.

At one time I had some hope that one might take advantage in England of this reaction of two of water upon two of waste, to the end of reducing by one-half the quantity of magnesium chloride to be employed, and consequently the quantity of that body to be recovered, per given quantity of alkali-waste treated. Mr. Chance was so obliging as to make some experiments on this point at Oldbury, and Mr. Helbig made others at Aussig, and the result of both series of experiments went to show that the idea is not applicable, or at any rate not applicable with any great advantage, when the magnesium chloride employed has to be regenerated. The reason is that the whole of the sulphur of the calcium sulphide of the waste which is heated with water under pressure does not come into solution unless a certain minimum quantity of water be used. This quantity of water is not too great to permit of the method being employed with advantage when the magnesium chloride has not to be recovered. But, when it has to be recovered, all this water would have afterwards to be driven off by evaporation, or the regenerated magnesium chloride would be impracticably dilute; and the cost of this additional evaporation would probably balance the economy due to halving the quantity of magnesium chloride to be dealt with.

Some attention has been drawn recently to a second Austrian method of recovering sulphur from alkali-waste: a method proposed by Herr Opl, of the chemical works of Hruschau, in Moravia. This gentleman proposes to mix waste with water, to treat the mixture with CO_2 and so drive off H_2S from it, and then to pass this H_2S into more mixture of waste with water, in order that it shall be absorbed by the calcium sulphide of this second quantity of waste with formation of solution of calcium sulphydrate, which could then be treated in any one of several ways. This proposal seems to me defective, for the reason, among others, that I do not see how it would be practicable to avoid sending an excess of CO_2 into the second quantity of mixture of waste and water, which excess of CO_2 would react on some of the calcium sulphydrate formed in that second quantity of such mixture, driving off H_2S, and so occasioning both loss of sulphur and nuisance. Certainly, Herr Opl's method of getting the sulphur of alkali-waste into solution as calcium sulphydrate cannot, I think, compete with the simpler method of heating the waste with water under pressure.

Here, at last, I draw this too long paper to a close. I have had to show in it that the immediate future of the English Leblanc soda industry is somewhat gloomy; but I trust that I have shown also reason to believe that sufficient attention to the complete utilization of all raw materials is yet capable of saving it. Very much has yet to be done before it will be placed once more on a satisfactory basis; but *nil desperandum!* Patient courage and wisely-directed labour will bring all right again in time. A French Leblanc soda-maker, discussing in Paris, a few weeks ago, "l'affaire de Rio Tinto," spoke very hopelessly at first, but suddenly his countenance brightened, and he said "*Mais, courage!* This is not the first time, nor the second, since I have been in the trade, that we have been menaced with apparently unavoidable ruin; but we have always pulled through before, and we will pull through again." That is a spirit on which we in England specially pride ourselves; and in whatever "pluck," combined with intelligence, can do,—and in this case I believe that they can do all that is required,—I am confident that my countrymen will not be left behind.

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN *v.* LEWIN.

At the Stonehouse County Court, before S. S. Underhay, Esq., deputy judge, on Monday, March 19, the Council of the Pharmaceutical Society sued Mr. E. C. Lewin, carrying on business as a chemist, at Whimple Street, Plymouth, at the Stonehouse County Court, to recover two penalties of £5 each; first, for that he styled himself as "chemist" and carried on business as a chemist without having duly qualified himself; and, second, that not being a duly qualified person he sold a poison scheduled in the Act.

Mr. F. R. Stanbury (instructed by Messrs. Flux, Son and Co.) represented the Society.

The defendant did not appear.

Mr. Stanbury explained the nature of the action, and said Mr. Lewin's name did not appear on the Register of Chemists, which he produced, and which could be accepted as evidence by the Court. The defendant was well aware that he was infringing the law, because he had previously paid fines to the solicitors of the Pharmaceutical Society (Messrs. Flux, Son and Co.) for similar offences, and he (Mr. Stanbury) had served notice on Mr. Lewin to produce the letters he had received in relation thereto. Of course it was for the protection of the public that gentlemen who entered into business as chemists and dispensed drugs and poisons should thoroughly understand that business. On February 16, last, his (Mr. Stanbury's) clerk went to defendant's shop and purchased of him a packet marked "oxalic acid," the label on the paper in which the poison was wrapped was endorsed, "Poison.—Lewin, chemist." Oxalic acid was one of the poisons coming under the schedule, and it was mentioned in the Act referred to, that any person not duly qualified selling "oxalic acid" should be liable to a fine of £5. The Act went on to say further, that any person who exhibited or used the name or title of "chemist" and at the same time not being a duly registered person should be liable thereby to a penalty of £5. That defendant had infringed the law was plain as he had sold "oxalic acid" and had styled himself "chemist" having no authority to do so. When his (Mr. Stanbury's) clerk served a notice on defendant, he admitted that he had infringed the Act, but said that he hoped to have been able to set the matter right before it came into court.

Howard Stanley Walter, a clerk in Mr. Stanbury's employ, proved purchasing a packet of "oxalic acid" from defendant and handing it over that morning, unopened, to Mr. Codd, for analysis.

Mr. F. Codd, chemist, stated that he had analysed a portion of the contents of the packet produced, and proved it by four tests to be oxalic acid, a poison included in schedule 2 to the Act.

Mr. Stanbury: Mr. Codd is Local Secretary of the Pharmaceutical Society and I think it right to say that he knew nothing about this prosecution when the packet of poison was taken to him.

Robert Ellis, clerk to Mr. Stanbury, said he served notices on Mr. Lewin and asked him if he had received the letters, copies of which he showed him, relating to a fine of £5 which he had already paid to the solicitors of the Pharmaceutical Society. Mr. Lewin admitted having received the letters.

Mr. Stanbury said, that as the case had been one that had entailed a certain amount of labour he asked his Honour to pass judgment with costs on the higher scale, as was allowable by the recent County Court Act.

His Honour gave judgment for the full amount of penalties, £10, with costs on the higher scale, £8 7s. 10*d*.

Poisoning by Prussic Acid.

An inquest was held at Christchurch, on Tuesday, March 13, before Mr. Druitt, Coroner, to inquire into the cause of the death of Mrs. Eliza Louisa Broadway.

According to the evidence of the husband the deceased had been in the habit of taking occasionally, before going to bed, some warm ale containing a few drops of laudanum and sal volatile. These preparations were contained in bottles usually kept in a cellaret, and in the same place was a bottle containing prussic acid which had been obtained for the purpose of poisoning a dog, but not used. The prussic acid was originally supplied in a bottle with three poison labels on it, but this having been broken deceased had placed it in another one, transferring to it one of the poison labels. On the previous night he had found his wife dead in bed by his side.

Dr. Henry W. Hartford deposed that just before Christmas he let Mr. Broadway have about 60 drops of Scheele's prussic acid to poison a dog the next morning. He wrote "Prussic Acid" on the bottle with a red "poison" label underneath it; put "poison" two or three times on the back, and gave him strict injunctions not to let it go out of his possession, and that he was to break the bottle as soon as he had used it. On the previous night Mr. Broadway came to his house and stated that he had found his wife lying dead in bed by his side; the room smelt of prussic acid, and that he feared that she had taken it in mistake for sal volatile, which she kept in the same place. Witness examined the place where the bottles were kept, and found four bottles in a division of the drawer, one contained about three teaspoonfuls of sal volatile; a small one was nearly full of laudanum; one labelled "prussic acid—poison" was empty; and there was one of olive oil. The opium and sal volatile were inside, and the oil and prussic acid outside.

As the result of a *post-mortem* examination medical evidence was given that deceased met her death through poisoning by prussic acid, and the jury returned an open verdict to that effect, and censured the husband for his carelessness in keeping so dangerous a poison.

Obituary.

RALPH DAVISON.

It is with great regret that we announce the death on Saturday last, the 24th inst., of Mr. Ralph Davison, Pharmaceutical Chemist, of Haysthorpe, Holgate Hill, York, in the 61st year of his age. Mr. Davison joined the Pharmaceutical Society in 1845, and for the last sixteen years has filled the post of Local Secretary, having continued his services in that office and as Local Superintendent of Examinations even after his retirement from business a few years ago. In 1881 Mr. Davison presided over the Local Committee which entertained the British Pharmaceutical Conference during its visit to York. During more than twenty years Mr. Davison held the position of Councillor in the city of York, and in this and many other ways rendered good and much appreciated service to his fellow citizens.

Notice has also been received of the death of the following:—

On the 2nd of February, Mr. James Rowell Rickard, Chemist and Druggist, Wadebridge, Cornwall. Aged 69 years.

On the 11th of March, Mr. Alfred Hodder, Pharmaceutical Chemist, High Street, Camden Town. Aged 42 years. Mr. Hodder had been a Member of the Pharmaceutical Society since 1864.

On the 15th of March, Mr. Ralph Robert Warrior, Chemist and Druggist, Edge Hill, Liverpool. Aged 55 years.

On the 16th of March, Mr. William Matthias Rackham, Chemist and Druggist, Upper Market, Norwich. Aged 51 years.

On the 26th of March, Mr. Francis Staveley, Chemist and Druggist, Park Lane, Liverpool. Aged 64 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Acetic Ether.

Sir,—It appears from the very able and complete investigation which Dr. W. Inglis Clark has made of the various processes which have been suggested for the production of acetic ether, as reported in your last number, that the process yielding the best result is that of the British Pharmacopœia. And this has been demonstrated notwithstanding the disadvantage resulting from larger proportions of sulphuric acid and acetate of soda having been used in the experiments than the Pharmacopœia process was intended to indicate.

I cannot understand how Dr. Clark could have inferred that the term "parts," when used in describing a process, without further explanation, should mean one thing as applied to a solid and another as applied to a liquid. The term is very commonly employed in describing chemical processes, and I have never seen it used otherwise than to represent parts by weight, unless accompanied by an explicit representation of its having a different meaning, as in the case of Squire's 'Companion to the Pharmacopœia,' where the explanation is given at the head of every page, clearly indicating what would be inferred in the absence of such explanation.

The postscript to Dr. Clark's paper seems to show that he had become sensible of having incorrectly interpreted the Pharmacopœia process, for he says:—"If we, however, calculate out the proportions as represented by weight as well as by measure, it seems probable that all the parts are intended to be taken by weight, and if this be so, the proportions in themselves are satisfactory enough."

The following figures will serve to show how well the proportions given in the Pharmacopœia accord with those which Dr. Clark has deduced theoretically and practically.

The theoretical quantities of the ingredients as given by Dr. Clark, if reduced to parts by weight, will be—

Rectified spirit	237·1	or 5	parts.
Sulphuric acid	423·8	,, 8·9	,,
Sodium acetate	351·0	,, 7·4	,,

Practically, however, it was found desirable to have excess, but not much excess, of sulphuric acid present, and the proportions suggested by Dr. Clark, when reduced to parts by weight, are as follows:—

Rectified spirit	237·1	or 5	parts.
Sulphuric acid	521·5	,, 11	,,
Sodium acetate	351·0	,, 7·4	,,

The Pharmacopœia proportions, similarly expressed, would be—

Rectified spirit	237·0	or 5	parts.
Sulphuric acid	474·0	,, 10	,,
Sodium acetate	379·2	,, 8	,,

As I had originally devoted considerable attention to this process, I should have been surprised to find that it required the alteration suggested, and, in fact, it will be found that the proportions indicated in the Pharmocopœia are all that can be desired, as also are the properties assigned to the finished product.

The value of Dr. Clark's paper will scarcely be lessened by withdrawing the requirement for any alteration of the simple and sufficiently exact statement of proportions in the Pharmacopœia process. The chief merit of the paper consists in the elaboration of important details relating to the production of acetic ether, the determination of its right specific gravity and solubility in water, and the best means of purifying the first crude product of the Pharmacopœia process. With regard to the last-named object, the author has suggested a mode of operating which is obviously a great improvement upon that described in the Pharmacopœia.

T. Redwood.

Sir,—Ladies are said to put the most important part of their communications in the P.S., and as far as the British Pharmacopœia is concerned Dr. Clark seems to have followed their example.

That a gentleman of Dr. Clark's attainments should have made such an assumption as that the Pharmacopœia meant solids by weight, liquids by measure, seems to me most extraordinary.

I must protest against the assumption that such a method of stating formulæ (not physicians' prescriptions) is according to English usage. On the contrary, except in Squire's 'Companion,' I have, as far as my memory serves, seen it used only once.

In this case it was quoted as a "Pharmacopœial dictum" by a gentleman who recently read a paper before the North British Branch, where this heresy seems to have found a home. The B.P., on almost every page, refutes such a supposition, as far as it is concerned, by using the terms fluid drachm and fluid ounce; and even Squire's 'Companion,' although written for the use of medical men, prints the statement, "Solids by weight, liquids by measure," on every page, which, to my mind, is conclusive evidence (if such were required) that such a rendering of formulæ is not according to "English usage," but an exception requiring specially to be noted.

But, respecting Dr. Clark's valuable and exhaustive paper, it may be well to compare the quantities required by theory, the B.P. and Dr. Clark for the production of acetic ether:—

	Theory (roughly).	B.P.*	Clark.
Alcohol ·838	50	50	50
Dry acetate of soda . . .	74	80	62
Sulphuric acid, B.P. . . .	91	100	92

Now these three proportions are not so very dissimilar, and I have no doubt that all would produce a satisfactory result, although perhaps Dr. Clark's may be the best. The latter does not seem, however, to be remarkable so much for the excess of sulphuric acid as for the deficiency of acetate.

I have myself only worked with the theoretical proportions and have found no difficulty (using chloride of calcium and carbonate of potash for purification) in obtaining a product of a pretty constant composition, and one having the same specific gravity as that of the best makers, viz., about ·891.

A preparation of this gravity is evidently easily obtained, as many writers give figures very closely approximating to it. I have no doubt, however, after reading an account of Dr. Clark's very careful experiments, that he is right, and that a sample of ·890 specific gravity does contain a certain amount of alcohol or common ether.

Doubtless acetic acid is not a desirable impurity, but ethyl ether or even alcohol in small quantities are, I should imagine, harmless, and it would seem desirable to adopt a gravity which is easily attainable. Perhaps, however, Dr. Clark's process may be found to be worked with almost as great facility and constancy.

87, *Bold Road, Liverpool.* Alfred C. Abraham.

The Pharmacy Act Amendment Bill.

Sir,—Your article in last week's Journal calls our attention once again to the draft Pharmacy Bill. Without going fully into the merits or demerits of this proposed Bill, there is one part which strikes my mind as pre-eminently objectionable, and which it is to be hoped the trade at large will by no means quietly allow to pass into law. I refer to clauses 4 to 6, touching the penalties attached to the sale of patent or proprietary medicines, in the event of such containing a poison within the meaning of the Pharmacy Act, 1868.

In your remarks upon this point you state "That the chemist is not to be looked upon as selling, like the grocer or oilman, articles of whose nature he does not pretend to have any knowledge," etc., etc. Now, unfortunately, I must venture to differ from you in this assertion, so far as regards the sale of proprietary medicines sold as patents, and I think the experience of the trade at large will support the statement, that as a rule we are practically excluded from the possibility of knowing the contents of the majority of the nostrums with which the market is flooded under the protection of the patent medicine stamp; and yet by these clauses we are to be held responsible, and subject to penalties for not knowing that which the proprietors take every precaution against our knowing.

But again in clause 4, the name and address of the first seller is required. Who can be the first seller but the person by whom the preparation is actually made and sent forth into the market? Whereas clause 6 again throws the entire responsibility, with all the accompanying annoyances, upon the retail dealer, notwithstanding the possibility that the article may have previously passed through three or four intermediate hands. In the event of such becoming law, I can see no alternative other than the abandonment of the sale of all patents, unless we are prepared to risk the continual annoyance of actions, fines and visionary prospects of indemnification from unknown parties, possibly men of straw.

Another serious difficulty is one which comes home to our own preparations in common with others, viz.:—How far is it necessary or desirable to label every proprietary article "poison" in which a possible infinitesimally small dose of opium, morphia, etc., is introduced? That protection against the unguarded sale of poisons is desirable is not questioned, but whether the existing law, if properly carried out, together with an extension of the schedules of poisons, is not in itself sufficient, I think very doubtful.

Without going into other points which this Bill is supposed to remedy, but which I fear in practice will prove lamentably wanting, I would ask the Council to consider whether much difficulty might not be removed by, among other alterations, the addition of another clause requiring the registration of all proprietary preparations containing poisons, with the name and quantity of such poison contained in each bottle, box or packet. The number of such registration to be distinctly printed upon the labels, and outside the wrapper. And further, whether some scale might not be devised, beyond which alone it might be deemed necessary to require the poisons caution to be affixed.

I hope that some such material alterations may yet be introduced into the Bill.

Belgravia House, West Brighton. Edwin B. Vizer.

Weight.—According to section 45 of the Weights and Measures Act, a weight or measure duly stamped by an inspector under the Act is a legal weight or measure throughout the United Kingdom, unless found to be false or unjust, and is not liable to be restamped because used in any place other than that in which it was originally stamped.

D. M. L.—Such persons would stand in the same position as others who have not passed the Preliminary examination.

Herbalist.—(1) *Berberis Darwinii*, probably; (2) *Luzula sylvatica*; (3) *Dicranum majus*; (4) *Hypnum rutabulum*; (5) *Thuidium tamariscinum*; (6) *Lophocolea bidentata.*

B. R. is recommended to make his want known through the usual channel of advertisement.

Vinum.—Griffin's 'Chemical Testing of Wines and Spirits.' See a paper by Nessler and Barth, before, p. 43.

Southwalian.—The visitor from the country to the Annual Meeting is not confined to one evening's social intercourse, since the Conversazione is preceded by the Annual Dinner. The Annual Ball is held in the early part of each year.

G. W. Gorman and *R. H.*—To a solution of chloride or nitrate of cobalt in water add sesquicarbonate of ammonia sufficient to redissolve the precipitate at first formed.

J. R.—See a paper on the Testing of Olive Oil, by Mr. Conroy, *Pharm. Journal*, May 14, 1881, p. 933.

Communications, Letters, etc., have been received from Messrs. Clark, Baldock, Parker, Devonian, A.P.S., R.L.

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* Evidently a free rendering of the theoretical requirement.

THE BITTER PRINCIPLE OF HYMENODICTYON EXCELSUM.*

BY W. A. H. NAYLOR.

The interest attaching to the two species of *Hymenodictyon*, viz., *H. excelsum* and *H. obovatum*, is derived from the circumstance that they both yield a bitter bark which is in common use among the natives of India as a tonic.

Surgeon-Major Dymock has remarked that the bark of *H. excelsum* is the more bitter of the two and is therefore probably the more valuable, although he is not aware that either of the barks has been properly tested in European practice.

As a remedy of repute it was invested with additional importance when it received a place among the non-official drugs of the Pharmacopœia of India for 1868. Referring to the species *H. excelsum* it is there stated that the "inner coat of the bark, according to Roxburgh, possesses the bitterness and astringency of cinchona. . . . The outer light spongy layer of the bark is comparatively tasteless. Considering the natural order to which the tree belongs and the sensible properties of its bark, it is not improbable that it may prove a valuable remedy. In all future inquiries into the subject of Indian antiperiodics this bark should be one of the first to which attention should be directed." The success which attended its use as a native febrifuge probably gave rise to the supposition that its medicinal properties were due to the presence of quinine. Consequently, in 1870, Mr. Broughton, who was at that time the Government Quinologist at the Ootacamund plantations, submitted to an examination the *fresh* bark of the tree. He found that the bitter taste was due to the existence of *æsculin*, and that the bark when dry was almost tasteless owing to its transformation into *æsculetin*, the decomposition having been induced by contact with decaying organic matter.

Through the kind services of Mr. E. M. Holmes, who placed at my disposal a quantity of the dried bark, an opportunity was afforded me of investigating its bitter principle. As the results obtained differ widely from these obtained by Mr. Broughton I am induced to place them on record.

The following was the mode of treatment. The bark, after being reduced to a moderately fine powder, was mixed with one fourth of its weight of lime and made into a thick paste with water. The mixture was dried and exhausted by percolation with boiling alcohol of 90 per cent. The percolate was acidified with sulphuric acid and the alcohol recovered by distillation. The residue was treated with hot water, filtered and the filtrate precipitated with caustic soda, when a gelatinous precipitate fell. The precipitate was collected, washed and dried in a water oven. Its weight was taken and found to be equivalent to 1·75 per cent. In this condition it presented the appearance of a blackish-brown gum-resinous mass, friable at the temperature of the water-bath, but readily becoming sticky through absorption of moisture as the temperature was lowered. It had a persistently bitter taste which was more quickly perceived when in solution than when in the solid state. It had an unmistakably alkaline reaction and dissolved readily in the mineral acids to all but neutralization. Its solution in dilute hydrochloric acid reacted with the following reagents:—With phosphomolybdic acid it gave a canary yellow precipitate; with iodide of bismuth and potassium, a brick red; with iodine in iodide of potassium, a brown flocculent precipitate; with iodide of mercury and potassium, a cream-coloured precipitate; with iodide of cadmium and potassium, a feebly coloured precipitate; with picric acid, a bright yellow precipitate, and with tannic acid a brownish precipitate. The several precipitates were amorphous. If to these reactions be added the fact that the body contained a quantity of nitrogen there can be no reasonable ground to doubt its alkaloidal character. In order, however, to study its properties more fully and with greater certainty it was necessary to resort to some method of purifying it. It was found that treatment of its alcoholic solution with animal charcoal was far too wasteful. The object was largely accomplished by digesting the crude alkaloid in a limited quantity of ether, dissolving the ether residue in acetic acid, and submitting the solution to partial precipitation with caustic soda or ammonia. The result was a white gelatinous precipitate, which became yellow on drying and assumed a darker colour when subjected to a temperature of 100° C. It dissolved readily in ether, alcohol and chloroform, but was little soluble in water. Its solution in alcohol of 95 per cent. had no action on a beam of polarized light. With the mineral and many organic acids it formed amorphous salts. Every attempt to crystallize the alkaloid or its salts of the mineral acids proved a complete failure. It began to fuse at about 120° C. Its solution in hydrochloric acid gave precipitates with perchloride of mercury, ferro- and ferridcyanide of potassium, iodide of potassium, phosphate of sodium, chloride of sodium and ammonium and nitrate of sodium. The precipitates resembled each other in character, and varied in colour from grey to brownish-yellow. The sulphate of the alkaloid was precipitated by nitric acid. Knowing as a matter of experiment that both beberine and quinoidine behaved in a similar manner towards these reagents, the thought was naturally suggested that the body I had isolated might be identical with one of these alkaloids, or more probably with paricine.

To decide this point a platinum compound of the alkaloid was prepared, and the percentage of carbon and hydrogen contained in the alkaloid itself was estimated. The double compound, when freshly formed, was a yellow amorphous precipitate, which became reddish yellow on drying at 110° C. On ignition it left 20·08 per cent. of platinum. The formula $(C_{16}H_{18}N_2O.HCl)_2+PtCl_4$—the platinum compound of paricine as determined by Hesse—requires 19·68 per cent., while that of beberine requires 19·50 per cent., and quinoidin from 26·28 to 26·59 per cent. of platinum respectively.

The combustion of the alkaloid was made with cupric oxide in a current of oxygen. Before it was burnt it was dried at 115° C. The mean of a series of satisfactorily accordant results gave 75·82 per cent. of carbon and 9·8 per cent. of hydrogen as against 75·59 per cent. of carbon and 7·08 per cent. of hydrogen for paricine dried at 100° C. Here it will be observed that while the carbon is within the limit of experimental error the hydrogen lies quite outside the field of computation.

A not improbable explanation of this anomaly—if anomaly it be—is to be found mainly in the high temperature at which the alkaloid was dried. This

* Read at an Evening Meeting of the Pharmaceutical Society, April 4, 1883.

was adopted as being the one at which beberine becomes anhydrous. Subsequent experiments proved that the alkaloid suffered partial decomposition, becoming converted into a resinous substance. Be this as it may, this much may be affirmed, that the bitter principle of the *dried* bark of *Hymenodictyon excelsum* is not the glucoside æsculin or its decomposition product æsculetin, but an alkaloidal substance. That as such it is allied to quinoidine, beberine and paricine. From quinoidine it differs in being optically inactive and from its double compound containing relatively less platinum. From beberine it differs in that it contains a higher percentage of carbon, while its double compound also yields a relatively larger amount of platinum. From paricine it differs alone in the percentage of hydrogen it gave, to which reference has already been made. So far the balance of evidence is clearly in favour of paricine.

In that I have been compelled, through force of circumstances, to discontinue for a time my investigations upon this subject, constitutes my apology for presenting the results while yet in so incomplete a condition. So soon as opportunity affords, I hope to resume my work on this inquiry and satisfactorily determine the identity of the alkaloid.

It may be stated that 2·5 per cent. of a waxy substance was extracted from the bark.

[*The discussion on this paper is printed at p.* 832.]

REMARKS ON SOME MEDICINAL PLANTS OF CEYLON.*

BY W. C. ONDAATJE, F.L.S.,
Colonial Surgeon of Ceylon.

It is well known that several Indian drugs have been incorporated into the British Pharmacopœia, which have added to the number of remedial agents, thus conferring no small advantage on the medical profession, and the publication of the Pharmacopœia of India has conferred an incalculable benefit on the medical practitioner in the East, but still there are many medicinal plants of the colonies and India which deserve a scientific examination.

The public revenue of the colonies is applied to many useful purposes for promoting the general welfare of the people. I believe that if a sum of money were voted annually to be expended in carrying out the chemical examination of indigenous drugs and other products by competent persons in this country, all expenditure would be well repaid by the advantages reaped in the saving of Government expenses for medicines and in the demand created for native products.

It is a matter of great importance to the millions in the East, and in fact to the whole community, that they be enabled to avail themselves of efficient substitutes for many official drugs which our colonies supply.

I may here mention that the annual cost of drugs for the use of the public service of Ceylon forms a considerable item. The natives are now more largely availing themselves of European medical practice, since the extension of Government hospitals and dispensaries, and consequently an increasing expenditure under this head cannot be avoided without detriment to the best interests of the population.

The necessity for adopting such a measure as I have suggested will be apparent to those who have studied Indian drugs.

The natives of the East have attributed imaginary properties to many plants and drugs, and much that is absurd is mixed up with much that is valuable.

While clinical observations in hospitals and medical colleges are of much importance to ascertain the therapeutic action, chemical examination will perfect the knowledge thus obtained, and will, with the aid of pharmacy, show the best mode of preparation and administration, and no institution can more efficiently carry out this work than the Pharmaceutical Society of Great Britain.

I will now proceed to make a few brief remarks on some medicinal plants which I brought with me from Ceylon.

1. *Randia dumetorum*, Lam.—The seeds of this tree are used by the natives of Ceylon and India as a reliable agent in producing emesis.

I am not aware that any chemical examination has been made to detect the active principle.

It belongs to the same family (Cinchonaceæ) as *Cephaelis Ipecacuanha*, and it would be important to determine if it contains emetine, more particularly since an allied species, *R. uliginosa*, is, according to Dr. Dymock, used in India as a remedy for dysentery. This species is also indigenous in Ceylon. The bark of *R. dumetorum* also possesses the same qualities.

I have seen the powdered seeds used with as good effect as ipecacuanha in doses of 5 to 10 grains. If analysis should prove *Randia* to possess the same active principle as ipecacuanha, a great saving might be effected by its substitution for the more expensive Brazilian drug.

Some weeks ago I had the pleasure of presenting a small quantity of the fruit to your Museum.

2. *Sethia acuminata*, Arn.—This is a remedy much used by the Cinghalese as a vermifuge. The part used is the leaves, the juice of the leaves being mixed with sugar and castor oil, or with the powder of the leaves. The leaves are easily powdered when dried.

Professor Bentley notices its vermifuge properties in his 'Manual of Botany.'

Dr. Thwaites, in his 'Enumeratio Plantarum Zeylaniæ,' also refers to it. He says, "the Cinghalese attach much value to this plant as an anthelmintic for children, giving the juice expressed from the fresh leaves." It is chiefly used for expelling round worm and possesses the advantage of not having a disagreeable taste. The powder is used in the dose of 10 to 15 grains.

I presented a small quantity of the leaves and a flowering specimen of the plant to your Museum.

3. *Coscinium fenestratum*, Colebr.—Many years ago, while using it as a tonic, I found by experiment that it possessed *antiseptic* properties, to which I beg to invite your attention.

I found that pieces of beef immersed in an infusion of the stem were preserved for several weeks. I am unable to give more details, as my notes made in Ceylon are not at hand.

I also used in Ceylon a weak infusion of the stem as a lotion for foul ulcers with great success.

I believe the plant has already been subjected to chemical analysis in this country and contains the active principle berberia.

It has been used also as a yellow dye. As this drug has recently been imported in quantity into England it could easily be obtained, and an examination of the cause of its antiseptic properties seems desirable.

4. *Vateria Indica*, L.—Some of the bark of the tree I have presented to your Museum. The natives use it daily to arrest the alcoholic fermentation of

* Read at an Evening Meeting of the Pharmaceutical Society, April 4, 1883.

the juice of the Jaggery palm, *Caryota urens,* which is a favourite beverage with them. This property of preventing fermentation might, I think, be turned to account in some of the great manufacturing industries, if not in medicine, and I trust the bark may be thought deserving of chemical investigation by some members of your Society.

5. *Semecarpus Gardneri,* Thw.—The black resin yielded by this tree, although not possessing medicinal properties, may be of some interest in the arts.

I have presented to the Museum some of the resin.

The resin is hard, breaks with a smooth fracture, burns with a bright flame, is soluble in turpentine, and adheres strongly to wood and metal. It is free from acridity.

The formula for using the resin as a varnish is as follows:—

To a saturated solution of *Vateria Indica* resin in oil of turpentine, add by degrees pieces of black resin, and put it into a bottle and shake it well until the whole is dissolved, then apply it to wood or metal, which will give a varnish of great lustre and beauty. The resin should be first melted and strained through coarse calico or a sieve, to free it from impurities.

6. *Vernonia anthelmintica,* Willd.—This plant is cultivated by the Cinghalese and is in great repute as a remedy, which is indicated by its name.

The seeds are black, of a bitter and nauseous taste, are easily procured from bazaars, and are commonly used by the village people for expelling the ascaris lumbricoides and act as a vermicide.

The dose of the powdered seed to an adult is from ½ to 1 drachm.

The native physicians prescribe it generally as a tonic in the shape of an infusion.

The Cinghalese name is *sanne nayan* and the Tamil name *kadoseragam.*

European practitioners in India, from personal observations, confirm the truth of the above statement.

7. *Alstonia scholaris,* R. Br.—In 1865 I forwarded to England, to my friend and correspondent, Mr. P. L. Simmonds, the Editor of the *Technologist,* specimens of a kind of caoutchouc, as a substitute for gutta-percha.

The following information supplied by me appeared in that periodical for August 1865:—

"Another substitute for gutta-percha, the milky juice of the *Alstonia scholaris,* a tree belonging to the natural order Apocyneæ, has been forwarded from Ceylon by Mr. Ondaatje; it is stated to possess the same properties and to be workable as gutta-percha. It readily softens when plunged in boiling water, is soluble in turpentine and chloroform, receives and retains impressions permanently, and is adapted for seals to documents."

The bark of this tree is thick and spongy. Its properties as a medicinal agent are fully described in the Pharmacopœia of India.

8. *Acorus Calamus,* Linn.—The well-known sweet flag I merely notice as an anthelmintic, which property is not included in the Indian Pharmacopœia.

An infusion of the rhizome or root-stock given to young children acts effectually, as I have seen many such cases treated among the natives.

I hope on a future occasion to be able to contribute further notes on the native materia medica of Ceylon.

[*The discussion on this paper is printed at p.* 833.]

NOTE ON ESSENCE FROM GREEN GINGER.*

BY C. SYMES, PH.D.

The increased use of ginger by manufacturers of mineral waters and others, of late years, has created a demand for a "soluble essence," *i.e.,* an essence which, when mixed with water, causes little or no opacity therein.

Dr. Thresh's scientific investigation of the constituents of this rhizome, particularly of the nature of its resinous constituents, added considerably to our knowledge of its composition. But strange to say, the process devised by him on the basis of this investigation, for the preparation of a soluble essence did not give (to my mind) very satisfactory results. Indeed, Dr. Thresh has since testified to the superiority of an essence produced by another maker.

It would seem, therefore, that the field is still open for the application either of science, or the results of experience. The contribution I have to offer this evening is a simple, short, and practical one. Many, indeed most, drugs deterioriate by age, whilst some few, such as *Rhamnus Frangula* bark, are said to improve as they grow older, at least to a certain point. Now, it occurred to me, that the nature and properties of ginger, and its behaviour towards certain solvents of its active constituents, may not be constant at all periods, and the receipt from Rio Janeiro of a supply of green ginger grown at Santa Catherina, enabled me to make an experiment in this direction. The ginger, of which I have here a sample, occurs in large pieces; it is quite soft, and is not decorticated. Two methods were tried for removing the outer portion; the one simple scraping, the other by first soaking in boiling water. The latter did not appear to possess any special advantage, and by the former it lost fully 15 per cent. of its weight. After a few hours' exposure to the air it was weighed, thoroughly dried and reweighed, when it was found to have lost 65 per cent. of moisture.

Taking a sample of the ginger from which the epidermis had been removed, and which had been surface-dried by exposure for a few hours to the air, I cut it in thin slices, and macerated it for some days with an equal weight of rectified spirit, which, when filtered, yielded an essence possessing a very fine aroma, and which when mixed with water scarcely rendered it turbid in the least degree. It is fairly strong, and could doubtless be prepared stronger were the drying of the ginger carried a little further. Probably, however, its solubility would diminish if the drying were completed, and of course the result would cease to be essence of green ginger.

[*The discussion on this paper is printed at p.* 834.]

A NOTE ON SAP.*

BY PROFESSOR ATTFIELD, F.R.S.

Beneath a white birch tree growing in my garden I noticed, yesterday evening, a very wet place on the gravel path, the water of which was obviously being fed by the cut extremity of a branch of the birch about an inch in diameter and some ten feet from the ground. I afterwards found that exactly fifteen days ago circumstances rendered necessary the removal of the portion of the branch which hung over the path, 4 or 5 feet being still left on the tree. The water or sap was dropping fast

* Read at an Evening Meeting of the Pharmaceutical Society, April 4, 1883.

from the branch, at the rate of sixteen large drops per minute, each drop twice or thrice the size of a "minim," and neither catkins nor leaves had yet expanded. I decided that some interest would attach to a determination both of the rate of flow of the fluid and of its chemical composition, especially at such a stage of the tree's life.

A bottle was at once so suspended beneath the wound as to catch the whole of the exuding sap. It caught nearly 5 fluid ounces between eight and nine o'clock. During the succeeding eleven hours of the night 44 fluid ounces were collected, an average of 4 ounces per hour. From 8.15 to 9.15 this morning, very nearly 7 ounces were obtained. From 9.15 to 10.15, with bright sunshine, 8 ounces. From 10.15 until 8.15 this evening the hourly record kept by my son Harvey shows that the amount during that time has slowly diminished from 8 to a little below 7 ounces per hour. Apparently the flow is faster in sunshine than in shade, and by day than by night.

It would seem, therefore, that this slender tree, with a stem which at the ground is only 7 inches in diameter, having a height of 39 feet, and before it has any expanded leaves from whose united surfaces large amounts of water might evaporate, is able to draw from the ground about 4 litres, or seven-eighths of a gallon of fluid every twenty-four hours. That at all events was the amount flowing from this open tap in its water system. Even the topmost branches of the tree had not become, during the fifteen days, abnormally flaccid, so that, apparently, no drainage of fluid from the upper portion of the tree had been taking place. For a fortnight the tree apparently had been drawing, pumping, sucking—I know not what word to use—nearly a gallon of fluid daily from the soil in the neighbourhood of its roots. This soil had only an ordinary degree of dampness. It was not wet, still less was there any actually fluid water to be seen. Indeed, usually all the adjacent soil is of a dry kind, for we are on the plateau of a hill 265 feet above the sea and the level of the local water reservoir into which our wells dip is about 80 feet below the surface. My gardener tells me that the tree has been "bleeding" at about the same rate for fourteen of the fifteen days, the first day the branch becoming only somewhat damp. During the earlier part of that time we had frosts at night, and sunshine, but with extremely cold winds, during the days. At one time the exuding sap gave, I am told by two different observers, icicles a foot long. A much warmer, almost summer, temperature has prevailed during the past three days and no wind. This morning the temperature of the sap as it escaped was constant at 52° F. while that of the surrounding air was varying considerably.

The collected sap was a clear, bright water-like fluid. After a pint had stood aside for twelve hours there was the merest trace of a sediment at the bottom of the vessel. The microscope showed this to consist of parenchymatous cells, with here and there a group of the wheel-like or radiating cells which botanists, I think, term sphere-crystals. The sap was slightly heavier than water, in the proportion of 1005 to 1000. It had a faintly sweet taste and a very slight aromatic odour.

Chemical analysis showed that this sap consisted of 99 parts of pure water with 1 part of dissolved solid matter. Eleven-twelfths of the latter was sugar.

That the birch readily yields its sap when the wood is wounded is well known. Phillips, quoted by Sowerby, says:—

> "Even afflictive birch,
> Cursed by unlettered youth, distils
> A limpid current from her wounded bark,
> Profuse of nursing sap."

And that birch sap contains sugar is known, the peasants of many countries, especially Russia, being well acquainted with the art of making birch wine by fermenting its saccharine juice.

But I find no hourly or daily record of the amount of sugar-bearing sap which can be drawn from the birch, or from any tree, before it has acquired its great digesting or rather developing and transpiring apparatus—its leaf system. And I do not know of any extended chemical analysis of sap either of the birch or other tree.

Besides sugar, which is present in this sap to the extent of 616 grains—nearly an ounce and a half—per gallon, there are present a mere trace of mucilage; no starch; no tannin; $3\frac{1}{2}$ grains per gallon of ammoniacal salts yielding 10 per cent. of nitrogen; 3 grains of albumenoid matter yielding 10 per cent. of nitrogen; a distinct trace of nitrites; 7·4 grains of nitrates containing 17 per cent. of nitrogen; no chlorides, or the merest trace; no sulphates; no sodium salts; a little of potassium salts; much phosphate and organic salts of calcium; and some similar magnesian compounds. These calcareous and magnesian substances yield an ash when the sap is evaporated to dryness and the sugar and other organic matter burnt away, the amount of this residual matter being exactly 50 grains per gallon. The sap contained no peroxide of hydrogen. It was faintly if at all acid. It held in solution a ferment capable of converting starch into sugar. Exposed to the air it soon swarmed with bacteria, its sugar being changed to alcohol.

A teaspoonful or two of, say, apple juice, and a tablespoonful of sugar put into a gallon of such rather hard well-water as we have in our chalky district, would very fairly represent this specimen of the sap of the silver birch. Indeed in the phraseology of a water-analyst, I may say that the sap itself has 25 degrees of total, permanent, hardness.

How long the tree would continue to yield such a flow of sap I cannot say; probably until the store of sugar it manufactured last summer to feed its young buds this spring was exhausted. Even within twenty-four hours the sugar has slightly diminished in proportion in the fluid.

Whether or not this little note throws a single ray of light on the much debated question of the cause of the rise of sap in plants I must leave to botanists to decide. I cannot hope that it does, for Julius Sachs, than whom no one appears to have more carefully considered the subject, says, at page 677 of the recently published English translation of his text-book of botany, that "although the movements of water in plants have been copiously investigated and discussed for nearly two hundred years, it is nevertheless still impossible to give a satisfactory and deductive account of the mode of operation of these movements in detail." As a chemist and physicist myself, knowing something about capillary attraction, exosmose, endosmose, atmospheric pressure and gravitation generally, and the movements caused by chemical attraction, I am afraid I must concur in the opinion that we do not yet know the real ultimate cause or causes of the rise of sap in plants.

Ashlands, Watford, Herts.

[*The discussion on this paper is printed at p.* 834.]

CATALOGUE OF SPECIMENS OF CINCHONA BARK, WITH ILLUSTRATIVE BOTANICAL SPECIMENS,

FORWARDED THROUGH HER MAJESTY'S SECRETARY OF STATE FOR INDIA FOR THE PHARMACEUTICAL SOCIETY FOR GREAT BRITAIN.

Number on Specimens.	Name of Specimen.	Number of Herbarium Specimens.	Kind of Bark.	Habitat.	Remarks.
				NILGIRIS.	
1/2	*C. officinalis, Uritusinga*	1	Natural .	Dodabetta .	This is the *C. Uritusinga*, type of Pavon.
2/7	*do. do.*	1	Mossed .	do. .	*C. Uritusinga*, Pavon type.
3/12	*do. Condaminea*	1	Renewed	do. .	*C. Condaminea*, How. variety.
4/15	*do. do.*	1	do.	do. .	*do.* How. type.
5/22	*do.*	1	From coppice shoots	do. .	These botanical specimens and also the bark were taken from coppice shoots.
6/27	*do.*	1	Renewed after shaving.	do. .	The bark belonging to this specimen is renewed, after the tree had been subjected to the Java shaving process. In this the outer cellular portion is shaved or pared off, the inner vascular layer being left intact.
7/28	? corky bark	1	Natural.	do. .	Bark covered externally with a thick corky layer, and very peculiar, of officinalis type but undetermined species.
8/29	*C. officinalis*	1	Renewed	do. .	
9/36	*do. Condaminea*	1	do.	Naduvattam	This is the *C. Condaminea* type of How.
10/9	*do. Uritusinga*		do.	Dodabetta .	Large leafed or *C. Uritusinga*, Pavon type.
11/16	*do. angustifolia*	1	Mossed .	do. .	This is the No. 1 form of *C. Angustifolia*, How., according to the estate nomenclature.
	do. do.	0	Renewed	do. .	
12/13	*do. do.*	2	do.	do. .	This is the No. 2 variety, in the estate nomenclature, of the variety *C. angustifolia*, How.
A/0	*do. Uritusinga*	0	Natural .	do.	
B/44	*do.*	0	do.	Naduvattam	
C/25	*do. angustifolia*	0	do.	Dodabetta	
D/0	*do. Uritusinga*	0	Mossed .	do.	
E/43	*do.*	0	do.	Naduvattam	
F/42	*do.*	0	do.	do.	
G/0	*do.*	0	Renewed	Dodabetta	
13/0	*C. Pitayensis*	1	Natural .	do.	
14/0	*do.*	1	No bark.	do.	
15/1	*C. Pahudiana*	1	Natural .	do. .	This species was discovered by Hasskarl, cultivated on a large scale in Java and found to be worthless. From Java it was introduced into India, but fortunately its culture here never went beyond the stage of an experiment.
16/23	*do.*	1	Mossed .	do.	
17/50	*do.*	2	Natural .	Naduvattam	
18/5	? corky bark	2	Renewed	Dodabetta .	This plant was said by Cross, on his recent visit to the Nilgiris, to be the *C. crispa* of which he sent seeds from the Loxa Mountains. That it came from Loxa there is no doubt, as the few specimens of it on the estate of Dodabetta are growing amongst the "crown" barks introduced from that region. It differs, however, very much from the *C. crispa* of Tafalla, which belongs to the *C. officinalis* group of Weddell. In general appearance it is more nearly allied to Weddell's section *Pahudianæ*. Its bark is also very peculiar, in fact unique.
19/14	? do.	1	Natural .	do.	
20/32	*C. micrantha*	2	do. .	Naduvattam	
21/48	*C. Calisaya*	1	do. .	do. .	This form of the *C. Calisaya* grows to a considerable size and has bright green shining leaves, some of which measure from 6 to 7 inches in length by 3½ to 4 inches in width. Flowers pink, very sweetly scented.
22/49	*do.*	2	do. .	do. .	This plant approaches the *Boliviana* form of Weddell, but the *Calisayas* are most variable.
23/47	*do. Josephiana* .	1	do. .	do.	

Number on Specimens.	Name of Specimen.	Number of Herbarium Specimens.	Kind of Bark.	Habitat.	Remarks.
24/38	*C. anglica*	1	Natural .	NILGIRIS. Naduvattam	This plant, according to Howard, is a hybrid between *C. Calisaya* and *C. succirubra*. On the other hand it is said to come perfectly true from seed, and in October last a planter sent me a fresh specimen of it from Wynaad, which had been raised from seed procured from Java, and which was identical with the Naduvattam plants. It appears to me to be only a variety of *C. Calisaya*.
25/35	*do.*	2	Renewed	do.	
H/46	*do.*	0	Mossed .	do.	
26/30	*C.* (*pubescens*)	2	Renewed Natural .	Dodabetta . do. .	This is not the *C. pubescens* of Vahl, but a plant which was considered to be a hybrid by the superintendent of the cinchona estates, the late Mr. McIvor. Mr. Cross, the explorer who was employed in collecting cinchona plants and seeds in the cinchona regions of South America for the Indian Government, regards it as the pubescent form of "Cuchicara," referred to by Dr. Spruce in the Parliamentary Blue Book of 1863, p. 116. Mr. McIvor stated that it is a hybrid between *Cinchona succirubra* and *Cinchona officinalis*.
27/10	*C.* (*pubescens*)	2	Renewed	do.	
28/37	*do.*	2	Natural .	Naduvattam	
29/39	*do.*	1	Renewed	do.	
30/6	? . . . . *do.*	1 0	Renewed Natural .	Dodabetta . do. .	This plant has been known on the Government estates as "McIvor's hybrid" and "Magnifolia," and Mr. Cross, the South American explorer, pronounced it to be the *Pata de gallinazo*, referred to by Dr. Spruce at p. 117 of the Cinchona 'Blue Book,' of 1863, as the smooth variety of the "Cuchicara." The term "Magnifolia" applied to this plant is purely a local one, as it is in no way related to the *C. magnifolia* of Ruiz and Pavon. The Kew authorities, under date the 24th January, 1882, remarked, "it may be said with some certainty that the Nilgiri "Magnifolia" is not the *Pata de gallinazo* of Chimborazo." Mr. Howard, from bark alone, identified it as *C. coccinea*, Pav., which Spruce considered identical with *C. erythrantha*, Pav. For a list of other species to which the name *Pata de gallinazo* has been applied, see Weddell's Notes, Article No. 10.
31/11	? *Pata de gallinazo* .	1	Renewed	do. .	Pata de gallinazo of Cross.
32/20	? *do.* .	1	Mossed .	do. .	Do. do.
33/34	? *do.* .	1	Natural .	Naduvattam	Do. do.
34/40	? *do.* .	2	Mossed .	do. .	Do. do.
35/31	*C. succirubra* . . . . *do.*	1 0	Renewed Mossed .	do. do.	
36/33	*do.*	2	Natural .	do.	
K/0	*do.*	0	do. .	do.	
L/0	*do.*	0	Mossed .	do.	
M/0	*do.*	0	do. .	do.	
N/0	*do.*	0	Renewed	do.	

C. officinalis. Specimens for microscopical sections, showing point of junction between renewed and natural bark.

BIDIE, M.B.C.I.E., *Surgeon-Major*,
Superintendent, Government C. Museum, Madras.

GOVERNMENT C. MUSEUM,
Madras, 27th January, 1883.

The Pharmaceutical Journal.

SATURDAY, APRIL 7, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE POSITION OF PHARMACISTS IN RELATION TO THE PHARMACOPŒIA.

THE unanimity with which the Council, at its meeting on Wednesday last, agreed to the motion of Mr. HAMPSON on the subject of the Pharmacopœia, proves that British pharmacists think the time has come when they should occupy a legally recognized position in respect to the compilation of the text-book which has towards them the force of law. The occasion is certainly opportune. A quarter of a century has now elapsed since the Council established under the Medical Act of 1858 was authorized to publish under its direction one National Pharmacopœia, which should authoritatively take the place of the three Pharmacopœias then existing in the British Islands. At that time, though there was already a promise of better things, it cannot be said that the status of pharmacists in this country was such as to entitle them as a body to expect legal recognition as coadjutors with the medical profession, even in a work for one department of which the pharmacist is so peculiarly well fitted as the preparation of a Pharmacopœia. The task of producing the national medicine book therefore fell inevitably to the medical profession alone, as represented in the Medical Council, by whom it was accomplished with a success that has called forth grateful recognition, not only from members of the medical profession, but also from pharmacists, and might well explain and excuse a certain amount of sentimental objection felt in some quarters,—though, we believe, not widely,—to any proposition which might have the appearance of disturbing a kind of vested interest which the Council had during this time acquired to a monopoly in the ordering of the Pharmacopœia. The twenty-five years during which the Medical Council, as at present constituted, has been in existence have, however, brought many changes, and, thanks to the work done by the Pharmaceutical Society, pharmacists in this country are now in a position to undertake duties which could not have been accorded to them when first the unification of the three Pharmacopœias was decided upon. Consequently, signs have not been wanting of a growing disposition to put forward claims with respect to the position of pharmacists towards the next edition of the British Pharmacopœia which the Medical Council might have found it impossible to acknowledge and embarrassing to refuse. That the claims themselves are not, however, thought to be unreasonable may be assumed from the fact that the organ of the British Medical Association has, within the last few weeks,* reiterated an opinion expressed some years ago on the occasion of the publication of the "Additions," as to the "necessity of giving greater prominence to the element of practical pharmacy in the Pharmacopœia Committee."

In this condition of affairs the introduction into the House of Lords by the Government of a Bill having for its object to substitute for the body which has so long had the control of the Pharmacopœia another one very differently constituted, furnishes a *tabula rasa* for the reconsideration of the whole subject, without the slightest suspicion of discourtesy or rivalry to anyone. But since in this Bill it is simply proposed to vest in the new body exclusively powers similar to those exercised by the old, it will be learnt with satisfaction that the Pharmaceutical Council has instructed one of its Committees to take immediate steps to secure the introduction into the Bill of a provision by which pharmacists shall be empowered, conjointly with members of the Medical Council, to revise and prepare future editions of the British Pharmacopœia.

It will be for the Committee to decide upon the arguments with which it will approach the Government upon the subject. But a strong one would appear to be available in the resolution which less than two years since was adopted by the International Pharmaceutical Congress assembled in London, to the effect that the future revision of any national Pharmacopœia should be entrusted to a permanent committee comprising among its members the largest possible number of pharmacists. Moreover, the important discussion, following the reading of a paper by the present President of the Pharmaceutical Society, which led up to the adoption of this resolution, showed that the proposition was no innovation, but that already in every country represented at that Congress pharmacists held a legally recognized position together with medical men in respect to the duty of revising the national Pharmacopœia.

As, notwithstanding the justice of the claim which the Council has determined to urge at the present juncture, some little extraneous effort may possibly be necessary in order to overcome the inertia inherent to conditions that exist, it may serve a good purpose to recall a few of the statements made at the Congress upon the subject. Looking first across the Channel towards our nearest neighbour, M. PETIT said that the French Codex Commission should, according to law, be composed solely of professors of medical schools and professors of superior schools of pharmacy; but to these have been added members of the Société de Pharmacie with only a consultative voice. In practice, however, the greater part of the work is done by the Société de Pharmacie and the other pharmacists belonging to the

* *British Medical Journal*, March 10, p. 478.

Commission, the medical members rarely attending the meetings and the decisions being generally arrived at by the pharmacists alone. Respecting Germany, Dr. Carl Schacht was able to say that the Pharmacopœia Commission, then engaged upon the work just issued, included seven practical pharmacists. In this Commission the decision as to the admission of new medicines, or the expunging of obsolete ones, lay with the medical members, but the pharmacists alone had the decision as to the manner in which the preparations were to be made. A small sub-committee, consisting of chemists and pharmacists only, was entrusted with the working out of the chemistry and pharmacy of each subject, and the results were afterwards submitted for the approval of the Commission at a general meeting. In Austria, according to Herr von Waldheim, the Pharmacopœia Commission consists of the Superior Board of Health and six chemists, who are summoned from time to time when any alteration or addition is thought to be required. In Russia, Dr. Poehl says the revision of the Pharmacopœia is carried out by the Medical Council, which includes two pharmacists among its members, the Pharmacopœia being first drafted by these pharmaceutical members acting by themselves, and then submitted to a full meeting of the Council for confirmation. In Italy, according to Signor Sinimberghi, the Commission entrusted with the preparation of the first national Pharmacopœia for the new Kingdom, as originally appointed, consisted entirely of medical men, but representations having been made to the Government, an equal number of pharmacists were added to the Commission. Dr. De Vrij described a position just the reverse of this as obtaining in Holland, where in 1864 the King appointed a Commission consisting of two professors of botany and pharmacology and one of chemistry, and four pharmacists, so that at first pharmacy was preponderant, whilst medicine was absent; at the request of the pharmacists, therefore, a medical member of the Commission was appointed. In Denmark the existing Pharmacopœia was prepared by a Commission consisting of eight physicians and two pharmacists. In Belgium, according to Professor Gille, the Commission engaged at the time of the Congress upon the revision of the Pharmacopœia was composed of three pharmacists and two medical men. Lastly, the recently issued edition of the United States Pharmacopœia is, as has been before stated, the work of a large Revision Committee, including a majority of pharmacists.

It will be seen, therefore, that whilst these Commissions present many points of difference they have all one feature in common, in the provision made that whilst medical men are present to decide as to the selection of new or the rejection of obsolete remedies the practical skill of pharmacists is utilized in working out the best methods of preparation.

THE VISIT OF THE BRITISH ASSOCIATION TO CANADA.

From a circular just issued by the Executive of the British Association it would appear that it has been decided to waive the opposition which the unexpected decision of the General Committee to accept an invitation to visit Montreal, if repeated for 1884, at first provoked, and as far as possible to secure that the meeting shall be a representative one, "creditable to the Association and gratifying to the Canadian hosts." Certainly the prospective hosts are doing all they can to remove every obstacle by means of arrangements that will ensure every visitor from this country an opportunity of making the most of his time at a minimum of expense. The inhabitants of Montreal have now repeated the invitation, as stipulated, and have already formed committees on invitation, finance, and conveyance, and opened a guarantee fund. The Dominion Government has also undertaken to ask Parliament to contribute a sum of twenty thousand dollars in aid of the money subscribed by the public.

The circular includes a letter from Sir A. T. Galt, High Commissioner for Canada, resident in this country, containing information as to the probable expenses that will be involved in attending the meeting, every line of which bears evidence of the generous hospitality the colonists are prepared to accord. In the first place, in respect to the cost of the journey to and from Montreal, the Committee offer to arrange fifty free passages for the conveyance of the officers of the Association whose attendance at the meeting is indispensable. Beyond this it is prepared to devote the balance of £3000 either to securing to a number of *bonâ fide* members passages at the single rate—about £15 10s.—for the single journey, or for a general reduction of the fares as far as the funds will admit. Arrived at Montreal, the Committee are willing to give assurance that free entertainment will be provided for at least one hundred and fifty, and probably for all others who may attend. But even those who may scruple to accept such free hospitality are told that the tariff of Montreal hotels ranges between two and a half and four dollars a day inclusive, whilst private accommodation may be obtained at much lower prices than in England. As to proposed excursions, Dr. Sterry Hunt says that the Grand Trunk, the Canada Pacific and the Intercolonial railways will furnish free transport over their lines from Nova Scotia to the North West. The Canada Pacific will also arrange an excursion to the Rocky Mountains and the Grand Trunk one to the Great Lakes (including Niagara) and Chicago, while the South Eastern Railway will do the same for the White Mountains and Portland and Boston. For an excursion of this kind, occupying three or four weeks, it is estimated that a sum of £20 would be required for hotels, carriages and other incidental expenses, though it is possible that a less sum will suffice.

The programme is a tempting one, and will give the members of the British Association an opportunity of visiting the Dominion under conditions more favourable than are likely to occur oftener than once in a lifetime.

THE ANNUAL DINNER.

We are pleased to be able to state that a large number of gentlemen, including the majority of the members of Council and all the officers of the Society, have already signified to the Honorary Secretary their desire to act as Stewards on the occasion of the Annual Dinner. But it is believed that there are many more, especially among the Local Secretaries, who will be glad of a further opportunity for sending in their names, and for this reason it has been thought advisable to postpone the closing of the List of Stewards until Wednesday next, the 11th inst.

The last Evening Meeting for the present session of the North British Branch of the Pharmaceutical Society will be held in the Society's Rooms, Edinburgh, on Wednesday evening next, when a paper on "The Preparation and Composition of Unguentum Hydrargyri Nitratis" will be read by Mr. T. Maben; after which Mr. Patrick Geddes will deliver a lecture on "The History and Present State of the Cell Theory."

* * *

The Government Medical Act Amendment Bill was read a second time in the House of Lords on Thursday evening, and committed to a Committee of the whole House, which is fixed for Thursday, the 19th inst.

* * *

An anonymous correspondent, using the suggestive initials A.B.C., asks in the *British Medical Journal* for an opinion on the following prescription which he appears to have written: "℞ Liq. ammon. acetatis ʒj; vini. ipecac. ʒjs (? ʒss); liq. morphiæ hydrochlor. ʒjs (? ʒss); syrupi acaciæ ℥j; aquæ, ad ℥j." He wished a two-ounce mixture to have been made, but his first doubt as to whether he had succeeded in expressing his intention correctly seems to have been excited when the prescription was shown to him at his patient's house, with the word "ad" marked through. A.B.C. is not particularly happy in explaining how his instructions were to have been carried out in their integrity, and as if conscious of his non-success, he adds: "If I am wrong, I pray Heaven that the examiners who allowed me to obtain my diplomas will try to find out if men know how to write a prescription accurately before giving a degree, and save them from the reproof of druggists." Probably most "druggists" will be ready to utter a devout "amen!" to this aspiration.

* * *

A correspondent, after describing in the current number of the *Medical Press and Circular* the "disreputable practice" of a qualified medical practitioner in keeping a chemist and druggist's shop, managed by an unqualified assistant, who also prescribes and signs certificates in the name of his principal, asks whether a M.R.C.P. Edin. is allowed to keep a druggist's shop, and sell penny nostrums and patent medicines. The reply is of course in the affirmative; but whilst deploring the fact the Editor informs his correspondent that "unfortunately such examples are legion in poor neighbourhoods." Both question and answer are worth pondering by those medical practitioners who are fond of blaming chemists and druggists for the propensity displayed by the public to seek medical relief in the chemist's shop.

* * *

One of the tendencies of medical dispensing is illustrated in the *British Medical Journal* of last week by a request of a correspondent for information as to the making of concentrated infusions "similar to those sent out by wholesale druggists."

* * *

The *Lancet* recommends prescribers who are in the habit of ordering pills to be coated to make the experiment of dissolving one of such pills in a bag of slightly acidulated liquid at a temperature of nearly 100° F., and prophesies that in a majority of cases it will be found, even when frequent agitation is applied, that the "mass is barely approached by the fluid after many hours and does not completely break down until a very considerable period has elapsed." The inference drawn is that "pills coated with gold, silver and even mastic—unless quite recent—are not brought into a condition in which the drugs of which they are composed could be appropriated by the stomach until long after the time of administration."

* * *

The new edition of the United States Pharmacopœia would appear to be meeting with a large sale, since a fresh issue—the third or fourth—has been announced as just ready.

* * *

After a lapse of more than six years a new edition—the fifth—of the 'Price List' compiled by the Committee appointed at a general meeting of Chemists and Druggists of Glasgow and neighbourhood has been issued. It contains a few modifications in the dispensing charges, chiefly in the direction of inserting alternative lower prices, and in the retail list, to which also a number of articles have been added. Copies may be obtained from the Convener of the Committee, Mr. J. A. Clarke, 148, Gallowgate, Glasgow.

* * *

At the next Wednesday evening meeting of the Society of Arts, on the 11th inst., a paper will be read on "The Portrush Railway and the Transmission of Electricity," by Mr. A. Siemens and Dr. Hopkinson.

* * *

In the Chemical Section of the same Society, on Thursday evening, the 12th inst., Mr. R. W. Atkinson will read a paper on "The Formation of Diastase from Grain by Moulds."

* * *

At the meeting of the Chemists' Assistants' Association, on Wednesday evening next, a paper will be read, entitled "A Few Hints on Germ Disease," by Mr. W. R. Dodd.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, April 4, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, Hills, Radley, Richardson, Robbins, Savage, Schacht, Squire, Symes, Williams and Young.

The minutes of the previous meeting were read and confirmed.

Nominations for Council and Auditors.

Council.

The Secretary reported that he had received *seventeen* nominations to fill the *fourteen* vacant seats on the Council, and that the following *sixteen* had declared their willingness to accept office if elected:—

Andrews, Frederick, 34, Leinster Terrace, W.
Atkins, Samuel Ralph, Market Place, Salisbury.
Baldock, John Henry, 3, High Street, South Norwood, S.E.
Borland, John, 7, King Street, Kilmarnock.
Bottle, Alexander, 37, Townwall Street, Dover.
Butt, Edward Northway, 13, Curzon Street, Mayfair, W.
Carteighe, Michael, 180, New Bond Street, W.
Hampson, Robert, 205, St. John Street Road, E.C.
Hills, Walter, 225, Oxford Street, W.
Radley, Wm. Valentine, 42, Hampton Road, Southport.
Richardson, John G. F., Elmfield, Stoneygate, Leicester.
Robbins, John, 147, Oxford Street, W.
Savage, William Dawson, 4, Park Road East, Brighton.
Symes, Charles, 14, Hardman Street, Liverpool.
Woolley, George Stephen, 69, Market Street, Manchester.
Young, John Rymer, 42, Sankey Street, Warrington.

The following had declined to accept office:—

Sandford, George Webb, 47, Piccadilly.

Auditors.

Hodgkinson, William, 198, Upper Whitecross Street, E.C.
Lescher, Frank Harwood, 60, Bartholomew Close, E.C.
Stacey, Samuel Lloyd, 300, High Holborn, W.C.
Thompson, Henry Ayscough, 22, Worship Street, E.C.
Watts, William Manning, 32, Lower Whitecross St., E.C.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Ball, Henry ....Southport.
Drew, Walter Clark ....London.
Marshall, Joseph Jewison ......Beverley.
Rouw, Theodore John............Eastbourne.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Austen, Charles Wilson ....Chatham.
Bolton, Frederic William ......Winchester.
Evans, Thomas Fryer ....Flint.
Francis, Charles Ernest ....Burnley.
Gray, John ....Forres.
Guy, Frederick.......................Brighton.
Hodgson, Alfred ....London.
Horrod, Thomas Samuel.........London.
Knight, Ramsey ....Pendleton.
Lindewald, Wilhelm Edvard ...Menton, France.
Newsam, William Henry ......Stoke-Ferry.
Stirling, George ....Dunoon.
Watson, John ....Newcastle-on-Tyne.
Willis, Henry James ....New Brompton.

Modified.

Bolton, Edgar Benjamin.........Winchester.
Hern, William Henry, jun. ...London.

ASSOCIATES.

The following, having passed the Minor examination and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Dadson, Horace Charles ....King's Lynn.
Davies, Llewelyn ....Newport, Mon.
Hudson, William ....Sunderland.
Ombler, William Henry ....Windsor.
Puckey, Courtenay ....Herne Hill.
Reeves, Alfred ....London.
Smith, Harry James ....Speenhamland.
Wall, Edward John................Peckham.
Walton, Frederick Miles.........Reading.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Adams, Joseph ....Bristol.
Bayley, Cornelius...................Boston.
Bulmer, John ....Pocklington.
Elliott, Henry Alfred ....Derby.
Field, Ebenezer......................Cambridge.
Heath, Walter Edwin ....Coleshill.
Henshall, Harry ....Lymm.
Jones, William ....Bolton.
McDiarmid, Fraser ....Deal.
Moody, William Morton.........Salisbury.
Terry, Edwin ....Tadcaster.
Walklett, George James ....Oxford.
Watkins, William Richards ...Llanelly.
Weston, Henry.......................Devizes.
Wride, William Blake............Shirley.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Restorations to the Register.

The names of the following persons who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

James Benjamin Bond, 6, Cornbrook Street, Manchester.

Edward Todd, 110, Newhampton Road, Wolverhampton.

Addition to the Register.

The Registrar reported that—

Alexander Clark, 89, Gilmore Place, Edinburgh, having made a statutory declaration that he was in business before the passing of the Pharmacy Act, 1868, and this declaration having been duly supported by qualified persons, his name had been placed on the Register.

Honorary Members.

The President reminded the Council that it was usual to elect Honorary Members in May, but looking to the fact that the number was limited to fifty, and that there are already forty-eight on the list, and also that a proposal had been made to create a class of Corresponding Members, he suggested that no election should be made at present.

This suggestion was unanimously agreed to.

Reports of Committees.

FINANCE.

The report of this Committee included a recommendation that various accounts be paid; also that a certain sum be guaranteed towards the expense of laying down wood pavement in Great Russell Street, outside the Society's premises (some portion of which would probably be subscribed by other householders), in consideration of which it was stated that the District Board of Works was prepared to undertake this improvement.

The report stated that some correspondence with regard to the purchase of ground rents had been laid before the Committee.

The Committee also recommended that a sum not exceeding £10 be expended in repairs, etc., of the Society's premises in Edinburgh.

After some conversation, the report and recommendations were received and adopted.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to a pharmaceutical member for twenty-nine years.

£5 to a registered chemist and druggist, aged 71, who had a grant of £10 in March, 1882.

£10 to the widow of a life member, who died in March last.

£5 to a registered chemist and druggist.

£10 towards the support of Isherwood's orphans.

Two applications the Committee had declined to entertain, and one had been deferred.

Further information with regard to the case of the widow of a life member having been given by a member of the Council, the grant of £10 recommended by the Committee was increased to £15. With this alteration the report and recommendations were received and adopted.

Further particulars were also given by the Vice-President with regard to a case which he had been requested to investigate, the applicant being the wife of a member for many years, who is now in an imbecile condition. In this case a grant of £20 was made.

LIBRARY, MUSEUM, LABORATORY, AND HOUSE.

Librarian's Report.

The report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
February	Day	608	40	19	25
	Evening	197	18	4	10

Circulation of books.	Town.	Country. (No. of Entries.)	Total.
February	180	134	314

Carriage paid, £2 4*s.* 3½*d.*

The undermentioned Donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Britten (J.), Dispenser's Vade-mecum, 3rd ed., 1863. From Professor Attfield.

Mathematical Questions, with Solutions, edited by W. J. C. Miller, vol. 38, 1883. From the Editor.

Putsage (J.), Le determinisme et la science rationnelle, 1883. From the Author.

The Committee recommended that the undermentioned works be purchased:—

Allen (G.), The Colours of flowers, 1882.

Brewer (The), Distiller and Wine Manufacturer, 1883.

Deutsche botanische Gesellschaft, Berichte.

Hardwich (T. F.), Manual of Photographic Chemistry, 9th ed., 1883.

M'Alpine (D.), Botanical Atlas. 2 vols.

Schützenberger (P.), On Fermentation, 1880.

Curator's Report.

The Curator had reported the attendance in the Museum during February to have been:—

	Total.	Highest.	Lowest.	Average.
Morning	523	32	11	20
Evening	134	12	0	6

The following Donations to the Museum had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimen of Natal Cayenne Pepper Pods. From Messrs. Hodgkinson, Stead and Treacher.

Specimen of Chilian Aniseed. From Messrs. Horner and Co.

Specimens of Chilian Aniseed. From Messrs. Jenkin and Phillips.

Specimens of Paraldehyde, Aldehyde Ammonia and Aldehyde resin, and of the root of *Dorstenia Brasiliensis.* From Messrs. Hopkin and Williams.

A letter had been received from the India Office, stating that a very complete collection of cinchona specimens had been forwarded from the Madras Government and on arrival would be sent to the Society.

The Professors had attended and reported satisfactorily as to their respective classes.

The Council went into committee to discuss in detail some of the matters mentioned in the report.

On resuming, the report was received and adopted.

GENERAL PURPOSES.

The report of this Committee was taken as usual in committee. It included the reports from Professors Bentley and Redwood as to the class examinations at the end of the first course (five months).

Professor Bentley had reported that the attendance and conduct of his students had been very satisfactory, the number being larger than last year.

Professor Redwood's report had also been of a highly satisfactory nature, stating that the attendance had been regular and punctual, and that there had been evidence at the after-lecture examinations of the existence, among a large number, of a desire to avail themselves of the means provided for their instruction. There had been fifteen competitors, eleven of whom furnished papers in which answers were given to the whole twelve questions. He did not recollect ever having had such a large number of equally good papers at a one course examination.

The Committee, having opened the motto envelopes to ascertain the names of the successful competitors, recommended that the following awards be made:—

Chemistry and Pharmacy.

Bronze Medal ....David Rees.
Certificate of Merit ...Edward Baily.
" " Charles Ranken.
" " Sidney Phillips.
" " Francis Ransom.
" " Thomas Southall Dymond.
" " William Edward Crow.
" " James Haddock.
" " David Low.
" " Edward Ernest Sewell.
" " Arthur Pumphrey.

Botany and Materia Medica.

Bronze Medal ....William Edward Crow.
Certificate of Merit ...Edward Baily.
" " David Low.
" " William Lloyd Williams.
" " Sidney Phillips.

The report also included the usual letter from the Solicitor stating the result of certain actions which he had been instructed to commence, and the progress which had been made in others. It reported that—

Edward Clayton Lewin, 7, Whimple Street, Plymouth, had paid £10 penalties and costs £8 7*s.* 10*d.*, as reported in last week's Journal, for the sale of poisons and use of title "Chemist."

Thomas Harrison, 42, Marsh Lane, Leeds, had paid £5 penalty for sale of poisons.

W. E. Pratt, Beck Street, Nottingham, had paid £5 penalty for use of the title "Chemist and Druggist."

Alexander G. Clark, 89, Gilmore Place, Edinburgh, had paid £5 penalty for carrying on the business of a chemist and druggist.

It also contained particulars of various other matters which had been brought before the Committee.

A long discussion took place in committee on some of the matters referred to in the report. On resuming, the report and recommendations were received and adopted unanimously.

The Amended Pharmacy Bill.

Mr. Churchill asked if there was any report from the Parliamentary Committee with regard to the various suggestions which had been sent up by local societies and meetings with respect to this Bill.

The President said the Committee had not yet considered these suggestions; it could not very usefully do so until it knew what were the intentions of the Government.

Mr. Symes thought some reply was desirable to the various bodies throughout the country which had been sending up recommendations, and were anxiously looking forward to know what would be the result. These people had never had any opportunity of discussing the Bill or any of its clauses before it was sent to the Privy Council, and, therefore, it was only reasonable that such communications should now be received. He had no doubt the Council would consider these suggestions and send a reply to them, because such a course would best tend to ensure unanimity when the Bill came before Parliament. If on the other hand the Council went to Parliament with all these men feeling that their views had not been duly considered, they would be very likely to oppose the Bill at a very important time.

The President said he could assure Mr. Symes and the Council that every one of these suggestions would be most carefully considered, but it would be much more convenient to deal with the whole of them together: one was coming forward that day, and there might be amendments coming from the Government. The Committee could not deal with the matter efficiently until the whole of these proposed amendments were before it.

Mr. Symes said he thought this statement would be quite satisfactory.

The Council again went into committee whilst the President answered several questions which were put by members with reference to the Bill, and the action which was being taken in respect to it.

Visitors to the Museum.

Mr. Symes said he wished to ask a question regarding the Museum. At page 232 of the Calendar there was a note saying that persons not eligible to become members of the Society who were desirous of obtaining admission to the Museum must make application to the Secretary, and he wished to know whether that rule would prevent the Secretary from granting admission to a person who was eligible to become a member. The case in point was that of a person who had passed the Preliminary examination, but not with a view of becoming a chemist and druggist; but prior to an examination he wished to pass, he asked, in his father's name, that he might be permitted to use the Museum for a few days in conjunction with his brother, who was studying at the School of Pharmacy. The two came together; the one who subscribed to the Society was, of course, admitted, but the other was refused. He came next day at his father's request, and again asked admission, but did not see the Secretary and was requested to withdraw. His father, who was a member, then came and made a similar application and was informed by the Secretary that the rules prevented his granting it. He (Mr. Symes) did not blame the Secretary in any way, for he had no doubt he had acted according to what he considered his duty, but it would be well for it to be understood by members generally whether they had any influence in introducing visitors to the Museum for proper purposes, or whether the Secretary had discretionary power in the matter. If no good reason were alleged for not joining the Society, but it appeared to be only an excuse for saving a half-guinea subscription, then no doubt it was quite proper for admission to be refused. It was not so much in the interest of any individual he asked the question as of the members generally.

The President said it was almost impossible for him to say what the Secretary might think it his duty to do. He took it they would all be disposed to give him the utmost latitude in dealing with such cases, and he could conceive that a few cases might occur in the course of the year where some discretion must be placed in the hands of their officer, and if he had not already exercised it it would be convenient for him to do so.

Mr. Symes said he did not understand that the note he had referred to dealt specially with the case of persons who were eligible to join the Society, although it might be inferred that they were meant to be excluded.

The President said the obvious intention was that the Museum should not be used to the detriment of those connected with the Society. The house was not large enough to accommodate all students, but he fancied the Secretary might manage to use a discretion by which the Museum might be placed at the service of anyone who was not likely to abuse the privilege.

The Vice-President said the gentleman referred to had written to him in his official capacity calling his attention to the matter. He had not the slightest charge to bring against the Secretary, who had, no doubt, acted fully within the law and according to the best of his light; but he thought the Council might do him a service in giving him a little more latitude, or intimating its wish that in cases where he was convinced there was no *mala fides*, he should be allowed to grant admission. The strong point seemed to be this, that the young man was not seeking to save his half-guinea by deferring his subscription until a later period, the fact being that he was going into veterinary practice. His father, who was an old member, thought he had a privilege, which it seemed he had not. It was a pity that an old member should be alienated if the law could be relaxed a little.

Mr. Richardson said this was not the first time a similar complaint had been made, for he remembered a case of the kind some two years ago. He thought, therefore, it would be well if it were referred to a committee to consider whether more power should not be given to the Secretary. Cases might occur where gentlemen from the country would be put to great inconvenience through being refused admission.

Mr. Hampson thought the Library Committee might very well consider the matter. He was sure the Secretary did not wish to exclude anyone who was really eligible, but possibly he might have been too zealous in serving the Society. The simple fact seemed to be that the present regulations were a little too rigid, and probably the Committee on consideration might be able to introduce a little more elasticity.

Mr. Greenish thought the Secretary ought to be asked to give his account of the matter. This question had been discussed several times within his recollection by the Library Committee, and the Secretary had been allowed a certain amount of discretion, which had been used on the whole very satisfactorily. If any discretion were used at all, admission must sometimes be refused, for if every one were admitted there would be no advantage to subscribers.

The President did not understand that there was any complaint made against the Secretary, it was simply a question whether the regulations in the Calendar were not a little more tightly drawn than was convenient.

The Secretary said the matter was very simple; it was a mere question of pounds, shillings and pence. If the Council said the Museum should be open to anybody who felt disposed to use it there was an end of the subject. He did not desire discretionary power, which would be unsatisfactory to all parties. Looking at the results for the last year it appeared that there were 1037 apprentices and students who subscribed to the Society, being about one-third of those who were on the Register as having passed the Preliminary examination. Were the other 2000 to be allowed the same privileges as these men who contributed to the funds? The gentleman who now complained had passed his Preliminary examination, and it was competent to him, if disposed, to acquire the right to use the Society's house as part of his own property; but he did not think that he should have been doing right in discharging his duties if he had allowed him to use the Museum the same as those who subscribed. His father came and said he was a member of the Society, and that he felt in that position he was able to delegate his privileges of using the Museum to whom he felt disposed, either his son or anybody else. In reply he had been informed that he had a right to use the Museum himself, but the privilege could not be delegated to anyone.

Mr. SYMES said there was no imputation on his part on the Secretary, who he had no doubt felt he was acting strictly according to the rules.

After a little further conversation, it was decided to leave the matter to be considered by the Library, Museum, Laboratory and House Committee.

MEDICAL ACTS AMENDMENT BILL.

Mr. HAMPSON then moved a resolution of which he had given notice, though in a somewhat different form, as follows:—

"That inasmuch as the Medical Acts Amendment Bill introduced into the House of Lords contains no provision by which pharmacists shall be empowered, conjointly with members of the Medical Council, to revise and prepare future editions of the British Pharmacopœia, the Library and Museum Committee be authorized to take immediate steps with a view to remedy this omission."

He said he considered that this motion was a very important one, inasmuch as up to the present time British pharmacists had not been recognized in the making of the Pharmacopœia to which they were compelled to comform. When the Pharmacopœia received the sanction of the Privy Council, it became, to all intents and purposes, a legal document, and pharmacists were bound to obey it, and it appeared to him that it was very strange after the Society had been engaged for many years in granting degrees to practise pharmacy according to the Act of Parliament, and in furthering education in every possible way, that pharmacists were simply to remain as heretofore servants in the matter, having no official voice in the preparation of the Pharmacopœia. In all other civilized countries where Pharmacopœias were used, scientific pharmacists took a part in their preparation on equal terms with the medical men, but in England, up to the present time, they had been entirely left out and ignored. The Government had now brought in a Bill to amend the Medical Act, the Bill being the result of a commission of inquiry held last year, and the Pharmacopœia was referred to in the Bill. Seeing the word mentioned he naturally looked to see if the Pharmaceutical Society or British pharmacists received any official recognition, but to his astonishment, he found that if this Bill became law the old conditions would prevail. He supposed the probable reason of this was that pharmacy was very slow in development in this country. On the continent of Europe, pharmacy, as a distinct branch of medical art, had received the sanction of the state for many years, and it was not to be expected that they in England should at once receive the reward which the education and improved culture of pharmacists in this country entitled them to do. It seemed to him that the Council was now bound in self-respect to make this request, for unless it did so pharmacists would probably have to wait twenty years until they could do so with any effect. Years ago, before the Society had got fairly into work, it might have been inequitable to make such a request, but it was felt now that it was entitled to fair recognition when legislation was in progress, and he could not conceive that the medical profession would object to the proposal. Anything which would advance pharmacy by giving it an improved social and scientific status must be beneficial to the medical profession. In making this request it would be clearly understood that the Society did not claim anything except to be officially consulted as to the preparation, and methods employed: they had nothing at all to say as to what should be included or excluded. Physicians must appoint the dishes and say what should be served, but educated pharmacists had some claim to speak with reference to the preparation of the dishes. It was an old joke that pharmacists were only a sort of physicians' cooks, and that was perfectly true; but cooks generally prepared cookery books. They had been singularly fortunate in having Professor Redwood on the Pharmacopœia Committee as representing pharmacy up to the present time, and that gentleman was worthy of full recognition, but what he wanted to see now was a recognition of pharmacists as a body by giving to them an official share, by legal arrangement, in the preparation of the Pharmacopœia.

Mr. SYMES, in seconding the motion, said it must commend itself to the mind of any thinking person that the preparation of a Pharmacopœia consisted essentially of two portions: first, of the medicines which it should contain; and secondly, how they should be compounded and prepared. It was quite certain that members of the medical profession were fully competent for the first of those duties; but the tendency of their education during late years had been to render them less capable of dealing with the second branch of the subject than they formerly were, and there were no persons educated for that purpose, except the pharmacists. They must all feel that this was only a matter of justice; it could not be sought under the Pharmacy Act or in any other way than under the Medical Act, and he took it that the present Bill was in so forward a state, the second reading being put down for the next day in the House of Lords, that there was no time to be lost. He hoped, therefore, there would be a unanimous vote in support of the motion.

Mr. SCHACHT said this motion, as far as it went, had his cordial support, but as the greater included the less he should have preferred if it had embodied the suggestion which he put forward some time ago, that the Council should take steps to endeavour to get itself represented on the Medical Council. Mr. Radley had already asked that this new Medical Bill should be placed in the hands of all the members of the Council for consideration, and his proposition was that it should be considered in all its aspects with regard to pharmacy. If it struck any of his colleagues that a special attempt might be made to remedy the defect with regard to pharmacy, and that it was not too much to ask for such recognition as he had named, he should be glad, and it seemed to him this would be an opportune moment to assert that pharmacy was an essential ingredient in the art of medicine, and might fairly claim to be represented in some sort on the Medical Council. He did not think that at all too ambitious a position to take up, and it would be a good opportunity now to put it forward. Why pharmacy should be systematically ignored passed his comprehension, except upon the supposition that it was generally understood that what was not worth asking for was not worth having. Even if such a request were not granted at present it might be entertained in such a way that its acceptance at some future time would be more hopeful.

Mr. WILLIAMS suggested that Mr. Hampson should explain what practical steps he thought ought to be taken.

Mr. HAMPSON said the motion itself referred to a committee which would necessarily take immediate steps to obtain the ear of the Government upon this question. That committee would have to consider what fair proposal it would have to make, and to formulate it before seeking an interview with the promoters of the Bill. He was not ready with any special proposal, but probably the experience of other countries would lead in a particular direction. He thought that was all he need say at present, the committee being left to consider details.

Mr. GREENISH cordially supported the motion. He only regretted that it had not been sent round in its amended form to members of the Council, because there were one or two expressions in the original notice of motion to which some exception might be taken. The remark had been made about pharmacists being physicians' cooks, which he wished to protest against, for at the present time a great many compounds came before the medical profession which never had any recipe for their formation in the proper cookery book, and it would be very desirable, in his opinion, if medical men would confine themselves to their recognized cookery book. He could quite understand that at the present time the medical profession was getting more than ever unable to frame a proper Pharmacopœia. Pharmacists did not wish to interfere with the remedial agents to be made use of, but simply to have a voice in laying down the methods by which those agents should be prepared. Medical education was advancing day by day, and as it did so medical men ceased to have much knowledge of pharmacy. When he was in St. Petersburg eight years ago, and an International Pharmacopœia was discussed, he had to state that in England pharmacists had no voice in their national Pharmacopœia, when the look of astonishment on the part of the different delegates at that Conference was perfectly unique. He believed this was the only civilized nation in which pharmacists did not sit upon the Committee for the formation of the Pharmacopœia. This was certainly the proper time to move in the matter, for the probability was there would be a Medical Council very differently constituted to what it had been. The Bill in question indicated the constitution of that Council, but there was no hint that any pharmacist should have a seat on the Pharmacopœia Committee.

Mr. YOUNG thought the Society would be justly blamed if it did not take this opportunity of making itself heard. It would be a very strange thing if after what the Pharmaceutical Society had done during the last twenty years no members of it were consulted in the formation of a new Pharmacopœia. He saw no objection whatever to the motion as it now stood, and hoped it would be carried.

The VICE-PRESIDENT also wished to support the motion. Reference had been made to the position that Professor Redwood occupied in the preparation of the last Pharmacopœia, and that seemed to him to be a very important point. It was at least a recognition of pharmacy, though in what way it originated he was not aware; but the fact of a well-known pharmacist being consulted by that Committee at any rate gave pharmacists a status, and was a small leverage which might be made use of again. With regard to Mr. Schacht's larger suggestion, of course, if pharmacists had a position on the Medical Council that would include the whole thing, but he thought their truer policy now would be to ask for recognition on this particular point. He believed that practical pharmacists found out soon after the last Pharmacopœia was published that there were many defects which would have been remedied had a practical man been on the Board, and if that consideration was brought forward, as well as the higher culture now possessed by the pharmaceutical body, he had no doubt the claim would be considered.

Mr. GREENISH said as a matter of fact the Pharmacopœia of 1864 was published without the assistance of any pharmacist at all, but as soon as it was published it was found to contain so many errors that it was immediately withdrawn, and Professor Redwood was called in to assist, but he had no vote.

Mr. ROBBINS said he believed pharmacists had always been called in in an indirect way, Mr. Phillips's assistance having been obtained with regard to the Pharmacopœia published in 1836.

The motion was then put and carried unanimously.

WRITTEN EXAMINATIONS IN THE PROVINCES.

The PRESIDENT then moved the following, of which he had given notice:—

"That on and after December 31, 1883, the resolution of January 7, 1874 (*Pharmaceutical Journal*, January 10, 1874, p. 563), respecting the method of conducting the Preliminary examination be rescinded, and that the following regulations be enacted, and come into force on January 1, 1884:—

"That persons be especially appointed by the Council to superintend the Preliminary examination in London and the provinces; that they be called Superintendents of examinations, and be paid fees for each examination; such Superintendents not being necessarily members of the Board of Examiners.

"That a Deputy Superintendent be also appointed by the Council in each centre.

"That a fee of one guinea for the first part and half-a-guinea for the second part of the examination be paid to the Superintendent or Deputy Superintendent on the occasion of each examination.

"That the Local Secretary be, in the first instance, offered the appointment of Superintendent.

"That the examinations be held in the months of January, April, July and October, on the second Tuesday of the month, from 11 a.m. to 4.30 p.m., with an interval of one hour from 2 to 3 p.m.

"That the examinations shall not be held in the house of the Superintendent or Deputy Superintendent, but he shall be authorized to engage some apartment suitable for the purpose, and charge a sum not exceeding 15*s*. to the Society on account thereof.

"That the examination for the Jacob Bell Memorial Scholarships be held annually on the second Tuesday in July, concurrently with the Preliminary examination.

"That notice be issued in the *Pharmaceutical Journal* two months prior to the day of holding the Preliminary examination, that such examination will take place, and giving a list of the centres at which it will be held.

"Candidates for the Preliminary examination must give notice to the Registrar not less than fourteen days prior to the day on which the examination is to be held, of their intention to present themselves for examination, and state the centre at which they desire to be examined.

"That the instructions to Superintendents and Deputy Superintendents of examinations be as follows:—

"INSTRUCTIONS TO SUPERINTENDENTS AND DEPUTY SUPERINTENDENTS OF EXAMINATIONS.

"*To be read aloud to the Candidates before commencing their writing.*

"*The Preliminary Examination.*

"The examination papers must be forwarded by the Registrar, under seal, to the Superintendents or Deputy Superintendents, so as to be received by them on the morning of the day fixed for the examination. Special sheets for the candidates to write upon will also be sent by the Registrar.

"Writing materials for each candidate must be provided, and all arrangements for the accommodation of the candidates completed before the hour fixed for opening the packets of questions from the Registrar.

"Candidates must be in their places at the time appointed, and after this time no candidate will be admitted.

"Candidates must be placed at a sufficient distance from each other to prevent copying, and they are not permitted to take either books, scribbling papers, or memoranda into the examination room.

"The examination papers must be opened by the Superintendent or Deputy Superintendent at the appointed time, in the presence of the candidates, and immediately distributed by him.

"He must see that each candidate signs his papers in the place indicated.

"The answers to the questions are to be written on one side of the paper only, the other side being intended for scribbling and calculations; no other scribbling paper is allowed to be used.

"No examination paper shall be taken from the room until the examination is complete.

"The Superintendent or Deputy Superintendent must carefully watch the whole examination, to see that the candidates do not use unfair means, either by assisting each other, or using books or notes. No person except the Superintendent or Deputy Superintendent is permitted to be present, and on no consideration shall candidates be allowed to speak to each other after the papers are distributed.

"A candidate wishing to ask any questions must hold up his hand; the Superintendent or Deputy Superintendent will come to him and satisfy any legitimate inquiry, but no explanation will be given on the subject matter of the questions.

"At the expiration of three hours from the time of the distribution of the questions on Latin and arithmetic, the written papers of the candidates, with all memoranda and scribblings thereon, shall be delivered to the Superintendent or Deputy Superintendent, who must immediately enclose all the papers in the envelope sent for that purpose by the Registrar, seal it with his seal, and forward it by first post thereafter to the Registrar enclosing the accompanying declaration duly filled in and signed.

"At the expiration of one hour and a half from the time of the distribution of the questions on English, the written papers of the candidates, with all memoranda and scribblings thereon, shall be delivered to the Superintendent or Deputy Superintendent, who must immediately enclose all the papers in the enveloped sent for that purpose by the Registrar, seal it with his seal, and forward it by the first post thereafter to the Registrar enclosing the accompanying declaration duly filled in and signed."

He said the object of this proposition was simply to alter and amend the regulations in order to meet the resolution arrived at by the Council in December last, that the Preliminary examination should be conducted at two different periods of the day, with an interval between. It was found very difficult to move any direct resolution which would carry out that change, and, therefore, it was considered desirable to rescind the original resolution and begin with a new one.

Mr. BORLAND pointed out that the first two clauses of the second section seemed to have no special reference to the candidate, but only to the Superintendent. He would also point out that in Scotland, in order to avoid casualties which might arise from examination papers not arriving on the morning appointed, it was provided in the case of the Science and Art Department examinations, that the papers should be deposited in the hands of some responsible person in the neighbourhood twenty-four or forty-eight hours previously. He thought a similar arrangement might be desirable in this case.

Mr. SAVAGE said in the University Local examinations it was laid down that the candidates should sit four feet apart.

The PRESIDENT said he should be inclined to leave the Superintendent some discretion on such matters. It was possible to be too elaborate in detail.

Mr. HILLS said there seemed to be some difference with regard to the fee for the Bell Scholarship examination when held concurrently with the Preliminary. He supposed that was intentional.

The PRESIDENT said that was so.

Mr. HILLS remarked that formerly the Superintendents of the Preliminary on the day of the Bell Scholarship examinations received two guineas. In view of the proposed alteration in the examinations, he thought that the Society could well afford to make the fee two guineas on each occasion, as it was very important to obtain the services of the very best men at each centre.

Mr. WILLIAMS thought this being a matter which included the voting of money, it ought to have come before the Council on the report of a committee.

Mr. RADLEY thought one guinea was quite sufficient. He remembered the examinations being conducted for years without any fee whatever, and he did not think there would be any complaint from their friends in the country if one guinea only were paid. He had heard complaints sometimes of the extravagance of the Council, and he thought it would scarcely be justified in giving a guinea and a half merely for superintending.

Mr. BORLAND asked if some words could not be introduced so as to allow of a member of the Council being present at one of these examinations, if it took place at a town where he resided.

The PRESIDENT said he would rather leave the draft as it was. He thought any member of the Council presenting himself would not be refused admission.

The VICE-PRESIDENT asked if Mr. Borland knew of any case in which the papers had not been delivered on the appointed day.

Mr. BORLAND said he believed that was the cause of the regulations being introduced to which he had referred.

The VICE-PRESIDENT asked if there would be any objection to the Superintendent receiving a sealed packet twenty-four hours beforehand.

The PRESIDENT thought there would.

The VICE-PRESIDENT said it would certainly be an awkward dilemma if a number of youths were assembled, having come some distance, and had to go home in consequence of the papers not being ready.

Mr. HAMPSON suggested as there were several points which the Council was not quite agreed upon it would be as well to refer the regulations to the Library Committee if the subject did not press for immediate decision.

Mr. WILLIAMS said it was not at all unusual for letters from the north to be delivered in London some hours late, and the probability was, therefore, that the same thing occurred with letters going to the north.

Mr. SYMES said although on a former occasion he had criticized the resolutions as passed by the Council, he quite accepted the decision, though that made him scrutinize these regulations more closely. He must say they seemed thoroughly in conformity with the resolution of the Council.

The PRESIDENT said there was no occasion to press the motion that day, and, therefore, in accordance with the suggestion which had been made, he would agree to refer it to the Library and Museum Committee for report.

THE HANBURY MEDAL.

Mr. GREENISH asked if the President's attention had been called to the fact that two years had passed since the Hanbury medal was presented at the International Congress, and that it should be awarded this year. He suggested that the meeting in October, when the sessional address was delivered, would be a suitable occasion on which to publish the award and present the medal.

The PRESIDENT said his attention had been called to the matter, although he had not yet taken any formal steps with regard to it. He thought the suggestion as to the time when the award should be announced was a very good one.

The Amended Pharmacy Bill.

The Secretary read a resolution which had been forwarded by the Chemists' Assistants and Apprentices' Association of Edinburgh, approving of the Pharmacy Act Amendment Bill and suggesting in the event of its becoming law that the Council should make provision by which the present Major examination should be continued after the year 1886.

The communication was referred to the Law and Parliamentary Committee.

Conversazione.

The Secretary stated that he had received a letter from the Lords of the Committee of Council on Education, stating that the South Kensington Museum would be placed at the disposal of the Society for holding its Conversazione on the evening of the 23rd of May next.

EVENING MEETING.

Wednesday, April 4, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

The last Evening Meeting of the present session was held on Wednesday evening, the 4th inst. Mr. Carteighe, President, occupied the chair.

The minutes of the previous meeting having been confirmed, a paper was read on—

The Bitter Principle of Hymenodictyon Excelsum.

BY W. A. N. NAYLOR.

The paper is printed on p. 817, and gave rise to the following discussion:—

The President said he was sure it would be the desire of the meeting that Mr. Naylor might shortly find an opportunity of completing his investigations on this subject.

Professor Bentley said that this question was invested with interest now in consequence of the "cuprea" barks and other barks obtained from allied plants, which were formerly placed among the cinchonas, having yielded a certain amount of cinchona alkaloids. At the first blush a botanist would naturally expect that *Hymenodictyon excelsum* would have yielded some of the alkaloids of cinchona, since the genus *Hymenodictyon* was formerly included in the genus *Cinchona,* and this plant was the *Cinchona excelsa* of Roxburgh. One would naturally expect to find paricine or some allied alkaloid. The first plant in which paricine was discovered, as far back as 1845, was a rubiaceous plant, namely the *Buena hexandra.* The interest of paricine being found in *Hymenodictyon excelsum* was still further brought out by the fact that it had been found in red bark together with quinamine. Therefore the investigation of substances derived from plants which had been within a comparatively few years disassociated from the cinchonas became a matter of great interest, and he looked forward with interest to the confirmation or otherwise of Mr. Naylor's present results by his further investigations.

Mr. Holmes said that his name had been mentioned by the author in connection with this bark, but he should like to disclaim any thanks with regard to the matter. The bark had been sent to him by Dr. Dymock, of Bombay, a gentleman who had in a most disinterested manner contributed very largely to the museum on various occasions. Dr. Dymock had kindly promised to complete the collection of Indian drugs for the museum.

Dr. Ondaatje, referring to the virtues of *Hymenodictyon excelsum* as a febrifuge, said that he was in India many years back, when Sir William O'Shaughnessy was compiling his first book on Indian drugs, the 'Bengal Dispensatory,' and this drug was then tried in the hospitals of the Medical College and found to be most valuable. In mild cases of fever it was almost equal to the cinchona bark. There was another species almost as efficacious as the *Hymenodictyon excelsum.* He believed that it was the *H. laxiflorum.*

Mr. Luff wished to ask Mr. Naylor whether heat was employed in drying the pasty mixture of the powdered bark. He would suggest that Mr. Naylor, on resuming his investigations, should extract the alkaloid under somewhat different conditions. According to his (Mr. Luff's) experience of alkaloid work, Mr. Naylor had employed almost the very conditions which were most likely to bring about a decomposition of the alkaloid, namely, in the first place, contact with a fixed alkali, lime; in the second place, percolation with boiling or hot alcohol; in the third place, contact with a strong inorganic acid—sulphuric acid—during the distillation; and in the next place precipitation with a fixed alkali, caustic soda. In his experience those conditions were likely to produce that destruction of the alkaloid which was generally spoken of in chemical phraseology as saponification. This change consisted of a decomposition of the alkaloid into another alkaloid of a lower molecular weight and an acid. Probably the reason why Mr. Naylor obtained a resinous mass, and failed to get a crystallizable alkaloid or crystallizable salts, was that he had brought about this kind of decomposition. All the different kinds of alkaloids which Dr. Wright and he had worked upon were decomposed by contact with even warm alcohol, by contact with any of the alkalies, and by contact with any of the mineral acids. He would suggest that Mr. Naylor should percolate the bark with alcohol acidified with tartaric acid, for an organic acid produced scarcely any saponification, and avoid precipitation with a strong alkali such as caustic soda or potash. Assuming that the alkaloid present with the bark was paricine, which seemed probable, Mr. Naylor's experiments would point to an actual decomposition or saponification of the alkaloid, for the general result of saponification was that, whilst the carbon percentage of the alkaloid remained the same, the hydrogen percentage was increased; and this Mr. Naylor's figures showed.

Mr. Gerrard differed somewhat from the statement which had just been made by Mr. Luff, especially with regard to the use of lime as the means of liberating alkaloids under certain conditions. He thought that the process employed by Mr. Naylor was admirably suited for the purpose where an alkaloidal body was in combination with an acid of the tannic acid series. Lime lent itself most readily to combinations with acids of that series, and also with many of the colouring matters. Let any one take a sample of cinchona bark, and mix it with potash, soda, or ammonia, and another portion and mix it with lime, and prepare a tincture from each mixture; the difference of colouring of the two mixtures would be astonishing. Of course an operator conducting an experiment with lime and a bark would take care that he did not carry his temperature too high. It was possible to exhaust cinchona bark with lime and alcohol at a normal temperature, provided that the bark and the lime were in a proper state of division. He did not say that lime was adapted all round under all circumstances; but under certain circumstances it was the best agent. Especially was it the best thing for beberine. He had lately had a bark sent to him from the west coast of Africa, and he had experimented upon it with various alkalies, but he found lime the best of all. He should like to ask Mr. Naylor whether he prepared the hydrobromide or the phosphate of the alkaloid. Those salts usually yielded themselves very readily to crystallization, and as a rule they were insoluble in cold alcohol, but they dissolved readily in hot alcohol, from which they were generally deposited upon cooling in a crystalline form. That was, in his opinion, one of the best methods of obtaining a pure crystalline salt of an alkaloid. He should like to know what quantity of bark Mr. Naylor operated upon, as the quantity made a considerable difference in the investigation. It was not possible to carry out a thoroughly exhaustive investigation with a small quantity; from 7 to 14 pounds were needed for a full investigation.

Mr. LUFF remarked that Mr. Gerrard had not brought forward any experimental evidence that lime did not bring about the decomposition which he (Mr. Luff) had mentioned.

Mr. TANNER said he should like to ask whether Mr. Naylor had examined the liquid from which the precipitate was obtained, and whether he concluded that by the precipitation of the body which appeared to be allied to paricine he had separated all the alkaloidal constituents. If not, Mr. Naylor's results and those obtained by Mr. Broughton might be brought into accordance. It was known that when alkaloids were precipitated with caustic soda or potash, the residual liquor might contain another body, even æsculin, or the product æsculetin. With regard to the non-crystallizability of the alkaloid, he should like to ask what solvents Mr. Naylor employed, for it was known that in some cases the addition of a body having a less solvent action on the alkaloid than the one in which it was dissolved would determine crystallization.

Mr. NAYLOR, in reply, said in reference to the remarks of Mr. Luff, that he did not think that any process which could be devised would be suitable for the extraction of an alkaloid in every instance. Had he not been pretty certain from preliminary investigations that the alkaloid in question was very closely allied to beberine on the one hand, and to quinine on the other, and further, had he not found the colouring matter somewhat troublesome, he certainly should not have employed such a process as the lime process. That process was by no means original. Not only was it largely employed for the extraction of quinine from cinchona barks, but it was the process which Dr. Hesse had himself made use of for the extraction of paricine. He thoroughly agreed with what Mr. Gerrard had said as to the use of lime, and he only needed to emphasize his remarks on that point. Oxalic acid was perhaps about as serviceable an acid as could be employed for the extraction in this case. It extracted the alkaloid with probably the minimum amount of colouring matter, and it might be advisable to employ a weak solution of oxalic acid; but decomposition took place very largely in the heating of the body afterwards. In reply to Mr. Gerrard, he might state that he did not prepare the hydrobromide, but he did prepare the phosphate, though he did not succeed in getting it to crystallize. The quantity of bark that he worked upon was 300 grams. The bark was tested for æsculin, but that body was not found. The solvents employed were benzol, chloroform, ether, petroleum spirit, acetic ether, organic acids and mineral acids. As to temperature, he had employed various temperatures ranging from 60° to 120°; and with regard to time, the periods had varied from very short ones to periods of four or five days, with a temperature of 110° F. It was well known that paricine had not yet been obtained in the crystalline condition. He wished it to be distinctly understood that he did not state that the body which he had obtained was paricine; that point remained for further investigation.

A vote of thanks to Mr. Naylor was then passed.

A paper was then read, entitled—

REMARKS ON SOME MEDICINAL PLANTS OF CEYLON,

BY DR. W. C. ONDAATJE, F.L.S.

The paper is printed on p. 818, and gave rise to the following discussion:—

The PRESIDENT said that it was always a pleasure to have members of the medical profession present at the meetings of the Society, and it was particularly gratifying to have present a member of the medical profession who had come from a long distance and brought with him typical specimens of the materia medica of his island, and who further enlightened the Society by a graphic description of them. The meeting was very much obliged to the author, both in his capacity of a member of the medical profession and in that of a pharmacologist.

Mr. HOLMES said that it was perfectly true, as Dr. Ondaatje said, that the natives of a country were very apt to ascribe imaginary virtues to some of their plants; but when a medical man who had made experiments on the properties of those plants came forward and stated which were valuable and which were not, he conferred a great favour both on pharmacists and on the medical profession. One of the specimens to which Dr. Ondaatje had called attention, *Sethia acuminata*, was a plant which was interesting, partly because it belonged to the same family as the coca, and partly because as an anthelmintic it was almost free from taste. Several of the anthelmintics which were in common use were not only disagreeable in their effects but also disagreeable in flavour. Another anthelmintic which had been mentioned, *Vernonia anthelmintica*, belonged to the same order as the Persian insect powder. It had somewhat astonished him sometimes that Persian insect powder had not been tried as a remedy for worms. If it killed insects outside the body, it might have a similar effect upon internal parasites. If any gentleman was willing to undertake the investigation of one or more of these drugs, he felt sure that Dr. Ondaatje would be quite ready to send him specimens in the quantity which had been mentioned, namely, from 7 lb. to 14 lb.

Mr. GERRARD inquired if Dr. Ondaatje could tell them if the bark of *Randia dumetorum* was known as emetic bark in Ceylon.

Dr. ONDAATJE said that he believed that it was so called, but he was not quite sure. He believed that the natives used the seeds of it as an emetic.

Professor BENTLEY said that he could not allow the paper to pass without expressing his thanks to the author for coming forward and giving his experience. It was most important that medical practitioners, who were scattered all over the world, should, when they were placed in a particular district, take an opportunity of trying the virtues of the remedies of the country. There was no doubt a vast amount of useless material, and it was almost impossible to sift it in this country; but medical men like the author of the paper could try the effects of the drugs in the country in which they grew, and separate the chaff from the wheat. If native remedies were not tested by practitioners like the author of the paper there would not be any opportunity of getting new remedies brought to this country. In different parts of the world there might be many drugs which would yet be found to be of incalculable benefit. With regard to *Randia dumetorum* it was a substance which had been known and canvassed over and over again. O'Shaughnessy spoke of it many years ago as being a remedy which was not at all reliable; but at the time of the compilation of the Indian Pharmacopœia, Dr. Bidie brought it forward as a substance well worthy of more particular investigation. Dr. Bidie spoke of the ripe fruit as being the active part of the plant. He (Professor Bentley) should like to know if the author had ascertained whether the valuable part was the seed or the fruit. There was no doubt that a substance which had been so long used deserved investigation, and it was desirable to know whether it contained emetia in any quantity and whether it could be employed as a substitute for ipecacuanha. *Sethia acuminata* was a well-known vermifuge. Anything concerning *Coscinium fenestratum* must be interesting to members of the Society, for he believed that he was right in saying that one of the earliest papers, if not the very first paper, which the lamented Hanbury read in that room was upon calumba wood, the origin of which he traced to that plant. As to the antiseptic properties of *Coscinium fenestratum*, as the author would know, there was nothing remarkable in a pure tonic possessing qualities of that kind. Quassia and almost all pure tonics had the same effect in preventing the decay of animal matter. As to *Vateria Indica*, the statement concerning its power to arrest fermentation was altogether new to him, and he should take care to notice it. The plant was interesting as the source of a resin which at the time the Indian Pharmacopœia was brought out was spoken of as a substitute for the official resin. Moreover, the bruised fruit of the same plant yielded, when boiled, a fatty substance which was called "piney tallow." This substance had been used externally in different parts of India as a remedy for chronic rheumatism. As to *Semecarpus Gardneri*, the fact of its yielding resin was what one would naturally expect from any anacardiaceous plant. He was glad to have confirmatory evidence as to *Vernonia anthelmintica*. It had been well known for a long time that the seeds were used as a vermifuge. He was particularly interested in *Alstonia scholaris*, because the medical properties of the bark were well known as the author had noticed. With regard to the juice being a substitute for gutta percha, he should like to know whether the author had got any further information on that subject since his communication to Mr. Simmonds. The plant belonged to the order Apocynaceæ, which yielded substances analogous to gutta percha. In view of the difficulty of obtaining gutta percha, and in prospect of the loss of that substance, anything which would act as a substitute would be of incalculable value. If he recollected rightly he was a member of the Council of the Society of Arts in 1865, and therefore this subject had rather impressed itself upon his memory, for even at that time the Society of Arts offered a premium for a substitute for gutta percha. Gutta percha was then very largely in use, and there was a fear that in consequence of the destruction of the trees the substance would be entirely lost. The next substance mentioned in the paper, namely, *Acorus calamus*, or the sweet flag, was one which he had heard his dear old master, Dr. Pereira, speak of over and over again. He always used to say that it was an aromatic stimulant, superior almost to any other. It was a substance which was somewhat put aside in this country, but it was not so in other countries, and although it was not actually in the Pharmacopœia of India, it was at the present time in the Pharmacopœias of the United States and of Germany. This would show that there were a good many other people of the same opinion as his far-sighted and much respected old teacher as to the value of this substance. Its anthelmintic properties were new to him, and they added still more interest to the subject of sweet flag.

Mr. Martindale said that no doubt the antiseptic properties of *Coscinium fenestratum* were due very largely to berberine, as Professor Bentley would acknowledege. Berberine was used very much in America to make lotions in cases of gleet and other diseases. Its antiseptic properties had never been well worked out.

Mr. Andrews said that there was an allusion made in this paper to a black varnish which was used in the arts. It had long been a desideratum among musical instrument makers to find a varnish which should be equal in hardness to the varnish which was found on old Cremona violins. He believed that age had a great deal to do with the hardness of that varnish; but there was certainly a very great benefit to be derived by any one who could, either by means of this varnish or any other, find a material which would be very hard and imitate the varnish of the old violin makers. Speaking from some little experience of the matter, he believed that the resonance or tone of a violin was, to a great extent, due to the quality of the varnish.

Mr. Bland said that the question of "fiddleology" and the matters connected with it was one which would require many hours for its discussion; but he could tell the last speaker that he had set out on an entirely wrong datum if he thought that the Cremona varnish was a very hard substance. If he obtained a varnish which would produce a very hard surface he would not have Cremona varnish. This subject, however, was not one which could be gone into at that meeting.

Dr. Ondaatje said that he was exceedingly obliged to Professor Bentley for his most interesting remarks on the paper, and he was highly encouraged to contribute to that great Society what he knew as to the plants of his island. With regard to the juice from *Alstonia scholaris*, he regretted to say that he had no further information than that which he had supplied to Mr. Simmonds, in 1865. His attention was called to the substance whilst he was travelling, for his servant, having accidentally cut the top part of a tree, he saw a large quantity of milky juice exuding from the cut branch, some of which he collected. A sample was sent in response to the prize offered by the Society of Arts for a substitute for gutta percha. As to *Randia dumetorum*, in Ceylon the seeds were used in the state of powder, and were found to be very efficacious. The author of the 'Supplement to the Indian Pharmacopœia' stated that in India the pulp was used. The drug had been employed in the east from time immemorial, and the tree was mentioned in all the ancient Sanscrit works as possessing valuable properties. As an emetic it was equal to ipecacuanha. It was in fact the ipecacuanha of the natives. The latter when in powder very often deteriorated in quality through being kept.

The next paper read was a—

Note on Essence from Green Ginger.

by Charles Symes, Ph.D.

The paper is printed on p. 819.

Mr. Tanner asked whether this particular form of ginger was yet an article of commerce. If it was, it seemed that it was likely that it would come into very great demand. The essence was one which would seem to meet the requirements of a great many consumers.

Professor Bentley said that a great deal of it came over a few years ago. There would be no difficulty in getting it if there was a demand for it. This form of ginger had been described by Pereira.

Dr. Symes said that he did not think it was a thing of very large demand. He was informed that its commercial value was somewhat low, simply because there was not much demand for it.

A vote of thanks was then accorded to Dr. Symes.

The next paper read was a—

Note on Sap.

by Professor Attfield.

The paper is printed on p. 819, and gave rise to the following discussion:—

Mr. Ekin said that with regard to the chemical aspect of this very interesting paper, he took it that that must more or less be new. As to the botanical aspect of the paper, it was a well known fact that various forest trees bled immensely if they had their limbs lopped off, especially large ones, before the leaves were expanded. He did not remember ever having seen the rate of flow determined; that was certainly very wonderfal. He once had under his observation a row of sycamore trees of considerable growth. Limbs of nearly a foot in diameter were lopped off, and the amount of bleeding was very great. The sap in that case was sweeter than the birch sap, as might be expected in the case of one of the maples. He was not surprised at the largeness of the quantity of sap yielded by such a tree, for the wood was very soft. But he had found sap exuding from the centre of a beech tree, the heart wood of which was very hard. The other part of the tree was dry, and not a leaf had expanded. He looked at some of the books, and according to them it seemed that the beech had no business at all to allow its sap to exude in that way.

Professor Bentley said that he should not have expected that such a large amount of sugar would have been found in the sap mentioned by Dr. Attfield, although perhaps the particular nature of the birch might account for it. He had himself seen gallons of fluid come in a few hours from a wounded tree before the leaves had expanded; and the fact that the leaves had not expanded was the explanation of the matter. At this season of the year, before the leaves were expanded, the reserve materials of the tree were largely stored up in the root, and from chemical changes actively going on the fluids in that part became very dense, and the consequence was that an excessive osmotic action took place. There was far more fluid absorbed from the earth than the plant could use, and what botanists called "root pressure" took place. This was a matter which had not been clearly explained until the last few years; it had nothing to do with the leaves. The pressure which took place forced the fluid up the stem. This was clearly the explanation of what was called bleeding. The process did not take place at any other time of the year, for as soon as the leaves were fully developed, the fluid which was absorbed by the roots was naturally carried up the plant, and became transpired and thus carried off. Probably the ascending sap had greater force in summer, but the tree did not bleed, for the leaves carried off the fluid. An analysis of the sap of a tree at this time of the year by a competent chemist like Professor Attfield was exceedingly valuable and useful.

Professor Attfield said that if there had been time he should have liked to ask Professor Bentley what root pressure was.

A note by Dr. Paul on the results of the analysis of samples of the cinchona barks recently received from Jamaica for the Museum was laid before the meeting by Mr. Holmes. The note will be printed in a subsequent number.

The President said he was sure the members would vote their cordial thanks to Dr. Paul for this very complete series of analyses.

Mr. Holmes then called attention to various specimens of Indian bark which had been forwarded under the instructions of the Indian Government by Surgeon-Major Bidie, the Superintendent of the Museum at Madras. A descriptive catalogue of the barks, and of the Herbarium specimens accompanying them, is printed on pp. 821, 822. Mr. Holmes said that the barks were accompanied by excellent specimens of the plants themselves, representing the flower, the leaf, and the fruit, the Herbarium specimens being labelled with numbers corresponding to the numbers of the barks. The specimens had been prepared with the greatest care, and full details had been given in each case, both of the plant and of the bark. This was one of the most valuable collections of Indian barks which had ever been sent to this country. Great credit was due to the gentleman who had superintended the collection of these specimens. It would be possible in the future for any person who wanted to identify the bark which he was using to do so by comparing it with the Museum specimens. Two of the specimens were very interesting from a botanical point of view as showing that the cinchonas, like the elms and maples of England, sometimes produced a bark which was excessively corky. The cork in some of these barks varied from $\frac{1}{4}$ inch to $\frac{1}{2}$ inch in thickness. There was also on the table a specimen of *Manilla Elemi* presented by Messrs. Evans, Lescher and Webb. It was imported in a new kind of packing, which he had never seen before. There was also a specimen of crude and refined ozokerit and an elastic bitumen from Castleton, in Derbyshire, somewhat approaching the coorongite of Australia.

The President said that the members of the Society would better appreciate the very complete catalogue of the specimens which had been sent with the collection of barks when they were able to read it. The Council of the Society had already expressed its thanks officially to the Government of India for its courtesy in passing on to the proper authorities the request of the Society to be furnished with these specimens. They had been collected and arranged under the personal superintendence of Surgeon-Major Bidie. If it had not been for Surgeon-Major Bidie's zeal, probably the Society would not have been so successful in getting a complete collection, and certainly not so successful in getting such excellent botanical specimens. Their thanks were eminently due to him and the officials of the Government for their courtesy.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

The anniversary meeting of this Society was held at Burlington House, on Friday, March 30th. Dr. J. H. Gilbert, F.R.S., President, in the chair.

The President read his annual report. There have been occasions in the history of the Society when important questions had to be discussed, sometimes involving matters of internal working and management, at others the consideration of some new departure with a view to more extended usefulness. At present there are no such questions requiring special notice; the attainment of the objects for which the Society was founded is steadily progressing, and the President, taking advantage of the fact that he was elected a Fellow during the first session of the Society, now nearly forty-two years ago, presents the Society with a review of its progress from the commencement of its existence up to the present time. Of the twenty-five gentlemen who met on February 23, 1841, for the formation of the Society, only two now remain in the list of the Fellows, and out of the one hundred and eighteen members on the register at the first anniversary meeting, March 30, 1842, only ten could now answer the roll call,—the President, Professor Andrews, Drs. De La Rue, Longstaff, Lyon Playfair, James Young, and Messrs. Heisch, F. R. Hughes, Pearsall and Denham Smith. The number of Fellows at the last anniversary was 1175. One hundred and four have joined during the past session. Nine have died,—Mr. John Gray, Mr. Dugald Campbell, Mr. J. J. B. J. Grosjean, Mr. A. Jesseman, Dr. G. A. C. Pearce, Dr. G. W. Septimus Piesse, Mr. E. Wilcock, Professor H. J. S. Smith and Mr. Frank Hatton; twenty-three have withdrawn, etc., so that the present number of Fellows on the register is 1247. One foreign member, F. Wöhler, is deceased, whilst nine have been elected, the total number of foreign members being now thirty-seven. The objects of the Society, as stated by the founders, were the reading, discussion and subsequent publication of original communications and the formation of a chemical library and museum. The number of papers read during the five years ending 1846 was 167, giving an annual average of about 33; in 1854–55 only 17 papers were read; during the past session 70 papers were communicated to the Society, and one discourse on the "Recent Development of the Theory of Dissociation" was given by Professor Dewar. As to the Journal, 1775 copies were printed during the past year. About 1851 an attempt was made to found a museum in connection with the Society, and some specimens were sent from the great Exhibition, but were eventually again dispersed. The President suggests that as a nucleus of a future museum the authors of papers on new compounds might be requested to present specimens to the Society. A much more favourable account can be given of the library. At the time the last catalogue was issued to the Fellows in 1873, the number of volumes was 3540; since that time 3260 volumes have been added, making a total of 6800. During the same period the number of pamphlets has increased from 540 to 840. The Council have decided that a new catalogue, arranged in order of subjects, shall be prepared, printed and issued to the Fellows as soon as possible. The income of the Society has steadily increased from about £183 in 1846 to over £3000. The report then dwells upon the vast facilities for the study of chemistry which are now afforded in all parts of this country, so that while less than fifty years ago there was no systematic course of analytical training in the kingdom, now almost every public school has some arrangements for teaching practical chemistry. With this great development in the past and all that it promises in the future there is surely every reason to believe that the Society must increase both in the number of Fellows and in the number and value of the papers communicated to it. There have been two offshoots from the Society during the last few years, the Institute of Chemistry and the Society of Chemical Industry, but neither has prospered at the expense of the parent Society; the valuable papers which have been published by the Society of Chemical Industry have probably been originated altogether under the auspices of the new Society, and are, so far, a pure gain rather than a transference of energy. The President then concluded this portion of the report with a most interesting *résumé* of the arrangements for chemical education and chemical research on the American continent, founded upon the experience gained during his recent tour in that country and on information received from Sir A. Galt, High Commissioner for Canada, and from His Excellency, Mr. Lowell, the American Minister in London.

Dr. Schunk said that all must regret that Dr. Gilbert was not in a position to accept the office to which he had been nominated by the Council; the Fellows were much indebted to him for his constant attendance and courtesy. He had much pleasure in proposing a hearty vote of thanks to Dr. Gilbert, and that his report be adopted. This was seconded by Professor Ronalds and carried unanimously.

Dr. Gilbert said that he appreciated very highly the honour of having been President, and most sincerely regretted that in consequence of the pressure of his own avocation, and his distance from London, he had been compelled to relinquish the office at the end of the first year. His successor was a tried officer of the Society, and had by his researches contributed largely to the interest of the meetings and of the Journal. It seemed only fitting that a chemist who had devoted himself specially to organic chemistry should fill the chair, when that branch of the science was so constantly brought forward at the meetings of the Society.

The Treasurer then presented his report. The total income of the Society was about £3073, the expenditure about £2770, leaving a surplus of £303. This surplus was rather smaller than last year for several reasons; there had been an increase in the expenses connected with the Journal of £217, and with the library of £61. The income was also rather less than was anticipated, owing to the fact that a smaller proportion than usual of the new Fellows had compounded. Next year there would probably be no surplus, as it would be taken up by the expenses connected with the new catalogue, and the redecoration of the Society's rooms. The assets of the Society consisted of £7788 stock and a balance at the bank of £1194. As to the Research Fund, £220 had been given in grants during the year: the assets consist of £4500 stock and a balance at the bank of £166. The donations to the Fund had fallen off considerably.

Mr. Warington proposed a vote of thanks to the Treasurer, which was seconded by Mr. Makins, and carried unanimously.

Votes of thanks were also given to the Auditors, the Council and Officers, and the Editor, Sub-Editor and Abstractors.

Messrs. W. Thorp and Newlands were then nominated Scrutators, and the following Officers and Council were declared duly elected:—President, W. H. Perkin, Ph.D., F.R.S.; Vice-Presidents, F. A. Abel, Warren De La Rue, E. Frankland, J. H. Gilbert, J. H. Gladstone, A. W. Hofmann, W. Odling, Lyon Playfair, H. E. Roscoe, A. W. Williamson, A. Crum Brown, P. Griess, G. D. Liveing, J. E. Reynolds, E. Schunk, A. Voelcker; Secretaries, H. E. Armstrong, J. Millar Thomson; Foreign Secretary, Hugo Müller; Treasurer, W. J. Russell; Council, E. Atkinson, Capt. Abney, H. T. Brown, W. R. E. Hodgkinson, D. Howard, F. R. Japp, H. McLeod, G. N. Makins, R. Meldola, E. J. Mills, C. O'Sullivan, C. Schorlemmer.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Acetic Ether.

Sir,—It would be unnecessary for me to notice the courteous criticisms of Professor Redwood and Mr. Abraham on my paper on "Acetic Ether," were it not evident that my postscript has not yet made clear how it was that I assumed the Pharmacopœia to mean liquids by measure. It is quite true that, following the scientific usage, I would have read such a formula as meaning parts by weight; but so far from Squire's 'Companion' bearing this out, it supports the interpretation I put on it. To quote Professor Redwood's words will at once show this: "I have never seen it (parts) used otherwise than to represent parts by weight, unless accompanied by an explicit representation of its having a different meaning, as in the case of Squire's 'Companion to the Pharmacopœia,' where the explanation is given at the head of every page, clearly indicating what would be inferred in the absence of such explanation." From this I understand, unless I suffer from mental obliquity, that as Squire distinctly says, "solids by weight —liquids by measure" at the top of the page containing the B.P. formula for acetic ether, this is an "explicit representation of its having a different meaning" from parts by weight, and "clearly indicating what would be inferred (viz., parts by weight) in the absence of such explanation."

Of course Professor Redwood's statement that parts by weight were meant at once settled this, and I am glad to find that the B.P. proportions correspond so well with my own. At the same time perhaps my remarks may not have been out of place, seeing that they have elicited an official explanation on the point. I should like to ask if the solubility (1 in 12 parts of water), is also intended to be taken by weight.

Mr. Abraham will doubtless, ere this, have noticed his mistake in referring to my proposed proportions, but for the benefit of others I will just draw attention to the error in his numbers. He gives my proportions as—

	According to Abraham.	As given in my paper.
Alcohol ·838.	50	50
Dry acetate of soda . .	62	74
Sulphuric acid, B.P. . .	92	110

How he has fallen into this error it is of no importance to discuss. The fact remains that my proportions show an excess of sulphuric acid along with the theoretical amount of sodium acetate.

I can assure Mr. Abraham that I find no difficulty in obtaining a uniform composition by following the directions given, and that the sp. gr. is always about 902 to 901, and the product (even without distillation) contains at least 97 to 98 per cent. ethyl acetate. It would be interesting if Mr. Abraham would analyse his sample "about sp. gr. 891, of pretty constant composition," and determine the percentage of ethyl acetate.

26, *S. Canongate.* Wm. Inglis Clark.

Communications, Letters, etc., have been received from Messrs. Rice, Abraham, Atkinson, Kirkby, Traub, Galen, Omega.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 758.)

OLEUM AMYGDALÆ AMARÆ, U.S.P.—The oil, either in its crude state or freed from hydrocyanic acid, is official, since the sp. gr. is given for each; the former should be 1·060 to 1·070, and the latter 1·043 to 1·049. The distillate, obtained at a temperature of 80° C. (176° F.), should not have the odour or characteristics of chloroform or alcohol. The potash test for the presence of nitrobenzol is given.

OLEUM AMYGDALÆ EXPRESSUM, U.S.P.; OLEUM AMYGDALARUM, P.G.—The sp. gr. in both Pharmacopœias is almost identical. The U.S.P. states that the oil does not congeal until cooled to near − 20° C.; the P.G. that it remains limpid at 10° C., and that when shaken with fuming nitric acid it should give, after some hours, a solid, white, not a brown or red mass, and an almost colourless liquid. This test excludes the use of peach kernel oil, which is said to be largely used in France as a substitute for almond oil. The U.S.P. states that when two drops of concentrated sulphuric acid are allowed to fall on about eight drops of almond oil on a white plate, the mixture should not assume a dark colour at the edge of the acid, and after stirring, the "mixture should not assume a dirty yellow colour, retaining its tint for several minutes."

OLEUM ANISI, U.S.P. and P.G.—Oil of *Pimpinella anisum* only is official in the P.G., but that of *Illicium anisatum* also in the U.S.P. The difference in the solubility of the two oils in proof spirit, pointed out by Mr. Bland (*Pharm. Journ.*, [3], xiii., p. 363), and the discrepancies likely to result from this cause in dispensing, render it desirable that only one oil should be official.

OLEUM AURANTII CORTICIS, U.S.P.—By a singular oversight (?) the botanical name of the orange to be used is not given, hence it is open to question whether the oil of the *Citrus Aurantium* ("essence de portugal") or the more valuable oil of *C. vulgaris* ("essence de bigarade") is intended. Under these circumstances the pharmacist who values his reputation will, of course, use the best variety. Its sp. gr. is given as about 0·860. The disagreeable terebinthinate taste which the oil acquires by keeping may be prevented by "mixing it while fresh with 5 per cent. of alcohol, and decanting the oil after it has become clear from the sediment."

OLEUM AURANTII FLORUM, U.S.P. and P.G.—The same remark as to the omission of the botanical source of the oil in the U.S.P. applies in this case, but in the P.G. it is attributed to *Citrus vulgaris*. It should be soluble in an equal quantity of alcohol, should exhibit a violet fluorescence when a little alcohol is poured on it and the fluid gently undulated (U.S.P. and P.G.), and a spirituous solution should be neutral to test paper (P.G.). The sp. gr. is given in the U.S.P. as 0·850 to 0·890. When pure the sp. gr. of *Ol. Neroli Bigarade* should be 0·899, according to Hanbury.

OLEUM CAJUPUTI, U.S.P. and P.G.—The P.G. gives *Melaleuca Leucadendron* as the botanical source of the oil, and the U.S.P. *M. Cajuputi*, Roxb. The latter gives the sp. gr. as 0·920. On shaking 5 c.c. of the oil with 5 c.c. of water and one drop of dilute hydrochloric acid, the oil should become decolourized (P.G.), nearly colourless (U.S.P.). When 1 part of iodine is mixed gradually with 5 parts of the oil and the mixture cooled, it should solidify to a crystalline mass (P.G.). This mass is easily decomposable.

OLEUM CARI, U.S.P.; OLEUM CARVI, P.G.—The U.S.P. gives the sp. gr. as 0·920. The P.G. orders the portion of oil obtainable from the fruits at a higher temperature, and, therefore, carvol. This does not appear to be in demand in Germany, but must of course be kept for dispensing. The question whether carvol or oleum carvi is to be used will therefore arise when old prescriptions containing oleum carvi have to be dispensed. It would have been better, therefore, that the name carvol should have been given to the fluid ordered in the P.G., of which the sp. gr. should be not less than 0·910. It should give a slightly violet or reddish colour with solution of perchloride of iron, and a white crystalline mass with alcoholic sulphide of ammonium.

OLEUM CARYOPHYLLI, U.S.P.; OLEUM CARYOPHYLLORUM, P.G.—The sp. gr. should be 1·050 (U.S.P.), or 1·041 to 1·060 (P.G.). According to the P.G. on adding a solution of perchloride of iron to water in which the oil has been shaken, it should not give a green or blue colour, indicating probably the presence of carbolic acid; if the oil be pure, a drop of the oil spread on the inner surface of a glass vessel, when the vapour of bromine is introduced, should become of a blue or violet colour. It should be miscible with an equal or larger quantity of spirit of wine.

OLEUM CINNAMOMI, U.S.P. and P.G.—The oil of cinnamon of the U.S.P. of course includes oil of cassia. The sp. gr. of the oil of Ceylon cinnamon is given as about 1·040, and that of Chinese cinnamon (oil of cassia) as about 1·060. The P.G. gives the sp. gr. (of Chinese cinnamon oil) as 1·055 to 1·065. The presence of carbolic acid is recognized by the test with perchloride of iron. No reference is made to the oil of cinnamon leaf, which has somewhat different odour from that of the bark.

OLEUM EUCALYPTI, U.S.P.—The oil may be derived from the fresh leaves of *E. globulus* or *E. amygdalina*, Labill., and some other species of *Eucalyptus*. The sp. gr. is given as 0·900. Muller (*Proc. Montreal Coll. Pharm.*, 1873, p. 28) gives the sp. gr. of *E. globulus* as 0·917, that of *E. amygdalina* as 0·881, and that of *E. oleosa* as 0·911, so that it would appear as if the oil from which this sp. gr. was taken was a mixed oil. Indeed, the oil of *E. globulus* until recently has generally been replaced with that of other species in commerce. For antiseptic purposes this is probably of little consequence; but if used internally, the difference in flavour of the different oils would, probably, be quickly detected by patients and lead to difficulties with the dispenser.

OLEUM FŒNICULI, U.S.P. and P.G.—The sp. gr. is given in both as 0·960. The clear spirituous solution should not be coloured by sesquichloride of iron (P.G.).

OLEUM GAULTHERIÆ, U.S.P.—The sp. gr. is given as 1·180. One of the adulterations commonly used, consisting of a mixture of chloroform and alcohol, is detected by the colourless distillate obtained at 80° C. (176° F.). The other, oil of sassafras, if present, gives a deep red colour when five drops of the adulterated oil are mixed with five drops of nitric acid, and the mixture solidifies to a dark red resinous mass. Oil of wintergreen being the heaviest of the volatile oils, the sp. gr. alone serves as a guide to the detection of any admixture of other essential oils.

OLEUM GOSSYPII SEMINIS, U.S.P.—It should be of a bright pale yellow colour, with a sp. gr. of 0·920 to 0·930. Concentrated sulphuric acid should instantly render it dark reddish-brown. The oil replaces olive oil in five of the official liniments. In the case of *Linimentum Calcis* the drying property of the oil might prove an advantage, but in the others oleum olivæ would probably be preferable so far as the comfort of the patient is concerned.

OLEUM HEDEOMÆ, U.S.P.—The sp. gr. should be about 0·940. This oil, commonly known as American oil of pennyroyal, may be recognized by its sp. gr. (that of *Mentha Pulegium* being 0·927), and by dissolving iodine with an explosive reaction. In some persons it produces unpleasant symptoms, and the English oil is therefore to be preferred in this country.

OLEUM JUNIPERI, U.S.P. and P.G.—The P.G. does not give the sp. gr. The U.S.P. states that it should be about 0·870, and that the oil should be soluble in about 12 parts of alcohol, forming a turbid liquid. The P.G. directs that a drop of the oil rubbed with sugar and shaken with 50 grams of water should not impart an acrid taste to the liquid. This test is probably intended to detect the cheaper oil prepared from the tops or wood of the plant. The P.G. remarks also that the oil is but little soluble in spirit, but forms a clear mixture with bisulphide of carbon. The solubility and specific gravity of the oil depend upon age and upon whether the oil is derived from unripe or ripe berries (*Pharm. Journ.*, [3], viii., 887), but in neither Pharmacopœia is any direction given as to the age of the fruit to be employed.

OLEUM LAVANDULÆ, U.S.P. and P.G.—It should not give evidence of alcohol, and the sp. gr. should be about 0·890 (U.S.P.), 0·885 to 0·895 (P.G.).

OLEUM LIMONIS, U.S.P.; OLEUM CITRI, P.G.—The U.S.P. states that it should be soluble in 2 parts of alcohol and have a sp. gr. of about 0·850, and should be soluble in all proportions in absolute alcohol or disulphide of carbon. The addition of 5 per cent. of alcohol to the oil when fresh and decantation after a sediment has been deposited is recommended to prevent it from acquiring a terebinthinate taste. The P.G. directs that it should not yield alcohol on distillation.

OLEUM MENTHÆ PIPERITÆ, U.S.P. and P.G.—The test given in the U.S.P. of the solubility in an equal weight of alcohol, and in the P.G. of its forming a clear mixture under these circumstances, as well as the test of not becoming heated when powdered iodine is moistened with it, would appear to be intended to exclude the American oil, which is said to explode with iodine and to form a turbid mixture with alcohol (*Pharm. Journ.*, [3], ii., 338). The American oil also has usually a sp. gr. of 0·85 to 0·86, while that ordered in the P.G. is 0·90 to 0·91, and in the U.S.P. 0·90. No test is given for the presence of castor oil (*Pharm. Journ.*, [3], ii., p. 981) or for other known occasional adulterants of oil of peppermint. Now that Japanese oil is a marketable article, a test for its detection if used as an adulterant might be useful.

(*To be continued.*)

NOTE ON DRIED ALUM.*

BY E. BAILY,

Bell Scholar in the School of Pharmacy of the Pharmaceutical Society.

[Contribution from the Research Fund of the School of Pharmacy Students' Association.]

So many different and conflicting opinions have from time to time been put forward as to the use and solubility of the alumen exsiccatum of the Pharmacopœia, that, after reading the evidence on both sides, one is left in considerable doubt as to which is most worthy of credence. For instance, in the *Pharmaceutical Journal* for November 26, 1870, Dr. Tilden states that "dried alum is nearly insoluble in water, but recovers its solubility by long boiling." Similar remarks are made in Watts's 'Dictionary of Chemistry' and other works. On the other hand, several well-known books, among which I may mention Roscoe and Schorlemmer's 'Treatise on Chemistry,' speak of it as a porous mass, slowly but entirely dissolving in water. It was with a view to investigating the truth as regards these statements, and ascertaining whether alum can be thoroughly dried without the occurrence of an insoluble residue, that the experiments were made of which the following is a brief report.

In the first place samples were obtained from a dozen different sources. These all differed considerably in appearance, degree of fineness, colour, and also, as will be seen, in solubility. A commencement was made by dissolving, as far as possible, 2 grams from each sample in 50 c.c. of cold water, filtering the solution and washing till the filtrate ceased to give a precipitate with chloride of barium. The following table shows the result of the process:—

	Percentage of residue insoluble in cold water.
No. 1	2·5.
" 2	6·5.
" 3	5·5.
" 4	·5.
" 5	1·0.
" 6	6·5.
" 7	·5.
" 8	None.
" 9	None.
" 10	3·5.
" 11	2·0.
" 12	5·5.

The insoluble residue consisted of oxysulphate of aluminium. As all the samples had absorbed more or less water, the above percentages may perhaps be placed somewhat higher than they have been given; but, even allowing for this, it is obviously a mistake to speak of the dried alum of the Pharmacopœia as being "nearly, if not quite, insoluble in water." Moreover, the effect of "continued boiling" is not to render the dried salt more soluble; but, on the contrary, to decompose it and cause the deposition of more insoluble matter than is the case when cold water is employed; thus, a sample which, with cold water, yielded 5·5 per cent. of insoluble residue, yielded, after boiling for four hours, as much as 17 per cent.

When the difference thus presented by various commercial samples is considered, we are driven to conclude either that those which were entirely

* Read before the School of Pharmacy Students' Association.

soluble had never been thoroughly dried, or that those which yielded an insoluble residue had been heated above the requisite temperature; my next object, therefore, was to prove which of these suppositions was correct.

Little or no trustworthy information on this point could be obtained by further drying, for dried alum rapidly absorbs moisture from the air; hence it was impossible to say whether the loss in weight on heating was entirely due to water absorbed after drying, or whether any of it had existed in the salt as water of crystallization. Therefore the effect of different temperatures upon ordinary commercial alum was tried, and the following results were obtained. One gram was first as far as possible dried over a water-bath; this heat was found only sufficient to expel three-fourths of the water, the residue weighing ·64 gram. At 240° F. the alum lost four-tenths of its original weight, about 7 per cent. of water being still left in combination with the salt. After drying at the maximum temperature allowed by the Pharmacopœia, viz., 400° F., the sample, upon examination, was found to have lost all its water of crystallization, and at the same time yielded a residue that was entirely soluble in water. With care I have been able to expel all water at temperatures below 400°, but since the products do not differ in composition, no advantage is gained by proceeding thus, while the time occupied is considerably longer. After several experiments, the conclusion arrived at is that when the directions of the Pharmacopœia are carefully followed, a good soluble product, answering all requirements, is always obtained.

It is, therefore, quite evident that dried alum ought always to be freely (though slowly) soluble in water, and that, when this is not the case, the insolubility of the product is caused by carelessness in the mode of preparation.

Having performed the above experiments I was still at a loss to account for the conflicting statements in chemical works alluded to at the outset; for, although the experiments proved that some of the samples must have been dried above the proper temperature, yet even these yielded only a comparatively small residue of insoluble matter, by far the greater part entering readily into solution. However, on referring to former Pharmacopœias, an explanation of the cause of the mistake was soon discovered, for I find that the methods of proceeding used to be as follows. The first quotation is from the London Pharmacopœia of 1788:—"Take alum, a pound, burn it in an earthen vessel so long as it bubbles." The compilers of the Pharmacopœia for 1836, having more regard for technical phraseology, give this direction: "Let alum melt in an earthen vessel over the fire, then let the fire be increased until the ebullition has ceased." Here, though the wording is altered, the sense is evidently the same, and in the Pharmacopœia of 1851 similar instructions are laid down. When thus prepared, dried alum is not only "nearly," but altogether insoluble in water, for, on proceeding in the above manner, the residue obtained consisted principally of oxide of aluminium.

From the results of the above experiments the following facts may, in short, be deduced. Dried alum of the Pharmacopœia should be entirely soluble in cold water. As a rule, among commercial specimens this is not the case, some insoluble matter being generally found, the occurrence of which is due to the employment of too much heat in its manufacture. This residue consists chiefly of oxysulphate of aluminium, and varies from ½ to 6½ per cent. of the whole mass.

In conclusion, I may state that only one of the above samples contained ammonium, the rest being sulphate of aluminium and potassium, and, on making inquiries I was informed that this solitary exception had been in stock for several years and was consequently no guide to the constitution of alum at the present time. To this extent, therefore, I can confirm what has been stated by others, namely, that potassium alum has quite replaced the ammonium alum ordered in the Pharmacopœia.

TURMERIC OIL—TURMEROL.*

BY C. L. JACKSON AND A. E. MENKE.

This oil, to which turmeric (and therefore curry-powder) owes its aromatic taste and smell, was extracted from Bengal turmeric with light petroleum, and after being freed from the higher-boiling portion of that solvent by heating to 150° in a flask, formed a thickish oily yellow liquid having a pleasant aromatic odour. It was purified by fractional distillation under diminished pressure, and was thereby separated into three portions, the first boiling below 193°, the second at 193–198°, and the third consisting of a viscous semi-solid residue. The middle portion consisted of nearly pure turmerol; the first, of that compound contaminated with hydrocarbons from the petroleum. The middle fraction, after further purification by distillation in a vacuum, gave, as a mean result of several analyses, 83·62 per cent. carbon and 10·42 hydrogen, agreeing nearly with the formula $C_{19}H_{28}O$, which requires 83·81 C. and 10·29 H.

Turmerol is a pale yellow oil having a pleasant, moderately strong aromatic smell, and a density of 0·9016 at 17°. It is optically dextrogyrate, $[\alpha]_D = 33·52$. Under ordinary pressure it boils at 285–290°, but decomposes at the same time, yielding a substance of lower boiling point. Under 60 mm. it boils at 193–198°, still, however, with slight decomposition. It is essentially insoluble in water, but mixes readily with all other ordinary solvents. It does not unite with acid sodium sulphite.

Turmerol is an alcohol, and is converted by heating at 150° with strong hydrochloric acid into turmeryl chloride, $C_{19}H_{27}Cl$, which is a pale brownish fragrant oil decomposed by distillation. The same compound is formed, but less definitely, by treating turmerol with phosphorus trichloride; the pentachloride appears to act partly in the same manner, but at the same time to add chlorine. By treating turmeryl chloride with boiling water, and with alcoholic solution of sodium acetate, potassium cyanide, or ammonia, substances are obtained having the characteristic odours of the classes to which they belong, but they have not yet been obtained pure. Turmerol treated with sodium yields a semi-solid mass having the composition of *sodium turmerylate*, $C_{19}H_{27}ONa$.

Isobutyl turmerylate, $C_{19}H_{27}.OC_4H_9$, prepared by boiling the sodium compound with isobutyl iodide in a reflux apparatus, is a heavy yellowish fragrant oil. The *ethylic ether* is a similar substance.

Oxidation of Turmerol.—By the action of a hot aqueous solution of potassium permanganate in excess, turmerol is oxidized to terephthalic acid. With a cold solution of the same salt, not in excess, it appears to yield some new acids, with the study of which the authors are at present occupied.

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* From the *Amer. Chem. Journ.*, iv., 368–374. Reprinted from the *Journal of the Chemical Society*, April, 1883.

THE EXPLOSIVE POWERS OF NITRO-GLYCERINE AND DYNAMITE.

The following information as to the extent of the destructive effects following the explosion of nitro-glycerine and dynamite has been supplied by Mr. G. M. Roberts, F.C.S., the Technical Manager for Nobel's Explosives Company, Limited, in a letter that appeared in the *Times* on Wednesday last:—

"I observe that exaggerated statements as to the destructive effects of exploded nitro-glycerine and dynamite have appeared in the newspapers. As those statements are likely to produce unnecessary alarm and augment the prevailing "scare," it may be well to reassure the public somewhat by giving them, instead of the grossly exaggerated assertions that have appeared, exact figures from which they will be able to judge how very little cause there is for alarm. Nitro-glycerine and dynamite do not when exploded, exert such a force as is popularly believed. To speak precisely, the power developed by the explosion of a ton of dynamite is equal to 45,675 tons raised one foot, or 45,675 foot-tons. One ton of nitro-glycerine similarly exploded will exert a power of 64,452 foot-tons, and one ton of blasting gelatine, similarly exploded, 71,050 foot-tons. These figures although large, are not enormous, and need not excite terror. Seventy-one thousand tons of ordinary building stone, if arranged in the form of a cube, would measure only 96 feet on the side, and if it were possible to concentrate the whole force of a ton of blasting gelatine at the moment of explosion on such a mass, the only effect would be to lift it to the height of a foot. The foregoing figures are derived from experiments made at Ardeer with an instrument which gives accurate results in measuring the force of explosives. The power exerted by an explosion on surrounding objects is in the inverse ratio of the cube of the distance from the point of explosion. Thus, at 100 feet from the exact point of an explosion, the power is only the cube of $\frac{1}{100}$, or $\frac{1}{1000000}$th part of what it is at a distance of only one foot from that point; or, in other words, if the power at one foot from the spot be represented by 1,000,000, at the distance of 100 feet it will be but 1. It is thus seen that the effects are intensely local, but comparatively trifling at even short distances. If a ton of dynamite or nitro-glycerine were exploded in a London street the effects would be felt severely in the immediate neighbourhood only of the explosion, and beyond that they would be confined to the mere breakage of windows. Indeed, it would be impossible by a single explosion, however large, to do damage to any considerable extent beyond the immediate neighbourhood in which the explosion took place. On one occasion I happened to witness the explosion of over a ton of nitro-glycerine from a distance of only 60 yards. The nitro-glycerine was about 10 feet beneath the level of the ground, which was of sand and covered with water. Beyond the breakage of windows, and the bursting of a few doors in the surrounding buildings, there was no damage done. A little sand was thrown over me, but I received no personal injury. Vague statements have been from time to time promulgated to induce the belief that there are stronger explosives than nitro-glycerine and nitro-glycerine preparations, and that the wretched men who have been guilty of the late attempts on public buildings, etc., are in possession of more powerful explosives than any known to chemists. The public may rest assured that such is not the case. Nitro-glycerine and its preparations form the strongest explosives yet known. The strongest of these is the material known as blasting gelatine. It consists of nitro-glycerine combined with a certain proportion of nitrated cotton. It is much more difficult to prepare than either nitro-glycerine or dynamite, and cannot be made by unskilled persons. If the power of dynamite be represented by 1000, that of nitro-glycerine will be 1411, and of blasting gelatine 1555.

"The $1\frac{1}{2}$ cwt. of nitro-glycerine seized by the police the other day would, if exploded, exert a force of only 4833 foot-tons, and if converted into dynamite, it would represent a force of only 4567 foot-tons. The conversion of nitro-glycerine into dynamite reduces the power of the former, but renders it more easy and safe to handle and use. The power given above is comparatively insignificant, and as it is the maximum effect that could be produced under the most favourable circumstances on the very spot of explosion, it never could be obtained in practice. It is, therefore, absurd to say, as was said the other day in a London paper, that the explosion of such a quantity of nitro-glycerine would blow up the whole of London. In fact, the explosion could scarcely be heard over London, and the damage done by it would be strictly local.

"I have often, by way of experiment, exploded a pound of dynamite suspended from the end of a fishing rod by string of about 6 feet long, holding the rod in my hand the while. As there was no solid matter to project I received no injury, and the end of the fishing rod was not even scratched. About 3 feet of the string at the end of the rod was always left uninjured.

"It will be seen from the foregoing that the scoundrels who attempt to destroy public buildings are powerless to do much harm by their operations. They cannot by any means at their disposal lay a whole city in ruins—not even a street. They may injure special buildings, but that is the most they can do."

KHAT, CAFTA, OR ARABIAN TEA.*

With the Arabs *Catha edulis* is a plant of some importance, inasmuch as it furnishes them with one of the necessities of life in every country, namely, tea. What the leaves of *Camellia Thea* are to us, those of *Catha edulis* are to them. The plant is of a shrubby nature, growing about ten feet high, with smooth, elliptical, serrate leaves, two or more inches long, and about an inch wide. They are peculiar in being arranged on some branches opposite to each other, and on others alternate. The flowers are small and white. The plant is largely cultivated in the interior of Arabia, mostly in gardens along with coffee. For the purposes of commerce, the twigs, with the leaves attached, are gathered and carefully dried; they are made up into closely pressed bundles of different sizes, the quality being known by the form and size of the bundles, the best of which are about a foot or fifteen inches long, and three inches wide; about forty slender twigs compose these bundles, which are tied together with strips of bark. The bundles are sent into Aden from the place of cultivation in the interior of Arabia in very large quantities, and sell at an average price for good quality of about two annas per bundle. The use of this tea in Arabia is said to antedate that of coffee; the effects of its use are described as similar to those of strong Chinese green tea. In consequence of its stimulating effects khat was at one time classed by the people as an intoxicant; the use of intoxicating substances being forbidden by the Koran, this fell under condemnation. A synod of learned Mussulmans, however, made a decree that, as it neither injured the health nor hindered the proper observance of religious duties, but simply increased good-humour and hilarity, it was perfectly lawful to use it. Besides the use of the leaves in the preparation of a beverage, the Arabs also chew them both in the green and dried state, the effect of which is to increase the flow of hilarity or mirth, and to produce extreme wakefulness and watchfulness, so that a man may fulfil the duties of sentry all night without a feeling of drowsiness, an effect somewhat similar to that produced by cocoa. The plant is considered by the Arabs as an antidote to the plague, and they also say that infection cannot be contracted if a twig is carried about on the person. About three hundred camel-loads are brought into Aden in the course of a year.

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PATENT MEDICINES.

WE have so frequently drawn attention to the various evils resulting from the popular faith in secret remedies, and from the support afforded to their use by the apparent authorization given to them under the existing system of Government stamping and licences, that it would be superfluous to say more upon the subject from this general point of view than to reiterate the opinion already expressed, both in these pages and in those of our medical contemporaries, that the conditions under which the trade in so-called patent medicines or specifics for the cure of disease is carried on constitute an anachronism inconsistent with the advanced state of the arts of medicine and pharmacy. So far as human credulity is concerned in furnishing favourable opportunity for the continuance of this trade, it is probable that little can be hoped for in the way of counteracting the specious recommendations with which secret nostrums are brought under the notice of the public; but there is another circumstance to which these articles owe much of the appreciation they possess that certainly admits of being dealt with to that end. We refer to the relation existing between the trade in "patent medicines" and the State. A certain amount of revenue is derived from the sale of patent medicines, insignificant from a fiscal point of view, but productive of a mischievous influence, inasmuch as the Government stamp which represents it lends to patent medicines the appearance of having the recognition and sanction of the State for being what they profess. That such a state of things is out of accord with modern enlightenment is, we think, a strong reason for doing away with patent medicine stamps altogether, and in support of this view we may refer to the reply sent some time ago by the German government to an application from the United States government for information as to the number of patent medicines and the extent to which they were sold in Germany. This reply was to the effect that Germany being now a civilized country, patent medicines had no existence in it.

There is, however, a particular class of "patent medicines" which claim especial consideration in regard to the facilities given for their sale and to the implied recommendation of their use, by reason of their bearing the government stamp, viz., those containing powerful poisons or potent drugs. Without raising the question whether preparations of this class do or do not come within the exemption of the Pharmacy Act in regard to the trade in "patent medicines," there can be no doubt that the sale of such preparations without proper precautionary labels is a breach of the spirit of that Act in so far as it was intended to provide for the safety of the public.

Our readers will not need to be reminded that in the draft of a Pharmacy Acts Amendment Bill, now under consideration by the Privy Council, this particular aspect of the patent medicine trade has met with attention, and that in accordance with numerous expressions of opinion on the part of medical men and others it has been proposed to enforce the use of poison labels for patent medicines containing potent drugs, and thus to reduce the risk attendant upon their use. Having regard to the forcible terms in which the necessity for such a step has been spoken of in the medical press we cannot imagine that this proposition will be disregarded. Not long since the *Lancet*, in referring to the numerous fatal results of indiscriminate sale of poisons in the form of patent medicines, did not hesitate to speak of "the revenue derived from the sale of stamps" for such articles as the "price of blood" and of the entire question of patent medicines as calling urgently for legislative revision.

In the current number of *Macmillan's Magazine*, Dr. H. W. HUBBARD again treats of this subject, and directs attention to the anomalous character of the law relating to patent medicines, its inconsistency with the provisions of the Pharmacy Act, and the disastrous effects of the system under which potent drugs can be obtained and employed without any knowledge of their deleterious characters. After instancing cases attended with fatal results that have come within his observation, Dr. HUBBARD remarks that "many of these medicines, though composed "of the most potent poisons of the Pharmacopœia, "are sold indiscriminately to the public from grocery "and provision stores. They are constantly proving "treacherous pitfalls to robust adults as well as to "tender infants. Being so easily obtainable, they "largely facilitate the development of the pernicious "practices and enslaving habits of chloral and opium "taking, now so common in the under currents "of the domestic life of these times."

This subject is capable of assuming a still more serious aspect, for as Dr. HUBBARD remarks, when deaths ensue as a consequence of overdoses of secret compounds, the potency and dangerous nature of which are known only to the proprietary compounders of them, such deaths can hardly come within the conditions of "circumspection" and "moderation" which BLACKSTONE had in view when defining "excusable homicide" or "death by misadventure."

As regards the position of the State in relation to the trade thus represented, Dr. Hubbard adds that "the one requirement is the exhibition of the stamp certifying the Government duty," and it may therefore be well to place beside his comments a statement that the revenue derived from the patent medicine trade, according to official returns for the year ending 31st March, 1881, amounted to only £144,451 8*s*. 10½*d*.

We cannot altogether agree with Dr. Hubbard's comment upon this comparison where he says that "legislation enacted for the purpose of gaining "revenue to the State at the risk of health and life "of the community can hardly be considered the "highest class of statesmanship;" for though the influence of the law to which he refers is pernicious at the present time, the statesmanship which sanctioned its enactment is not necessarily chargeable with defect. The true view to take is that the law having become effete and inapplicable to modern conditions, it presents itself as fitting material to contribute by its repeal to the domestic legislation of the present.

ELECTRIC LIGHTING.

In the fourth of the series of lectures on the applications of electricity, now in course of delivery before the members of the Institute of Civil Engineers, Dr. John Hopkinson, F.R.S., dealt with "Some Points in Electric Lighting." Dividing his subject into two parts—the methods of production of electric currents and the method of conversion of the energy of those currents into heat at such a temperature as to be given off in radiations to which the eye is sensible—the lecturer proceeded to point out that electrical phenomena are essentially mechanical in form and closely related with mechanical laws. Thus the terms "potential," "current" and "resistance" have close analogues in "head," "rate of flow" and "co-efficient of friction" in the hydraulic transmission of power. In hydraulics "head" multiplied by "velocity of flow" is power measurable in foot-pounds per second or horse-power; in a similar manner "potential" multiplied by "current" is power measurable in the same units. Again, just as water in a pipe has inertia and requires an expenditure of work to set it in motion, and is capable of producing disruptive effects if that motion be too suddenly arrested, so a current of electricity in a wire has inertia requiring the work of electromotive force for a finite time to set it in motion, and if arrested suddenly by breaking the circuit the electricity forces its way across the interval as a spark. Whilst, however, the inertia of water in a pipe is confined to the water, the inertia of the electric current resides in the surrounding medium, and this gives rise to the phenomena of induction of currents upon currents and of magnets upon moving conductors, which have no immediate analogues in hydraulics.

The laws upon which the action of dynamo-electric machines is based have been the subject of successive discoveries. Oersted first found that an electro current in a conductor exerts force upon a magnet; and Ampère, that two conductors conveying currents generally exert a mechanical force upon each other. But the most important was the discovery of Faraday, that when a closed conductor moves in a magnetic field, a current is induced in it, in one direction if the number of lines of magnetic force passing through it are increased by the movement, and in the other if they are diminished. Since the dynamo-machine consists essentially of a conductor made to move in a magnetic field, the variation in the direction of current, due to the above cause, furnishes the explanation of the action in the alternating current machine. Alternating current machines cannot be worked in series, but they can be worked in parallel circuit, and are, therefore, quite suitable for the distribution of electricity without the necessity of providing a separate circuit for each machine. In the continuous current machine a commutator revolving with the armature is so arranged as to reverse the connection between the armature and the external current just at the point where the current would reverse; but though it is possible in this way to obtain a current constant in direction, such a current is not constant in intensity. The irregularity may, however, be reduced to any extent by multiplying the wires of the armature, giving each its own connection with the outer circuit and so placing them that the electromotive force attains a maximum successively in the several coils. A practically uniform electric current was first commercially produced with the ring armature of Pacinotti as perfected by Gramme.

A dynamo-machine is not a perfect instrument for converting mechanical energy into electricity, certain losses inevitably occurring. The properties of a machine depend very much upon its dimensions, and were there no disturbing influences it would appear, judging from known data, that a large machine is capable of doing thirty-two times the work done by one half its size. But practically no such result is obtained, for many reasons, and it may be briefly stated—(1) that the capacity of similar dynamo machines is pretty nearly proportionate to their weight, that is, to the cube of their linear dimensions; (2) that the work wasted in producing the magnetic fluid is directly as the linear dimensions; and (3) that the work wasted in heating the armature consequent upon its electrical resistance is as the square of the linear dimensions.

In dealing with the second part of his subject, Dr. Hopkinson referred mainly to incandescence lamps, the Institution having been temporarily lighted with about 230 Edison lamps. The electrical properties of such a lamp were discussed, and in particular it was shown that its efficiency increases and its resistance diminishes with increase of current. One of the advantages presented by the incandescence lamp is the smaller amount of heat communicated to the atmosphere as compared with a gas flame. The light equal to sixteen candles given by each lamp used was described as being produced by 75 Watts of power developed in the lamp; to produce the same amount of light in good flat-flamed gas-burners would require between 7 and 8 cubic feet of gas per hour, contributing heat to the atmosphere at the rate of 3,400,000 ft.-lbs. per hour, equivalent to 1250 Watts, or nearly seventeen times as much heat as the incandescence lamp of equal lighting power.

At the present time, Dr. Hopkinson is of opinion, lighting by electricity in London, using incandescence lamps, must cost something more than lighting by gas. Neither is there much prospect of reduction of cost in the direction of the engine and boiler or of the dynamo-machine, except so far as the prime cost of the latter may become less. Any hope of considerably increased economy must be based upon probable improvements in the incandescence lamp itself. It has been shown that marked economy of power can be obtained by working the lamp at high pressure, but this is done at the expense of its permanence, the filament soon giving way under the strain. Ordinarily each horse-power is made to produce light equal to from 140 to 200 candles from incandescence lamps, but the same amount of power is capable of producing from them, for a short time, light equal to 1000 candles. The problem then is so to improve the lamp in its details that it may last a reasonable time when pressed to this degree of efficiency. If this improvement could be realized, the cost of electric lighting by incandescence lamps would be reduced to one-fifth of what it now is.

It might seem at first sight superfluous to say anything in these columns as to the Explosive Substances Act which Parliament, at the request of the Government, has just passed with very unusual speed. Some of the provisions of the Act are, however, so far reaching that a word of caution may be useful in helping some of our readers to avoid being unwittingly drawn into a position where they may meet with much inconvenience and annoyance. Under the fifth section of the Act any person who, by the providing of premises or the supply of materials, aids, abets, or is accessory to a crime under the Act will be guilty of felony. It is, therefore, easy to conceive of conditions, as for instance where by means of invoices or labels the source of certain "materials" may be identified or suspected, a perfectly legitimate business transaction may be productive of a considerable amount of inconvenience and annoyance to the unwitting seller.

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The Pharmacy Board of New Zealand appears to have recently issued a circular setting out the qualifications at present recognised by the Board for registration under the New Zealand Pharmacy Act of 1880, the fourth clause of which circular reads as follows:—"Any person who holds a certificate or diploma of competency, as pharmaceutical chemist, from the Pharmaceutical Society of Great Britain." The editor of the journal issued under the direction of the Pharmaceutical Society of Victoria, commenting upon this clause, remarks that it would appear from it that "the Minor examination of Great Britain (chemist and druggist) is not accepted." In order, therefore, to prevent any further misconception arising through the incomplete statement in this circular it will be as well to point out at once that under the existing law the New Zealand Pharmacy Board has no power to refuse it. In the 3rd sub-section of the 19th section of the Pharmacy Act for New Zealand, 1880 (*Pharm. Journ.*, x., 402) it is definitely enacted that any person who "holds a certificate or diploma of competency as a pharmaceutical chemist, *or as a chemist and druggist*, . . . from the Pharmaceutical Society of Great Britain, . . . shall be entitled to be registered as a pharmaceutical chemist without being subjected to examination." The justice of this will be seen when the fact is recalled that in this colony there is only one examination, the passing of which qualifies for registration as "pharmaceutical chemist." On the other hand it may be remarked that only such persons as have passed the qualifying examination in this country will be in a position to present certificates or diplomas of competency from the Pharmaceutical Society of Great Britain.

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The Executive Committee entrusted with carrying out the arrangements for the International Pharmaceutical Exhibition, to be held in Vienna in August next, has established in Paris, at 39, Rue Rodier, a branch office for the States of Western Europe. The accredited agent is Herr Maximilian Leucht.

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At the meeting of the Chemists' Assistants' Association on Wednesday evening next, the adjourned discussion upon Mr. Giles's paper on "Pharmaceutical Politics"—a portion of which is printed in this number of the Journal—will be resumed. It is anticipated that a resolution will be proposed expressing approval of the draft Pharmacy Acts Amendment Bill.

* * *

In like manner the late hour at which Mr. Frazer concluded the delivery of his lecture on "The Proposed Changes in the Pharmacy Act of 1868 and in the Educational System of the Pharmaceutical Society" at Glasgow on Wednesday evening last—a portion of which also appears in the present number—necessitated the postponement of the discussion. It is expected that a General Meeting of Chemists and Druggists in Glasgow and the West of Scotland will be held on an early day for the purpose of affording an opportunity for an expression of opinion on the subject.

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At the meeting of the Chemical Society on Thursday next there will be a ballot for the election of Fellows, and a note by Mr. L. Thorne will be read on "An Apparatus for Fractional Distillation under Reduced Pressures."

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, April 4, in the College of Physicians, Dublin, at three o'clock. The Vice-President, Dr. Aquilla Smith, presided.

The other members of the Council present were:—Messrs. Allen, Bennett, Brunker, Dr. Collins, Messrs. Grindley, Hayes, Sir George Owens, Mr. Wells and Dr. Whitaker.

Mr. Hugh Fennell, the Registrar, read the minutes of the last meeting, which were confirmed.

Mr. Fennell read a letter from Mr. Hatchell Whitby, 61, South Great Georges Street, asking what arrangements had been made for the meeting of a joint committee of four members of the Society and four of the Council, which had been appointed in pursuance of a resolution moved by him, to report to the Council on the best means of improving the prospects of the Society.

Mr. Brunker: That committee is waiting for his action in the matter.

Mr. Wells: There was a letter from him stating that he could not do anything in the matter himself.

Mr. Fennell: The committee were named at the Annual Meeting.

Mr. Brunker: And Mr. Whitby was written to, asking him to name the members of the Society not on the Council who were to confer with the members of the committee representing the Council. He declined to do so, and there the matter rests.

At the request of members, Mr. Fennell read from the minutes a record that a letter, dated November 29, had been received from Mr. Whitby, stating that he could not undertake to arrange for the meeting of the committee.

Mr. Allen: I understood that the matter was to be to a great extent left in his hands.

The Chairman: Let Mr. Fennell inform him that the Council did not take any action in the matter in consequence of his letter of November 29. The matter originated with him and it is not for the Council to help him. Let him take his own course.

Dr. Whitaker: The committee is still in existence.

Mr. Fennell was directed to write to Mr. Whitby in accordance with the suggestion of the Chairman.

A report from the Law Committee was read.

The Chairman remarked that the cost of two prosecutions carried out by the Society last year amounted to £29 3*s.* 2*d.*, and only £3 was received by the Society as a fine in one of the cases.

Mr. Wells: But you gained a very substantial advantage.

Dr. Whitaker: The money was well spent in sustaining a principle.

Dr. Collins said there was an instance in which a prosecution had cost the Apothecaries' Hall of Ireland £125, out of which they got £24 or £25.

Dr. Whitaker said it appeared to him that prosecutions could be more readily and inexpensively conducted in Dublin than in the country.

Mr. Wells: If you do not protect the members of the Society you will have no members shortly.

Mr. Brunker: The great excuse which licentiates make for not being members of the Society is, that we are not putting a stop to illegal dispensing. We reply that we cannot do it because they will not give us funds. We have 219 licentiates and 61 subscribing members.

Mr. Wells: You will get a great many more members if you show them something for their money. If it be a general complaint that you do nothing for the licentiates, they will not subscribe.

On the motion of Mr. Wells, seconded by Dr. Whitaker, the report was adopted.

A report of the Certificate Committee, containing the following passage was read:—"The declaration of Mr. John P. Middleton, brought before the Committee, having been substituted by a certificate, could not be entertained by them. The certificate is signed by Mr. G. H. Grindley, M.P.S.I., representing himself as 'late managing partner of the firm of Brooks and Co., 136, Lower Baggot Street.' The certificate goes to show that Mr. Middleton was for five years engaged with the firm. The Committee cannot undertake the responsibility of declaring that Mr. Grindley was a pharmaceutical chemist legally keeping open shop for the dispensing of prescriptions in the sense of the regulation on page 55 of the Society's Calendar for 1883, he being associated with an unqualified partner in the business."

Mr. Brunker: The position of the firm referred to is analogous to that of another in respect of which a prosecution is to be undertaken. We are not prepared to say that the member of such a firm is entitled to give the certificate required by our regulations. One member of such a firm is only half a pharmaceutical chemist.

Dr. Collins: It is for any member of the Council who thinks the young man is aggrieved to move that the certificate be accepted.

On the motion of Mr. Bennett, seconded by Sir George Owens, the report of the Certificate Committee was adopted and ordered to be entered on the minutes.

Mr. Brunker moved—

"That Mr. Middleton be informed that the certificate of practical pharmacy presented by him cannot be accepted as complying with the regulation relating to such certificate on page 55 of the Calendar of the Society for 1883, Mr. Grindley not being a pharmaceutical chemist keeping open shop in the strict sense of that regulation."

Mr. Hayes seconded the resolution, which was carried.

The Chairman moved the following resolution pursuant to notice:—

"That the subscription for the *Pharmaceutical Journal* be discontinued from and after the 30th of June next."

He had given this notice in consequence of having noticed the heavy expense the Society had incurred for the last three years in supplying the *Pharmaceutical Journal* to members of the Society. The facts had satisfied him that the experiment which had been going on since 1879 had proved an utter and costly failure. In 1879, the amount paid for the Journal was £45 2*s.* 4*d.* In 1880, it cost them £47 10*s.* 0*d.*; and in 1881, the cost was £42 9*s.* 2*d.* The cost for 1882 was still outstanding.

Mr. Allen: You have it on the paper £34 14*s.* 4*d.*

The Chairman said the fact was that they had lost a great deal of money by the matter. They had been told that it would be a great inducement to licentiates to join the Society; but so far from that having been the case the reverse had happened, as the following figures would show. In 1877 they had fifty members, and in 1878 they had seventy-nine, and there were no resignations in either of those years. In 1879 they had eighty members and there were two resignations; in 1880 there were seventy-four members and four resignations; in 1881 there were seventy-seven members and six resignations; in 1882 they had seventy-three members and eleven resignations; and in 1883 they had sixty-one members and ten had ceased to subscribe. The fact was that if they had only twenty-seven members now and were not obliged to supply the Journal they would be better off than they were under the existing arrangement.

Dr. Collins stated that the President had told him that he would not be able to be present that day, but that it was his opinion that the resolution of which the Vice-President had given notice was opposed to a resolution which the Council had passed on his motion about two months back, to the effect that when any member should become a month in arrear of his subscription to the Journal it should not be supplied to him.

Mr. Grindley: I think the motion has not been seconded yet.

Mr. Bennett seconded the motion.

The Chairman said Dr. Tichborne's resolution did not touch that which he now proposed at all.

Mr. Brunker said he was altogether with Dr. Smith in the opinion that this arrangement about the Journal was a losing game, and the sooner it was given up the better. But would it be fair towards gentlemen who had paid their subscriptions from October 1, last, on the understanding that the Journal was to be suppled to them for a year, to put an end to the arrangement in June?

The Chairman: That could be met by supplying those gentlemen with the Journal for the remainder of the year.

Mr. Grindley said the fact was being lost sight of that although financially the arrangement had not been a success, morally it had been. It had kept the members of the Society together. If they discontinued giving something for the subscriptions they would soon have no members at all except the Council, the greater part of whom did not pay anything at all towards the support of the Society. He moved that instead of hastily discontinuing the supply of the Journal, which many members considered a right, the Registrar should be instructed to send out post cards to all the members of the Society asking them whether in the event of the Journal being discontinued they would continue members of the Society.

Mr. Hayes thought that would be a very injudicious proceeding.

Mr. Brunker said the Journal was costing them a great deal, and their ability to put an end to illegal dispensing was very much interfered with by their want of funds.

Mr. Grindley: The mistake was in giving the *Pharmaceutical Journal* instead of the *Chemist and Druggist*.

Mr. Allen: Would we cease to have reports of our proceedings?

Mr. Grindley: That would follow naturally.

Mr. Brunker: No; the journals would be very glad to get them.

Mr. Wells: We should explain to the members that we want funds to carry on prosecutions. That would satisfy a great many.

Mr. Grindley: The cost of the Journal will be very much reduced in consequence of the adoption of Professor Tichborne's motion.

Mr. Brunker suggested that the Chairman should alter the date from which his resolution proposed that the subscription for the Journal should be discontinued to the 1st of October next.

The Chairman accepted the suggestion; and the resolution so altered was put and carried, Mr. Grindley dissenting.

Some financial business having been disposed of, the Council adjourned.

At the Preliminary examination, held on April 2, ten candidates presented themselves, all of whom passed.

The examination for the licence was held on April 4 and 5 (this being the first occasion on which it was held on two days under the new regulations). There were three candidates for this examination, two of whom passed. The report will be presented at next Council meeting.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The eleventh general meeting of the above society was held at the Royal Institution, on Thursday, March 15. The President, Mr. Councillor Woodcock, in the chair.

The minutes of the last meeting were read and confirmed, and the following donations announced:—The *Pharmaceutical Journal*, from the Society; a specimen of *Cassia Fistula*, from Mr. J. Parkinson; 'The Sixth Annual Report of the Lancashire and Cheshire Entomological Society,' and 'Proceedings of the Liverpool Geological Society,' from the respective Societies; 'The Thirteenth Annual Report of the Free Public Library, Museum and Art Gallery,' from the Committee.

Dr. Symes showed some kola nuts which had been sent over in the moist state in earth. He mentioned their active principle, caffeine, and the use to which they were put by the natives of the districts where they are used, viz., as a stimulant under fatigue.

Mr. A. C. Abraham then showed a copy of Linnæus's first published 'Systema Naturæ,' and also the 'Pharmacopœia Augustana,' respecting some of the formulæ in which he made a few remarks.

The thanks of the meeting having been voted to Messrs. Symes and Abraham for these communications, the Chairman called upon Mr. Albert H. Samuel to read a paper upon "Indophenol." This paper will be printed in a future number.

Mr. E. Davies, in proposing a vote of thanks to the author, said that he had listened to him with considerable interest, and that by means of the diagrams the production of indophenol, although complicated, had been made clear even to those who had only an ordinary knowledge of chemistry. He had himself learned much that was new to him from the paper. He thought that there was a moral to be learned from it. He was not surprised to hear that so far the English dyers had not been successful with such a delicate preparation as this, nor were they likely to be so until the ignorant and self-conceited foremen so often employed at the head of their establishments were replaced by chemists of ability. The consequence of the present state of things would, he feared, be that we should have to send our calicoes to Germany to be printed.

The motion was seconded by Mr. M. Conroy, and carried unanimously.

The meeting closed after a few words from Mr. Samuel, in reply.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

A meeting of this Association was held on Wednesday evening last. The chair was occupied by the President, Mr. McAdam, who, after reading some apologies for non-attendance, called on Mr. Daniel Frazer to deliver a lecture that had been announced. At the close of the lecture, Mr. Frazer, on the motion of Mr. Kinninmont, was awarded a vote of thanks. In consequence of the lateness of the hour the discussion was adjourned. The following is a report of the lecture:—

The Proposed Changes in the Pharmacy Act of 1868, and in the Educational System of the Pharmaceutical Society, together with some Remarks on the present Position of Pharmacy.

BY DANIEL FRAZER.

Through the great kindness of our esteemed President, in convening the present meeting at my special request, I am permitted to address you on the proposed changes in the Pharmacy Act of 1868. These changes have been proposed by the Council of the Pharmaceutical Society itself. They (not we provincials) have broken the ice. Our footing as traders on the unbroken ice of the legal safeguards that to a large extent give us a practical monopoly in carrying on the more legitimate part of our business has not been an over secure or comfortable one of late years. What will it be when we have to tread upon the broken ice? That the ice will be broken when we get into Parliament seems to me so manifest that I stand amazed at what I consider the judicial blindness of the wise men of Bloomsbury Square.

In vindication of this strong language I will, with your permission, *first* discuss the proposed Pharmacy Acts Amendment Bill, as issued by the Council at their meeting in February last, along with some notice of the proposed changes in the educational system of the Pharmaceutical Society; and *second*, I will make some general remarks on the present position and future prospects of Pharmacy. I need hardly preface these remarks by saying that I by no means seek to commit a single person here to accept as his my views on the topics I now proceed to discuss.

Our esteemed friend, Mr. Kinninmont, with his usual honest impetuosity, lost no time in taking part in the discussion of the Bill that has been waged in the *Pharmaceutical Journal* since its publication there. In his letter, Mr. Kinninmont expresses satisfaction with the action of the Council for having, in his opinion, "avoided everything which had the appearance of grasping at a monopoly."

Truly, appearances are sometimes deceitful—it is not all gold that glitters. To my apprehension the weakness of the Act lies mainly in the opposite direction. It so nakedly demands additional protection for ourselves in carrying on our business that I feel sure that when it reaches Parliament this feature of it will lead to the wrecking of the Bill as a whole, and to the sweeping away of some of the protection we now enjoy. With my views on such subjects I would not object to this; but not so, I believe, with some of you.

This feature is exhibited in the preamble. Its words are:—"Whereas it is expedient for the safety of the public that sales of poisonous articles should be regulated: also, that any seller or keeper of an open shop for the retailing, dispensing, or compounding of poisons and medical prescriptions should possess a competent skilled knowledge, and also that the sale of poisons should be further regulated."

There are two quite new things embraced in this preamble—the first being the bringing within the scope of the law several articles hitherto unrestricted in their sale to the public, and the second is the demand made in it to have the sale of *non-poisonous* agents, when in the form of "medical prescriptions," confined to pharmacists and other "qualified" men. Regarding the first, I remark that as every pharmacist of any standing has hitherto labelled all the "poisonous" articles referred to in it as "poisons," little, if any, inconvenience will be caused by its enactment to us. But I would have opposed its introduction into the Bill as an unnecessary interference with trade in articles of enormous consumption, and from the sale of which no hint of any inconvenience has come from any part of the country save from the Veterinary College of Lincoln. I would also have objected to it from being persuaded that, even if it be enacted, it will prove a dead letter so far as the sale of the mineral acids by outsiders is concerned, and I think it a serious mistake to pass laws that cannot or will not be enforced.

Some years ago, along with Mr. Mackay, and other members of the Council, I strongly opposed the introduction of the first four of these "poisonous articles" into the Poison Schedule. This took place originally in 1875, when a Bill, called the "Drugging of Animals Bill," was introduced into the House of Lords. Mr. Sandford brought it under the notice of the Council, and our law agent, then present, characterized it as too absurd to have any chance of passing. The Council then was unanimous in petitioning against it. On at least three occasions since then, when white hellebore powder was included in the list, there was a considerable support given to the suggested additions to the Poison Schedules by some members, but happily the Council, by a majority, threw the suggestion overboard. But, in an evil hour, as I think it, our present Council at last yielded to the application of the men of Lincoln, and last summer it applied to the Privy Council to sanction their insertion in one of the Poison Schedules.

But, as those who interfere in other people's quarrels generally come off second best, so with our Council on that occasion. It got a direct rebuff. The Privy Council refused to add to our existing monopolies. Hence Clause 2 of the present Bill, which is so generally denounced by pharmacists who are ignorant of its history and origin, as well as by those of our number who take all the protection they can get and ask, like little Oliver, for more.

I would still more have objected to the restriction sought, for the first time in Britain, though it is embraced in the Irish Act, of confining the sale of non-poisonous agents, when in the form of "medical prescriptions," to registered pharmacists and medical licenciates. If there is one thing more than another in which pharmacists have an almost absolute practical monopoly it is the dispensing of prescriptions. So far as I know, the dispensing of prescriptions by others than pharmacists proper and medical men in their surgeries, is confined to two or three of the larger stores in London, Liverpool and Manchester. But supposing that they are dispensed in even a dozen stores scattered over the kingdom, is it worth our while risking a battle on such a subject in the House of Commons? It is in these few stores alone, so far as I know, that our practical monopoly in the dispensing of prescriptions is in any way interfered with. It cannot be doubted that the existence of this monopoly will be made plain in Parliament by the representatives of the stores. And, whatever may be said as to injuries arising to the public from the unrestricted sale of poisons or of poisonous agents, as it cannot be alleged that injury or accident has arisen from the sale of any of the non-poisonous drugs, I cannot conceive of Parliament sanctioning this addition to the monopolies already enjoyed by pharmacists.

As directly bearing upon this point, and in proof that the views I am now enunciating have not been hastily or lightly arrived at, I will here refer to a speech I delivered in the London Council on February 3, 1881, when moving the first of eleven amendments I had tabled against the Bill, then under discussion, and which, with a few exceptions, is practically the same Bill as the one now before the country (*Pharm Journ.*, [3], xi., 641).

To the views thus expressed two years ago I adhere still, if possible, with a stronger conviction as to their soundness than ever. The terms of the amendment I ventured to move against the preamble of the proposed Act, for our adoption in 1881, were these:—"Omit '*and medical prescriptions*'; or if these words are retained, insert after them the words 'containing scheduled poisons.'" To that, so long as restrictions are laid on the sale of scheduled poisons themselves, I do not object, much as I do object to the fettering of ourselves or others by any sort of legal entanglements not demanded by the laws of truth and justice.

I further ask your attention to what seems to me a remarkable change in the terms used in the preamble, and continued with a distinct emphasis throughout the Act, to describe the owner of the "open shop." In the Act of 1881 the terms were:—"Whereas, it is expedient, for the safety of the public, that all persons *selling* or keeping open shop for the retailing, dispensing or compounding of medical prescriptions, should possess a competent knowledge of their business." In the proposed Act now before us the terms are these:—"Whereas, it is expedient, for the safety of the public, that sales of poisonous articles should be regulated; also, that any *seller* or keeper of an open shop for the retailing, dispensing, or compounding of poisons and medical prescriptions, should possess a competent skilled knowledge," etc. Lawyers do not generally substitute one term for another without a distinct purpose in doing so. What I want to know is this. Is the "seller" another name for the "keeper" of an open shop; or is it a lawyer's mode of getting at the proprietors of co-operative stores? If so, if the mere salesman in a co-operative store can thus simply be made responsible for the sale of poisons or "medical prescriptions" that he may make, then, most assuredly, the same law will be measured out to our own "unqualified" assistants. That such a result was intended by the authors of this Bill need not be insisted upon. That is not the question. If it become a part of the law of the land, its interpretation and administration will fall into other hands than those of its authors and present supporters. For my own part, though I have as yet failed to get any pharmacist to agree with me, I hold that if this clause comes into court in its present form both judge and jury will interpret it in the way I have pointed out.

So much then, for the preamble. My only apology for dwelling at such great length on it is that it is the keystone of the bridge—the arch on which the whole superstructure of the Bill rests.

The next, or "Definition Clause," as it is innocently termed, is also an all-embracing one, and demands our maturest consideration. Mr. Kinninmont sees no monopoly even in it! I see in it on the other hand, nothing but monopoly!

"Words importing the singular number only shall include the plural number." If they say one thing and mean another, why use such words at all? If you mean the plural, why not use the plural? Why, in short, not say in plain and unambiguous terms "Co-operative stores shall not be permitted to sell scheduled poisons or 'medical prescriptions' unless every single person in them be on our register?" If that is what is meant by this clause, why not say so? Do the authors of it expect this clause to pass the gauntlet of a free discussion in the House of Commons without this fact being discovered by the lynx-eyed "fourth party," if by no other? And, when discovered, when it is seen that the whole purport of it is to stab the co-operative stores and to prohibit their dealing in scheduled poisons or dispensing prescriptions, I can only express my unbounded surprise at the innocency of our Council expecting to carry it. I hold now, as I have done all along, that it is a very foolish proceeding on our part, whatever it might be for other and disinterested parties to do, to attack the stores, and that, too, in the "house of their friends." I said so over and over again long before the House of Lords decided in their favour and against our claims. With this decision in their favour in the highest Court of Appeal in the country, does any sane man expect that the House of Commons will sanction a Bill depriving the stores of their existing legal rights? No, emphatically I say, no. Do not then risk such an encounter on the floor of the House of Commons as the introduction of this clause in the Bill will certainly provoke. Our Society has already, as I have said, suffered defeat in attempting to interfere with the dispensing of poisons by the stores. Why then court another and a still more disastrous one in the very face of Parliament itself—the law-making Court of the land? Does the present most sagacious and energetic President of our Society's Council expect such a clause to be passed by men — many of whom are members of the stores themselves? Will they put their hands to the rope that is intended to hang them?

Having discussed the substance of the second clause while dealing with the preamble, I now pass on to the third clause. This is to compel wholesale drug houses to keep a record of their sales of poisons. I really do not see the need of it. Practically the thing sought is already done; and even where, in some rare cases, it may not be done, I for one would be slow to entangle our wholesale friends in the meshes of the law in the conducting of their business. It is bad enough that we are so entangled that not a few of us, I believe, would give a great deal to be free of it. Why so needlessly provoke a collision on the subject with the wholesale trade?

Then comes the fourth clause—or the first of two clauses bearing on the sale of patent medicines containing scheduled poisons. This is the labelling one. What shall I say of it; or rather, what will makers of and wholesale dealers in proprietary articles containing, in however minute and innocent a form, any of the scheduled poisons say of it? That they will oppose it cannot be doubted. Mr. Davenport, Messrs. Savory and Moore, Powell, the maker of Locock's wafers; Messrs. Edwards, Newberry, Barclay, and Maw and Sons will be up and stirring; and, as their interest in this matter is ours, we are pretty safe to leave it to them to fight our battle at this corner of the field. Only this will I ask here—how is it possible to secure that this labelling be done by makers in France, in America, or anywhere out of the United Kingdom? And if we cannot do this, how can we recover the penalties from men who are beyond our jurisdiction? For myself, I do trust that this attempt to assimilate the laws of this country to those that obtain on the Continent regarding the sales of such remedies as are here aimed at will be unsuccessful. It is bad enough when Messrs. Jones, Brown, and Robinson, in their journeys on the other side of the Channel, are put to their wits' end to obtain five drops of laudanum or a teaspoonful of paregoric when a colic or a cough requires such medicaments for their alleviation or cure. Do not, for any sake, attempt to legislate for such restrictions in this free country; or, at least, do not do it so long as our rivers and canal banks are open to would-be suicides, and so long as six-chambered revolvers and nine-inch bladed knives can be obtained without let or hindrance by the would-be assassin, or even by "Number 1" himself.

I would here ask, On whom do our Councillors seek to impose these shackles? Is it on our enemies the stores or on ourselves? On ourselves in at least the first instance. It is we pharmacists, and we almost exclusively, and not the stores who are the makers of those proprietary articles, and so it is ourselves that we are asked to burden with these legal restrictions! The Government of its own accord did impose a restriction on the sale of arsenic now many years ago, but they did it for a specific reason—the poisoning of children by its means in several districts in England; and if the Government of its own accord were now to impose such a restriction on the sale of any proprietary articles that can be proved to have been employed at all extensively for wilful poisoning, or that, through their potency, have proved to be dangerous agents in the hands of the public, I would not object. But why ourselves seek to impose these restrictions upon a whole class of remedies against which no such evidence can be adduced, and very many of which are of unquestionable value, and are largely prescribed by some of our most eminent medical men? You may like them or not like them, but you cannot put them down as long as the columns of our newspapers and the pages of our magazines, of our own Journal, and of the *Chemist and Druggist*, are open to the reception of their advertisements.

Clause 5.—This is a penalty clause. It need not trouble us much. Our wholesale friends will take good care that it does not become law, and so we can quite safely leave it in their hands.

Clause 6.—Even more certain and successful will be the opposition of the makers and of the wholesale trade to this penalty-recovering machinery.

Clause 7.—This is superfluous. The common law abundantly provides for this. Just as the great railway companies are responsible for the action of their servants, so are we for that of ours, and rightly are so.

This responsibility, both at civil and criminal law, on the part of pharmacists, not only for their own actings, but for the actings of every one of their assistants and apprentices, is, I have all along held, the greatest safeguard that the public can have for the careful conducting of our most onerous business. Self-interest comes in here with immediate and immense force. If I, by any chance, take down this bottle instead of that one, and substitute a poisonous for a simple remedy, and fatal results follow, I am responsible at criminal law, and liable to be tried for culpable homicide or manslaughter; or if I escape this, as happened in well-known cases in England and in Ireland some yeare ago, and I be only made responsible at civil law, I may have, as in one of these cases, to pay £2000 of damages, in addition to immensely injuring, if not ruining, my business. With such possibilities attached to the proper conducting of our business, even apart from all the feelings of grief and mortification engendered by our being the means of death or of serious injury to another, can more stringent securities for the proper administration of our business be reasonably demanded of us? I think not; and certainly we ourselves should not, however much we may be annoyed at the stores, be instrumental in imposing still furthur penalties on the conducting of it.

Happily we have at last reached a clause to which I can give my most cordial support. I mean the one requiring the placing of a "qualified" assistant in every branch shop. But I wonder how many of the London Council agree with me in this. They have all accepted it, but how many of them love it? This I have no means of knowing; but this I know, that when I in committee two years ago proposed, as I think I did—but at least I supported—the insertion of such a clause as the present in the Bill then before us, it was most strenuously and successfully opposed by the great majority of the then existing Council—one not largely differing from the present one.

I wanted such a clause then, and I welcome this one now, because I maintain that as long as the Act of 1868 exists in its integrity I have no right to open a second or third shop, in addition to the one qualified by my own attendance, unless I put a qualified assistant in it.

Clause 9.—Though I have already referred to the substance of this clause, I wish here to draw your special attention to the exact wording of it—"Duly qualified persons to sell medical prescriptions and sell poisons." Hitherto the words "medical prescriptions" were modestly placed in the rear of "poisons." Now they are boldly put in the front, and "poisons" are made to play second fiddle to the prescriptions. There is also here a decided step taken in advance in the use made of the terms "seller" and "keeper." In the preamble it is "any seller *or* keeper of an open shop." Now it is boldly stated "unless the seller *and* keeper of any such open shop." If the seller and keeper are one, why "seller *and* keeper?" I would strongly urge, whatever may be your views as to the general purport of the Bill, that you get a clear and explicit explanation of all that is involved in the use of these words—"the seller *and* the keeper" of an open shop. Ask any lawyer how he would interpret the words, were he employed to defend you, in regard to their true meaning in a court of law.

Clause 10 is apparently aimed at the co-operative stores, or at medical men who carry on business in other names than their own. The penalty asked is a pretty heavy one, but as it does not affect aboveboard traders who do not object to their names being given, even where the firm under which they trade may not contain it, we need not greatly concern ourselves with it.

Clause 11.—A clause of penalties that need not in any way disturb us, law-abiding subjects of Her Majesty.

Not so with clause 12.

It is remarkable above all the other clauses of the Bill from the quiet way in which it seeks arbitrary powers for our Society that, if obtained in the terms of it, will, in my opinion, whatever the Council itself may have intended by it, completely override even the powers of the Privy Council itself. To the corresponding clause of the Bill of 1881 I moved that after "Britain" the words "with consent of the Privy Council" be inserted, but I was overruled by the authority of our legal adviser —he stating that that was necessarily implied. Well, it it is implied, why is it not so stated here, as it is stated in a much less important and less far-reaching clause—namely, the second, or "Poisonous Articles" clause? There the authority of the Privy Council is recognized; here it is completely ignored.

Further, I would oppose it even were this saving clause in it, on the ground of the demand it makes for powers to revolutionize the examinations and powers to alter the fees, and that means, judging by all antecedent legislation on the subject, to increase them. If it be carried, the Council shall practically, as representing the Society, have full power to institute a curriculum through which all our candidates must pass, and this, probably, without the Society, in its corporate capacity, being consulted in the matter. In the face of the large numbers of our best men who are leaving our ranks in consequence of even the existing standard of examinations in use, and their expense, and in face of the transference of large portions of our business to other traders—including the stores—are you willing to give your Council such enormous powers? Unless you are so prepared you had better take care that, whatever other part of the Bill be carried, this clause shall not. What makes me the more anxious upon this point is—(1st) that in the opinion of two members of the existing Council, as we shall see further on, the Council has already in its actings infringed the existing law; and (2nd) because of finding, in a letter to the Council to which I shall also refer later on, this sentence:—

"But little alteration of the Pharmacy Act of 1868 is needed to effect all that is above indicated in the way of Parliamentary legislation; *the rest* can be accomplished by bye-laws and by the *resolutions of the Council.* (*Note.* —By the Council: not by the Privy Council—not by the Society!)"

And all this, too, in face of the closing sentence of clause 2 of the Act of 1852:—

"Provided always, that all such original bye-laws and all altered, amended, or additional bye-laws, shall be confirmed and approved by a special general meeting of the members of the said Pharmaceutical Society and by one of Her Majesty's principal Secretaries of State."

Before parting with this part of my subject, I frankly repeat the opinion I have never ceased to hold—that I believe the examinations are already, in their stringency, and in their expense, beyond the requirements of the case. As an evidence of this you have but to read the results of the February examinations:—

11 Majors examined	. . . . .	6 failed!
84 Minors examined	. . . . .	56 failed!!*

Clause 13.—£5 of a penalty if I admit an apprentice into my premises before he has passed the Preliminary! I do not know what it may be in England, where large premiums are often given by the apprentices, but in Scotland, where we pay ours salaries ranging from £10 to £25 a year, such apprentices cannot, judging by my own experience, be obtained. Though I have some six at present in my different shops, only one of them had passed his Preliminary before entering. If it be replied, the penalty is only to apply to articled apprentices, then I reply it does not affect me, for I have ceased articling apprentices for many years. The demand for apprentices who have passed the Preliminary is as likely to be obeyed, in Scotland at least, as was the old demand of calling spirits from the mighty deep. The reason is quite simple. The families who alone, or who almost exclu-

* "Indeed, looking at the results of the examinations, I do not consider any material change at present desirable. The Minor examination, which confers all the privileges of the Pharmacy Act, as now conducted, affords a sufficient guarantee of competence to keep an open shop for retailing, dispensing and compounding medicines. It is thoroughly practical, and any increased stringency could only have the effect of adding to the already large number of candidates who are rejected."—*From Dr. Greenhow's Report on Examinations*, March 8, 1881.

sively supply us with our apprentices do not and cannot educate their children up to the point needed for passing the examinations until the candidates themselves earn the means of obtaining the needed education by their labours. Such, at all events in Glasgow, is my experience over the last forty or more years. I need not add that I oppose this clause, as I have done most of its predecessors.

Clauses 14 and 15 can pass without remark.

Clause 16 I do not object to. But why make two bites of a cherry—why not make a good bolt when swallowing so much? Why not at once abolish the Major examination and declare all the present and future Minors to be Majors? Some say this would be an injustice to the existing Majors. Well, call them Majors No. 1, or "Fellows," if they like. It will cost no money and break no bones, and if it please them it will do us no harm.

Clause 17.—I think this quite right, having on several occasions seen the beneficial working of the principle it contains. It will not keep out any proper candidate, and it may be useful in keeping out an improper one. During my ten years of experience I only recollect of two cases in which it was put to active use, and in both cases I quite agreed with the action of my colleagues in the Council.

Clause 18.—This dog is so nearly dead that I hardly think it worth while spending a clause on him—giving him the last knock on the head.

Clause 19.—No objection to it.

Clause 20.—I suppose we must have a little red tape now and then, and as there does not seem a formidable use of it here, I do not object to it.

Clause 21.—Most certainly. Punish to your heart's content everybody guilty of falsehood. No punishment can well be too severe for wilful misrepresentations.

Clause 22.—That is, that this Act is not to apply to Ireland. Most certainly not. It is, however, quite worth while, to show the hopeful progress cur Society is making in some points, if it is losing in others, to recall how matters stood in 1875, when the Irish Act was before Parliament. After one of the keenest discussions at which I ever was present, the Council, in June of that year, petitioned the House of Commons against the Bill, and petitioned for one to embrace the whole kingdom. Mr. Sandford, Mr. Schacht and myself, were the only opponents in a meeting of eighteen members, and so the petition against it was sent to the House of Commons. In the Journal (that of June 5, 1875) reporting this discussion there is a list of one hundred and sixteen petitions sent in to Pariiament against the Act—Edinburgh, Aberdeen, Dundee, Perth, Greenock, Dumfries, Montrose, Peterhead and Elgin, being the Scotch towns. Glasgow, happily, is not on the list.

Clause 23.—Commencement of the Act. Instead of fixing on a specific date, better say—"The Act shall come into operation in two years, or thereby, from the date of its receiving the signature of Her Majesty." This would give all a reasonable time to prepare for its operation.

The Schedule of Poisonous Articles.—On the merits of the proposed addition to Scheduled Articles, the only article in it that I think there is any colour for inserting here is the last one—carbolic acid. It certainly has been the cause of numerous poisonings by misadventure, and so I think there is a call for some restriction being put on its sale—much as I object to all unnecessary legislation of a restrictive character.

Having now gone over the Bill as issued by our London Council, and having frankly stated my views on what it contains, I will now, with your permission, refer to some three things it does *not* contain, but which formed parts of the Bill in 1881. Regarding the first of these, namely, Clause 5 of that Act, as published in the Journal of June 8, of that year, I remark:—This clause was intended to prevent the widows of deceased pharmacists carrying on their husbands' business by means of a qualified assistant for a longer period than three years, except with the permission of the London Council. This clause formed the subject of much earnest debate in the Council. Mr. Sandford pled with great eloquence against the insertion of this prohibitory clause. With his permission I was allowed to move its rejection; while Mr. Sandford seconded and supported the rejection with all his known ability and earnestness. Nothwithstanding this, and the fact that Messrs. Mackay, Williams, Bottle, and others took the same view of the question, we could only command six out of nineteen votes, and consequently it stood a part of the Bill sanctioned by the Council at that time.

Now, it is not once referred to in the Bill of to-day, nor in the published discussion that took place when it was carried in the Council. The Council of to-day differs but little from that of two years ago—Messrs. Young and Borland have taken the place of Mr. Mackay and myself; Messrs. Carteighe and Walter Hills the place of Messrs. Sandford and Hills; all the others are the same. Whence, then, this change of view, or, at least, of action? Is it due to influence from without or from within? This I have no means of knowing; but this I do know, and you all may know, that at a meeting of the Executive of the Chemists and Druggists' Trade Association, held in Birmingham, on the 19th of February last, Mr. Barclay, of Birmingham, moved for its insertion in the Bill of this year. Mr. Barclay's motion was carried and remitted to "officers" of the Association and a small Committee to take such steps as they may deem desirable to carry out the wishes of the Executive in amending the Pharmacy Acts Amendment Bill of 1883. One of these officers, Mr. Hampson, occupied his place as President, and there were also present Messrs. Andrews and Churchill. There is no record in the published reports of the London Council's proceedings of any of these gentlemen standing up in it for the insertion of this clause, as they all did two years ago. Neither, on the other hand, is there any record in the report of the Trade Association meeting of their opposing Mr. Barclay's motion. I have the highest respect for the personal qualities of all these three gentlemen, and I by no means intend to hint that they took one side of the question in Bloomsbury Square and another in Birmingham. Over and over again did I find myself in the position of appearing to support, or at least of not actively opposing motions in the Council against which I had protested in Committee, but being in a hopeless minority, did not renew a profitless opposition in the Council. That, I am convinced, was the case with Messrs. Hampson, Churchill and Andrews, in one or other of the meetings. I am, however, curious to know which view had the benefit of their personal support. Do they still hold the views on the subject they held in 1881, or have they come to accept the views then so eloquently pled by Mr. Sandford and Mr. Mackay? I sincerely hope they have. I also would like to know if Mr. Schacht still holds the opinion he held then, when he moved that the widow should only have *one* year to wind-up her husband's business? Have such men as Messrs. Greenish, Woolley and Symes altered the views they then held and come to accept those of Mr. Sandford that they so strongly opposed. It would indeed be quite a feather in my cap to find a band of such men as these accepting the views on this subject I so unsuccessfully advocated in their presence so long ago. I cannot too strongly express the surprise I felt at Mr. Hampson's view on this special question, knowing well his leanings to "Women's Rights" in other fields.* On the merits of the question, I maintain that to deprive, through legislative interference, the widow of the means of carrying on her husband's business for her own behoof and that of her children, when she has them, is a piece

* It is, however, only fair to add that the grounds of the opposition to widows carrying on their husbands' business was their want of that *personal* qualification that these gentlemen hold the Act of 1868 implied, and the safety of the public demanded.

of intolerable tyranny, and which, happily, no Parliament in these days, even when backed up by all the influence which Mr. Barclay undoubtedly possesses, can for a moment be supposed capable of granting.

There were two other clauses of the Bill before the Council in 1881 which have disappeared from that of this year, namely, the first and the last enacting one. Thanks to Mr. Mackay and the opposition all over Scotland, the first—that to allow of others than residents in Scotland being appointed to the Examination Board in Edinburgh —was lost by eleven to six, being the only one out of my eleven amendments that was carried.

The last clause to which I have to refer as having been in the Bill of 1881, but which has not been repeated in that of this year, is the one that proposed to exempt Minors from serving as jurymen. The Trade Association have, however, resolved to demand its insertion. So, I think, has the Scotch Council, and if so, in face of my protesting against their doing so. I have always opposed this proposed exemption, and for two reasons:—First. I feel convinced that the application to Parliament will not only be unsuccessful, but will almost certainly lead to the deprivation of the pharmaceutical chemists themselves of the right of exemption which they now enjoy. Second. I oppose it on the merits as well. Though not professional men, we are generally very fairly educated, and enjoy a social position superior to many other classes of traders. The Government will not readily deprive themselves of some twelve thousand men so qualified for the office of jurymen as are the chemists and druggists of the nation. The wise course in the matter, I believe will be "to let sleeping dogs lie."

(*To be continued.*)

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, April 5, Dr. W. H. Perkin, F.R.S., President, in the chair.

It was announced that a ballot for the election of Fellows would take place at the next meeting of the Society (April 19).

The following certificates were read for the first time:—H. R. Mill, J. E. Richardson, A. H. Samuel, R. Williams.

Mr. L. T. Wright then read a paper—

On the Estimation of Hydrogen Sulphide and Carbonic Anhydride in Coal-gas.—In the analysis of crude coal-gas by absorbtiometric methods, as in Bunsen's, etc., it is usual to term that portion of the gas which is absorbed by manganic peroxide, ferric oxide, etc., hydrogen sulphide, whilst that portion which is absorbed by caustic potash and not by manganic peroxide is usually designated carbonic anhydride. The author first gives some results obtained by absorption with a bullet of manganese peroxide, and with KHO solution in a Frankland and Ward apparatus; higher results were always obtained when the gases were absorbed successively, than when they were absorbed simultaneously by using a solution of KHO. This difference between the results was considerably diminished by submitting the manganese bullet to a current of clean coal-gas, before using it for absorption. The author prefers the following method:—The crude coal-gas dried and freed from ammonia by passing through phosphoric acid, is passed through two weighed U tubes; the first charged with roughly powdered cupric phosphate in one leg and calcium chloride in the other, the second containing soda lime (slightly moistened by exposure to the air for about eighteen hours) and calcium chloride. The increase of weight in the first gives the sulphuretted hydrogen, in the second the carbonic anhydride. The copper phosphate is prepared thus:—2 lbs. of ordinary phosphate of soda are dissolved in 1 gallon of water and 2½ lbs. of cupric sulphate in 1½ gallons of water. The two solutions are vigorously stirred together, the precipitate washed by decantation and dried at 100° C. Phosphate thus prepared absorbs hydrogen sulphide very perfectly. Before using the absorption tubes, 3 cubic feet of clean dry coal-gas are passed through to "saturate" the reagents. The gas during the absorption should be passed at the rate of ¼ to ½ cubic foot per hour. The total quantity must vary with the impurity in the gas. The sum of the hydrogen sulphide and carbonic anhydride thus estimated is always greater than the number obtained by absorbing these gases simultaneously in one U tube charged with soda lime. A 6 inch U tube charged with cupric phosphate will absorb 20 grains of hydrogen sulphide. A similar sized U tube charged with soda lime will absorb perfectly 18 grains of carbonic anhydride.

Dr. Armstrong suggested that some acetylen might be absorbed by the cupric phosphate.

The President asked if bisulphide of carbon vapour was absorbed by soda lime.

Mr. Wright said that he did not think that the gain of weight was due to absorption of acetylen, and in answer to the President said that bisulphide of carbon was not absorbed by ordinary soda lime from gas previously freed from hydrogen sulphide.

The Secretary then read a paper entitled—

Contribution to the Chemistry of the Cerite Metals. By B. Brauner.—In the first part of the paper the author gives an account of a most careful determination of the atomic weight of didymium. The numbers obtained by chemists differ widely from each other, from 142· to 147·39. The author finds that the so-called pure didymium can be split up into heterogeneous constituents. By an elaborate process of purification a sulphate was obtained which was proved by fractional precipitation with ammonia and with sulphate of potassium to be homogeneous. From this precipitation the atomic weight of didymium was found to be 145·4. In a previous paper the author obtained the number 146·58, while Cleve gave the atomic weight as 147·2; such discrepancies seemed to indicate the presence of some metal of higher atomic weight and of a less basic nature. This metal the author eventually succeeded in isolating; its formiate is difficultly soluble, and by its absorption spectrum it was identified with samarium. The author has calculated its atomic weight to be 150. The effect of the presence of samarium on the absorption spectrum of didymium is carefully studied. The paper concludes with an investigation as to whether cerite contains earths of the yttria group as well as those of the cerium group. By taking advantage of the solubility of the formiates of the yttria group, the author separated out a fraction with atomic weight 114·5, whose spark spectrum showed the presence of yttria, whilst holmia, thullia and erbia were recognized by their absorption bands, and the presence of terbia also was determined.

A communication entitled—

Some Compounds of Antimony and Bismuth containing two Halogens, by R. W. Atkinson, was then read by the Secretary.—Amongst the so-called double salts, one of the best characterized is that produced from antimonious chloride and potassium chloride. The author has prepared the compounds obtained by combining antimonious chloride with potassium bromide and antimonious bromide with potassium chloride. On the theory of a molecular combination the first compound should be $SbCl_3 + 3KBr$, the second $SbBr_3 + 3KCl$. In both cases the author finds that the compound $Sb_2Cl_6Br_6K_6 + 3H_2O$ is formed. The identity of the two compounds was proved by identity in colour, crystalline form, formula and chemical behaviour. The action of heat upon the crystals is of considerable interest; at 100° the lemon-yellow substance darkens, and between 200° and 300° white antimonious fumes escape, leaving a white mass behind which contains chlorine and bromine in equal atomic proportions. Attempts to prepare a similar bismuth compound were unsuccessful, but a yellow crystalline salt, $Bi_2Cl_6Br_4K_4 + 3H_2O$, was obtained.

Professor McLeod said that it would be of great interest to ascertain the composition of the antimonious fumes given off when the substance was heated.

The Society then adjourned until April 19.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of this Association, held on Tuesday the 3rd inst., the following paper, on "Pharmaceutical Politics," was read by Mr. R. W. Giles.

The discussion upon the paper was postponed until Wednesday evening next.

Pharmaceutical Politics.

BY R. W. GILES.

"The word politics," said Mr. Pickwick, "comprises in itself a difficult study of no inconsiderable magnitude."

This oracular and incontrovertible proposition reproves the temerity which would presume to condense the whole subject of pharmaceutical politics into a single evening's address; especially as time must be allowed for others to express their opinions. For politics without discussion would be about as insipid as cold veal without bacon.

I am, however, unexpectedly assisted in contracting my observations by the appearance of the new Pharmacy Bill, which has flashed meteor-like across the horizon since you did me the honour to invite me to address you, when you at the same time suggested the subject for our evening's meditations.

This happy accident droppeth upon me in the quality of mercy and like the gentle rain that is twice blessed. It justifies me in concentrating attention upon the legislative aspect of pharmaceutical politics, and cannot fail to give an interest to our proceedings which I could not hope to arouse under less stimulating circumstances.

In order to open the discussion logically I must refer at some length to the history of pharmacy; though in so doing I cannot help repeating a twice-told tale, and must run the risk of wearying you by going over again a series of events with which you are all more or less familiar. It would, however, be a mere waste of time to dwell upon the condition of pharmacy previous to the formation of the Pharmaceutical Society. Pharmacy can scarcely be said to have existed in this country before that epoch. It was in a state of chaos, without organization and without order. Not but what there were, even then, some pharmacies in which business was conducted creditably and even scientifically; but these were rare exceptions to a prevailing average of incompetence.

Let me give you an illustration from a London house of considerable repute, where my father was an assistant in the early part of the present century. The proprietor was an apothecary in large practice, at the sign of the Galen's Head, in the city. There was a good laboratory, in which pharmaceutical preparations were manufactured upon a large scale. Everything was genuine and of best quality. There was a staff of assistants, qualified as times went, directed by an old apothecary who had charge of the retail shop and dispensing department. One day, shortly after the publication of the Pharmacopœia of 1809, a high functionary of the College of Physicians came in and interrogated this ancient worthy upon the preparations of mercury, which had been newly named in the recent publication. The old gentleman was at fault, and being requested to furnish 2 grains of "hydrargyri submurias," he proceeded to weigh out 2 grains of corrosive sublimate, which had been previously known as "hydrargyrus muriatus." The doctor (very probably with a pedantic assumption of superior knowledge, which is always exasperating) pointed out the serious mistake the dispenser was making, whereupon the old man's temper boiled over and he burst out with, "Confound your new-fangled names, your submuriates and your oxymuriates, your carbonates and your subcarbonates. I wish the whole College of Physicians was in H—,"—well let us say Hades, though it is a feeble substitute for the original Saxon.

If this was the state of pharmaceutical science amongst the responsible managers of London houses of first rank, it may be imagined what was the condition of obscure shops in the provinces. Happily for the lives of King George's lieges, the medical practice of that day was more simple than it has since become; the materia medica, with which the pharmacist had to deal, comprehended no deadly alkaloids and few ambiguous salts; nor was he often called upon to supply potential remedies in concentrated forms, whereby the patient gets the maximum of doses and the dispenser the minimum of remuneration; the relations of pay and responsibility being ingeniously adjusted according to the rule of three inverse. Provided he could manipulate some innocent decoctions and infusions (they used to be made "fresh" in those unsophisticated days), and could compound a saline mixture or an almond emulsion, *secundum artem*, he was esteemed capable of performing the whole duty of man in that station of life.

It is told of a French *avocat* that he thought fit to trace the sequence of events which led up to his client's wrong from the creation of the world, and that he pursued this part of his narrative with so much prolixity that the Court, losing patience, presently interrupted him with the gentle monition—"*Eh bien! passons au deluge!*"

I am much indebted, sir, to your greater forbearance that you have not yet interrupted my antediluvian reminiscences, and I will now pass on, as rapidly as I may, to that deluge which swept away the old world of pharmacy and is gradually replacing it with the better order of things inaugurated by the Pharmaceutical Society.

But in spite of my desire to escape reproof it will first be necessary to refer to those events which remotely called the Society into existence; for it is almost an axiom that no bodies (much less one so disunited as were the chemists and druggists of that period) ever reform themselves without external pressure.

The early history of pharmacy presents a view of the chemists and druggists in a chronic (if intermittent) state of persecution at the hands of the medical profession, especially of the Society of Apothecaries, who, having unmistakably "interloped" upon the practice of medicine and surgery, and to a great extent neglected their own legitimate functions, naturally looked with the greater suspicion upon the chemists and druggists, who in their turn had shown a disposition to take up the business which the apothecaries had only half thrown up; for they were still willing to retain its privileges and emoluments.

It is only necessary to remind you of the derivation of the word "apothecary," from ἀποθήκη, a store, to show that the apothecary was originally the storekeeper for drugs, or in other words, a pharmacist. The pharmacists of to-day are therefore the veritable successors of the apothecaries of former times, who then claimed the exclusive right to the name "pharmaceutical," which they have since as completely abandoned. Thus we find that in one of the many assaults made upon the chemists and druggists by the apothecaries, viz., in the year 1794, an attempt was made to put them down by a system of what we should now call "Boycotting," for which amiable purpose an association was formed "under the title of the General *Pharmaceutical* Association of Great Britain," consisting entirely of apothecaries; and curiously enough it established itself in Bloomsbury Square. The chief object of this notable combination, as stated in its articles, was that the members "should engage to deal with such druggists only as would immediately consent to relinquish the composition of all medical prescriptions—to retain to themselves their wholesale occupation alone—and to receive no apprentice and employ no assistant who had not had a classical education." It is a pity that the composers of this liberal manifesto had not had the advantage of an *English* education, that they might have made it more clear that it was the qualified apothecary, and not the unqualified druggist, who was to insist upon the classical education of his assistants and apprentices. We cannot suppose that at this early period the apothecaries were agitated by a desire to establish a "Preliminary examination" for chemists and druggists concurrently with a determination to keep them down to the level of traders.

It is sufficiently clear, from the above quotation, that at this time the business of the apothecary and that of the chemist and druggist bore the same relations to each other in this country as still exist in many Continental states between the profession of pharmacy and the trade of the Drogueries or Drogherrias; and I am much mistaken if that distribution of business is not tending to re-establish itself. I think pharmacy will again sever itself from drysaltery, which will either be carried on in a new order of shops, or, more probably, will be divided between the grocers and the oilmen, who are quite competent to perform it. "Men do not cut blocks with razors," by which I mean that you do not want a scientifically trained man to sell common drugs and chemicals required for rough domestic or technical uses. There is, to my thinking, an incompatibility between the two functions which have hitherto been united in the person of the chemist and druggist, in consequence of which both have suffered. I feel sure that a separation will prove advantageous to pharmacy, and that it will (by affording more suitable conditions) give an impetus to pharmaceutical research which the old system tended to stifle. I also believe that this new development will be hastened by the operation of the proposed Pharmacy Bill, if it should become law, as I sincerely trust it may.

So long as the attacks upon the chemists and druggists were confined to the medical profession, the former were always able to resist legislative interference with their trade. Parliament seems to have penetrated the motives by which these attacks were instigated, and would not lend itself to the efforts of the apothecaries to secure for themselves a monopoly which would have operated as a tax upon the public without equivalent advantage. From this we may learn (and it is of the utmost importance that we should learn, from whatever source the teaching may come) that it would be absolutely useless to apply to Parliament for anything savouring of monopoly in these later days of more enlightened political economy.

All the Bills affecting chemists and druggists which had been submitted to Parliament previous to 1815 were prompted by this spirit, and had one common character—they proposed to place the druggists at the mercy of a medical control, in which they themselves would have no voice. It was usually provided that the druggists should be examined by a Medical Board of Examiners, from whom they must obtain licences before they would be permitted to go into business; but no provisions were made for pharmaceutical education. It was the old story of making bricks without straw,—the cause of the first workman's strike upon record and the type of a good many that have happened since, in which obstinate journeymen have set their faces against economic improvements. The druggists were as obstinate as their neighbours, and had better reason. In fact, the incorporated medical bodies (and the Society of Apothecaries most of all) wanted to "domineer" over the unincorporated chemists and druggists; but they attempted this selfishly, without showing a corresponding desire to accomplish a public benefit, and consequently all their attempts fell through.

The Apothecaries Act, 1815, was the last of the measures of this epoch. It deserves some notice here because it is the Act upon which apothecaries, and other medical practitioners also, have relied as prohibiting what is known as "counter prescribing." It was a stringent measure, in the form in which it was presented to Parliament, and aroused the strenuous opposition of the druggists, who succeeded in obtaining the withdrawal of all the obnoxious clauses aimed at themselves, and secured the insertion of a clause which expressly exempted their trade from its operation. That clause is as follows, viz:—

"Provided always, and be it further enacted, that nothing in this Act contained shall extend, or be construed to extend, to prejudice or in any way affect the trade and business of a chemist and druggist; but all persons using or exercising the said trade, or who shall or may hereafter exercise the same, shall and may use, exercise, and carry on the same trade in such manner and as fully and amply to all intents and purposes as they might have done in case this Act had not been made."

It is difficult to believe that even a lawyer would attempt to put an Act thus limited in force against the trade of a chemist and druggist. It has been attempted nevertheless, though the attempt failed, and the capacity of the English language to express what it intended was upheld. But so marvellous is the possibility of legal ambiguity that an eminent judge lately deceased has said that if a competent lawyer were to contend before him that black was white, he should feel it necessary to suspend his judgment until he had listened to the argument.

"Counter prescribing" is a delicate and difficult question of pharmaceutical politics, and I could not therefore omit to refer to it; but do not suppose that I am an advocate for the abuse of the practice. It is a practice which every good pharmacist desires to keep within reasonable bounds—only to be defined by public convenience. None but idiots (of whom I have met many) desire or expect to suppress it altogether. I go just so far as, and no farther than, the Committee of the General Medical Council appointed in 1865 to inquire into and report upon the two Pharmacy Bills which were before Parliament in that year. Their report contains the following passage, viz.:—

"It is well known that many existing chemists and druggists, both members of the Pharmaceutical Society and others, practise medicine, although unqualified by law and not competent by education. To a limited extent this practice may be inevitable, and at all events cannot be prevented. But the existence of it gives peculiar facilities and temptations to the pharmaceutic chemist to embark largely in irregular medical practice as an unqualified practitioner."

It is thus officially admitted on the authority of the Medical Council, that counter prescribing "to a limited extent is inevitable and cannot be prevented." I may say that the person least able to prevent it is the "pharmaceutic chemist," who has to choose between obliging and offending his customer, and who would generally find his own pecuniary interests better served by referring his "inevitable" patient to the nearest doctor, if he dared to do so. The only practical question is, therefore, how can the "inevitable" be kept within such reasonable limits as not to interfere with the public convenience on the one hand and not to imperil the public safety on the other. I utterly refuse to recognize the interests of the medical profession in the matter. Neither they nor pharmacists have a vested interest in the diseases and sufferings of their fellow-creatures, who have the most unimpeachable right to cure themselves by any means accessible to them. Let there be no nonsense about that. I say confidently that improved pharmaceutical education is the only agency by which "counter prescribing" can be kept within legitimate bounds. Education teaches us to know certain things. That is its first aim, but it is not its sole effect; it also generates a logical mind, which enables us to distinguish between that which we know and that which we do *not* know. A mind thus trained will fight very shy of meddling with obscure symptoms which it *knows* that it has not the power to interpret. It will make a prudent application of the proverb "Omne ignotum pro mirabili," and will not make speculative shots at disease in the dark. On the other hand the illogical man, who sees no danger, because his eyes are shut though he knows it not, concludes there is none, like the much libelled ostrich, and proceeds with the confidence of ignorance to treat the premonitory symptoms of paralysis as a bilious headache. For still—

"Fools rush in where angels fear to tread."

Pharmaceutical education operates in yet another way. By the dignity it gives to his calling and the pride it inspires in the pursuit of that calling, it offers a worthy goal for the pharmacist's ambition, and creates a perfect horror of empiricism. Is it not well known that high pharmacy and counter prescribing are the opposite poles of the pharmaceutical microcosm?

It was not in the nature of things that the anomalous condition of pharmacy, at the period of which I am speaking, should be regarded with approval in other quarters, outside the medical profession. Its Bashi-Bazouk irregularity was too flagrant to escape the notice and censure of less interested reformers, although no overt proceedings were taken until the year 1839. It should, however, be recorded to the honour of the late Mr. John Savory, that he endeavoured to induce the chemists and druggists of London to co-operate with him in promoting a Pharmacy Bill in the interests of the trade in the year 1830. But it was too early then to enlist hearty support or to rouse a real belief in the practicability of such a novel proposition. The druggists were not yet prepared to assert that they too were men and brothers, or to look for anything better than to be left to live and die in peace. Mr. Savory met with so much apathy and incredulity that he found it hopeless to persevere, and he reluctantly abandoned his enterprise, which, however, deserves to be held in honour, not the less because it failed, as every first attempt in similarly new ground is likely to do. It was the first enunciation of the principle that chemists and druggists were entitled to be legislated for, instead of to be legislated against; and it cannot be doubted that it was one of those useful failures that lay the foundation for future success.

The Medical Reform Movement, which began in 1839 in a parliamentary inquiry, came to no immediate result, but it continued to simmer until it took shape, in 1841, in the obnoxious Medical Bill, brought in by Mr. Hawes, which literally bristled with penalties and bid fair, should it become law, to improve the chemists and druggists off the face of the earth. I can well remember the announcement of this measure and the consternation which it spread amongst the trade throughout the country. It would have compelled the druggists to obtain a licence to carry on their business from a body practically constituted by the votes of the medical profession, amongst whom their old enemies, the apothecaries, would have been dominant by reason of their numerical majority. The Bill, in fact, attempted too much and was too arbitrary. It has been wisely said that "strength is strong, but weakness is stronger," and this attempt to crush the weak proved the wisdom of the saying. Vigorous action was taken by the chemists and druggists in London, to whom the provinces have often been more indebted than they are always ready to acknowledge. A committee was formed to watch and to oppose the progress of the Bill in Parliament, consisting of the following members, whose honoured names I ask your permission to read, viz.:—William Allen, F.R.S., Robert Alsop, Jacob Bell, Richard Battley, John T. Barry, Charles Barron, Thomas Butler, Edwin Briggs, George Baxter, Charles Dinneford, Charles Davy, Samuel De Castro, John Ellis, Robert Farmer, Samuel Foulger, Joseph Gifford, Samuel Green, Thrower Herring, Thomas Herring, Edward Horner, W. B. Hudson, William Ince, Thomas Keating, William Lowe, J. S. Lescher, T. N. R. Morson, Samuel M. Mayhew, Richard Hotham Pigeon, Matthew Pound, John Savory, Peter Squire, George W. Smith, Joseph Smith, Edwin Simkin, Ralph Stamper, John Toller, George Waugh, Edward Winstanley, Thomas Walker.

This was not the first occasion by many that the disintegral atoms of which the drug interest was made up had been brought together to make common cause against hostile attacks; but this particular occasion was characterized by special features producing important consequences, without which it is probable that we should not be here to-night discussing pharmaceutical politics, for there might, in all probability, have been no such thing as pharmaceutical politics to discuss. The speciality of this defensive combination will be best told in the words of the resolutions passed by the Committee and adopted by a general meeting of the trade held on April 15, 1841, viz.:—

"That a Society be forthwith formed under the title of 'THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.'

"That the object of the Society be to benefit the public, and elevate the profession of pharmacy, by furnishing the means of proper instruction; to protect the collective and individual interests and privileges of all its members in the event of any hostile attack in Parliament or otherwise; to establish a club for the relief of decayed or distressed members."

The Report of the Committee presented upon this occasion concluded with the following memorable declaration of independence, which must have appeared little less than revolutionary to the mass of those to whom it was addressed, and evidently required no small exercise of courage on the part of those who made it, to wit:—

"Your Committee, having considered the subject, are of opinion that the chemists and druggists are capable of self-government."

I like that interpolation, "having considered the subject." What a picture it presents of the hesitation and mistrust to be overcome before the Committee could screw their courage to the sticking point and venture to call their souls their own!

At this meeting, viz.: on the 15th of April, 1841, the Pharmaceutical Society was formally constituted by the enrolment of a hundred members on the spot. Let the 15th of April be for ever marked with a white stone in the calendar of all good pharmacists.

I shall ask you to pause at this first epoch of inauguration and to consider how sagaciously comprehensive was the programme of the young Society, including the three great purposes of Education, Protection, and Benevolence, to be from thenceforth the Faith, Hope and Charity of the pharmaceutical creed; but the greatest of these is Education. It was this which gave vitality to an ephemeral association called suddenly into being by fear and self-interest, to be as quickly dissolved when the immediate crisis was past if it had not consecrated itself to public usefulness by a wise, elevated, and far-seeing policy. I shall also ask you to observe how steadfastly the Society, as it grew in years and in organization, has held to the principles thus early propounded; amplifying, perfecting and extending, but adding nothing thereto and diminishing nothing therefrom. I shall ask you to give your loyal support to the institution which has done so much on these broad lines and has deserved so well,—to resist the temptation to small criticism (the weakness of little minds), and to the still more detestable spirit of schism (which is as the sin of witchcraft), to do that which in you lies to strengthen and still further to extend its influence and the scope of its operations, and this not solely upon sentimental grounds, in grateful remembrance of how much its disinterested founders have done for you and for the vocation which I hope you love, and of whose coming estimation in the eyes of men I trust you will have reason to be proud,—how much greater reason if you yourselves contribute, as I doubt not you will, to that estimation—I say not solely upon these grounds, though I should do injustice to your generous sympathies if I doubted your willing acknowledgment of these strong claims, but also upon practical, I might almost say upon selfish, grounds, namely, that the Society is the only corporation which is empowered, or is ever likely to be empowered, to regulate the education and qualification of pharmacists, or in other words to uphold and, as we hope, to exalt the standard and dignity of pharmacy. The Society may, it is true, fall short of its obligations; it may become apathetic or even obstructive; it may become selfish and forget its high duties as the guardian of scientific pharmacy and the trustee of the public welfare in connection therewith; it may take a low view of its responsibilities and grasp vainly at some illicit advantages which are not consistent with these higher aims; and by so doing you may say that it has forfeited your allegiance. But remember, if it does these things it will be the fault of its members, or of those who should be members but are not. The Society *is* what its founders and many worthy successors *have* made it, it *will be* what you and those who follow you *shall* make it. Take heed, therefore, that you neither negligently, disloyally nor wilfully detract from the high character which has been impressed upon it by other hands than yours; for of this be sure that if the Society fails there is none other power to which English pharmacy can look for rescue. Above all things see that you do not entrust its government to unworthy hands.

The Society being now launched, the work of organization proceeded briskly. A school of pharmacy was established, comprising a laboratory for instruction in practical chemistry, which it may astonish many of you to hear was the first of the kind opened in this country; also a library and museum, with the extensive resources of which you are doubtless familiar. Lectures were instituted for which the services of eminent professors were secured—I need only mention the name of Dr. Jonathan Pereira—and finally examinations were arranged as a means of admission to the Society for all engaged in the pursuit of pharmacy who chose to submit themselves to the ordeal.

But the Society was now, and remained for many years, a merely voluntary Association, and had nothing to offer to those who satisfied the examiners beyond a bare certificate of membership, which conferred no more substantial privileges. Those who sought pharmaceutical education for its own sake accepted the opportunities offered with alacrity, and thought themselves amply rewarded; but those who hankered after more solid pudding, according to their notions of substance and shadow, flattered themselves that they were not to be caught with that hollow sort of chaff. Obviously such an organization as this was not competent to effect any marked or immediate improvement in the general aspect of pharmacy. It is not true that all mankind, or even the majority, are possessed of an insatiable thirst for knowledge. And, alas! pharmacists are but men.

It is rather to be wondered at that the Society effected so much within its narrow powers, than that it did so little. By means of evening meetings held in Bloomsbury Square for scientific papers and discussion, by the publication of the *Pharmaceutical Journal* and by some other less conspicuous agencies, the influence of the Society began to be disseminated, and a considerable awakening in practical pharmacy, to be followed in due course by signs of more scientific activity, became apparent. The example of London spread to the provinces, where local associations with similar objects sprang into existence, and attention began to be directed to the scientific aspect of the vocation which had hitherto been followed according to the good old rule of thumb.

In this way the Pharmaceutical Society made itself known and respected not only by its own members, but by members of the medical profession, whose good opinion it was and is most desirable to conciliate. They were in those days frequent attendants at the evening meetings in Bloomsbury Square, and often took part in the discussions. Of late years they have been conspicuously absent, which is to be regretted. It was a pleasing incident of the last evening meeting, and strongly suggestive of the good old times, to meet a medical gentleman there who contributed valuable remarks to the discussion of a subject which lay between pharmacy and therapeutics.

The Society became also favourably known to the Government, and slowly but surely laid the foundation for that influence which it has since exercised with good effect upon various legislative measures, which would otherwise have passed through Parliament in a form not only objectionable to chemists and druggists, but also prejudicial to the interests of the public. Even so early as 1841, that is, in the first year of the Society's existence, the Home Secretary consented to recognize it as the representative of the trade, and undertook that no legislation upon medical reform should be proceeded with without notice to the President. This was an important point gained, and contrasts strongly with the unrecognized position held by the unassociated chemists and druggists of former times. Thus within the short space of a few months had this purely voluntary, and as yet unlicensed, Association come to be a political power.

As soon as the Society felt itself fairly established and could point to good work in full operation, it made the first move towards consolidating its position by applying for a Royal Charter of Incorporation. This explosive strategic movement was appropriately executed on November 5, 1842, by petition to the Queen, which was "graciously" received, and the *ci devant* private association became a chartered corporation with perpetual succession, common seal, right of suit and such like incidents of a Royal grant, on February 18, 1843.

The Royal Charter forms the second important epoch in the progress of the Society. But the powers of a Royal Charter in these days of constitutional Government are, properly, very limited; and the Charter neither did nor could confer upon the Society any authority over persons outside its own list of members. It left it, as it found it, a purely voluntary Association; and none knew better than the leaders of the Society, who had petitioned for the Charter, that larger powers were needed, which only an Act of Parliament could give, to enable them to carry out their views for the regeneration of pharmacy. They knew this—they knew also that "everything comes to the man who waits." Accordingly they took for their text the familiar motto of the Onslows, "Festina lente," which has been happily translated into the vernacular as "Go it, ye cripples." And they waited and watched.

As the years rolled on the necessity for further powers grew more apparent and seemed to come more within the range of practical politics; but the long incubated Medical Bill stopped the way and gave time to trim the Pharmacy Bill into shape before it was eventually presented to Parliament in 1851. Let me take advantage of the lull during these eight years to introduce a personal recollection of another great Charter, which was mixed up with the School of Pharmacy in a manner deserving a place in the page of history.

In the session 1847–8 my connection with the School of Pharmacy commenced. The year 1848 was politically remarkable. A democratic wave swept over the Continent, tumbling thrones in the dust, and driving their royal occupants across the Channel in menial disguise, exposed to the perils of the sea in open boats, to seek refuge in the greater stability which England owes to her free institutions. But even here there was a faint reverberation of the convulsion that was shaking Europe to its foundations. April 10, 1848, was fixed for the great Chartist demonstration to perambulate the streets of London in force from Kennington Common to St. Stephens, there to carry the great Charter to the very doors of Parliament with throng and tumult, in flagrant defiance of the statute in that case made and provided. But the boys of Bloomsbury Square were equal to the occasion. They rose up as one man; were sworn in at St. Giles' Church, and with the staves of special constables in their hands and loyalty in their hearts mustered under the leadership of their professor, who gallantly headed them under his umbrella! for the day was drizzly, and severely tried though it could not damp the ardour of the specials. And now you know by what means London was saved and the constitution preserved from outrage. The public buildings were garrisoned with troops; the Bank was fortified with a breastwork of sand bags, loop-holed for musketry. But these precautions were needless, the perils and the honours of the day were with the "specials," to whom the School at Bloomsbury furnished its heroic contingent, as the treasured relic now lying upon the table (being the staff that I carried on that memorable day) will testify.

In the years 1848–50, the Society was busy in maturing its first Pharmacy Bill; but the Council were met at the outset with a serious obstacle. It was impossible to find a member of Parliament with sufficient knowledge of pharmacy, of its wants, its claims and its peculiar relation to the medical corporations and to the public, to whom the conduct of the Bill through Parliament could be prudently entrusted. It was obvious that an efficient advocate must possess a competent knowledge of "Pharmaceutical Politics," and where amongst the representatives of the nation was such an advocate to be found? This was a perplexing question, to which no ready answer was forthcoming.

On the other hand there was one circumstance that greatly favoured the Society's movements. The Sale of Arsenic Act had been brought before Parliament in 1850. The Pharmaceutical Society, by means of their organization, had collected valuable statistics relating to the trade in arsenic, though it was the Provincial Medical Association who had first raised the question and who now brought it under the consideration of the Government. The Government took charge of the Bill and brought it in as a Government measure, and in the course of the inquiry, the chaotic state of pharmacy came so prominently under notice of Parliament as to encourage the hope that the evils might be remedied by speedy legislation. Thus early did the sale of poisons mix itself up with the question of pharmaceutical legislation.

Finding that there was no chance of securing the assistance of a member of Parliament whom the Society could trust to pilot the Bill through the House, Mr. Jacob Bell took the bull by the horns and determined to look for a vacant seat since the full ones would not help him. Accordingly he became a candidate for the representation of St. Albans, for which town he was elected member after a severe contest. It is amusing to hear that he had decided upon offering himself as a candidate before he had made up his mind to which political party he belonged; but as it was necessary that he should espouse the principles of one or the other, he was not long in coming to the conclusion to appeal to the constituency as a Liberal, which in the best sense of the word he certainly was. Liberality went a long way in St. Albans, and Mr. Bell was returned.

And now I can no longer postpone an obligation from which I have hitherto shrunk from conscious inability to deal with it creditably. I have not, until now, mentioned the name of Jacob Bell in connection with the formation and direction of the Pharmaceutical Society. Yet it is well known that Jacob Bell was the moving spirit in it all; and his name, his work and his memory have been present to my mind with every line that I have penned. Mr. Bell had able and influential colleagues, who did good service and whose services are held in grateful remembrance, as they deserve to be. They did all and more than all that patriotism could reasonably claim from them. But Jacob Bell was more than this. He gave, without stint, his time, his talents, his means, and, alas, he finally sacrificed his life to the object with which the best years of his life had been identified. If you read the first part of the 'Progress of Pharmacy' written by his hand—and everyone who wishes to understand pharmaceutical politics should read the whole of it—you will see that no name is less prominent in the early proceedings of the Society than that of Jacob Bell. This is not solely due to the modesty of one who writes of events in which himself played the leading part, for you will find that he as studiously kept himself in the background while those events were passing. You will never read of Mr. Bell as the chairman of a meeting; it is always someone else, whose co-operation he desired to secure. I think you will never meet with his name as the mover or seconder of a resolution. He was careful that the distinction attending these little ceremonies should fall upon the shoulders of others. This was not affectation; it was downright, genuine unostentatiousness. Jacob Bell was the most unselfish man I ever knew, and I am proud to say I knew him well. Yet whenever there was real sustained hard work to be done,—no mere flash in the pan,—and from which no κύδος was to be expected, it was Jacob Bell who did it. It was he who toured the provinces, holding meetings, making himself all things to all men if only he could thereby stir up their sympathies to co-operate in the great work upon which he had set his heart, though he had no selfish benefit to reap. It was he who projected the *Pharmaceutical Journal* and edited and published it at his own risk for twenty years, finally handing it over, a valuable property, to the Society to which he bequeathed the copyright. The Journal, perhaps, did more at this time to extend the reputation and influence of the Society in the provinces than all other agencies put together, and it still continues to be its most valuable organ and auxilliary; for this we are indebted to the enterprise and generosity of Mr. Bell. I do not attempt to eulogize him. I feel how inadequate any words of mine must be to do justice to his worth, his ability, his liberality, and to his complete devotion to the cause of pharmacy. I also feel that such words, could they be spoken, are entirely unnecessary; for wherever English pharmacy is known, there the services of Jacob Bell are remembered, and his memory is revered. He has long ceased to be with us, alas! and there have been times when the want of his influence has been grievously felt. "But though dead he yet speaketh," and the echo of that silent speech may be felt by all who will put aside suggestions of self-interest and open their hearts to a broad conception of the duty that lies before them—the duty of loyalty to a worthy cause.

(*To be continued.*)

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, March 29, Mr. R. H. Parker, Vice-President, in the chair.

A paper was read by Mr. J. B. Barnes, on "Vortmann's Method for the Separation of Chlorides, Bromides and Iodides," which will be published in a future number of this Journal.

In the discussion that followed the Chairman, Secretary, and Messrs. Crow, Dymond and Elworthy took part.

A vote of thanks was accorded to Mr. Barnes.

The Reporter on Botany, Mr. J. O. Braithwaite, then made a report on "Plant Movement."

A discussion followed in which the Chairman, Secretary, Messrs. Crow, Elworthy, Rankern, Ransom, Reynolds and Taylor took part.

Parliamentary and Law Proceedings.

Alleged Death through a Cough Mixture.

An inquest was opened at Brighton on Wednesday, March 28, touching the death of Arthur Long, aged eighteen months. The mother stated that on Sunday evening she obtained some cough mixture for the child from Mr. Goyne Stevens, chemist, in North Street, and the dose as stated on the label was a teaspoonful three times a day. She gave the child one dose at half-past seven and another at twelve o'clock. In the morning upon going to the child's bed she found it was dead. She used an ordinary teaspoon.

Dr. Ross, who had been called in, said he had made a *post-mortem* examination of the body and he was of opinion that the child died from an overdose of morphia.

Mr. William Goyne Stevens, chemist, 53, North Street, said the mixture had not been dispensed by him and he was much surprised to learn that it had been supplied, since he always declined to give medicine of the kind to children. It was a mixture kept for coughs in the case of adults. According to the manner in which the assistant had told him he prepared what was given to the child's mother there would be one 120th part of a grain of morphia in each measured teaspoonful. Looking at the bottle he found that there were four doses gone, instead of two. The spoon produced was not a teaspoon, but it would hold double the ordinary dose; the old silver teaspoon was the type of what the measure should have been. The mixture had been supplied against his general instructions not to give morphia or any dangerous drug to children. There would only be one-eighth of a grain of morphia in the whole bottleful.

The inquest was adjourned to allow of an analysis being made of the remainder of the medicine in the bottle.—*From the Sussex Daily News.*

Correspondence.

"Quackery Rampant."

Sir,—Under the above heading, your contemporary, the *Lancet*, in the spirit of justice and fair play it usually adopts when speaking of chemists, says in its "Annotations," March 17, at page 463, after a diatribe against quackery and quack medicines, that "The real cause of this evil is the counter practice of the druggists." The *Lancet* then goes on to demonstrate the ignorance of the druggist, and suggests that the public, especially the poorer classes, should be educated so as to be able to discover this ignorance, by which they are misled and induced month after month to squander money and waste precious time in the futile attempt to get cured of their disorders. On the face of this, one would be tempted to think that perfection, or at any rate something like it, would at least be found among the class of men represented by the *Lancet*, yet what do we find?

Turning again to the same number, on page 461, we find a leader on the "Testing of Urine," called forth by some demonstrations given by Drs. Pavey and Oliver, and following a mass of correspondence on the same subject in its own pages. In this article the writer says, "It is a platitude to insist on the importance of this branch of clinical investigation, and yet we do not exaggerate when we say that no part is more generally neglected or more perfunctorily made." It would seem, therefore, that the charge of "knowledge defective as regards disease" is not always confined to the druggist, but, diagnosis being at fault, may exist also in the medical man.

Again, one would suppose, after so severe a denunciation of "quack medicines," that the *Lancet* itself would be above reproach. But what do we find? Still in the same number, on page 458, under "Analytical Records," a list of secret preparations, with the names and addresses of the makers attached, the composition of some of which is, according to the *Lancet's* own admission, known only by advertisement, and yet that Journal does not hesitate to recommend them. If this is not advertising advertised secret—which can be only another name for quack—medicines, may I ask what is? Can there be any moral difference between a patient taking a remedy prescribed by a chemist who knows at least something about it, and the same patient taking a remedy prescribed by a medical man who knows nothing about it, except that it is advertised in the columns of the *Lancet*?

South Norwood, S.E. J. H. Baldock.

The Constituents of Cacao Oil.

Sir,—I have had under my notice a letter from Mr. Kingzett respecting an investigation of cacao oil carried out by me, which induces me to make the following reply.

Mr. Kingzett, without making himself acquainted with the contents of my original communication, notwithstanding that the necessary reference was given in the abstract in question, has cast doubt upon the correctness of the facts experimentally demonstrated by me. I therefore dispute the right of Mr. Kingzett to exercise criticism upon the basis of a report in which only the results of my investigation are given, since he is ignorant of the grounds upon which I formed my opinion that the arachic acid which he declared to be a mixture was a single body.

I maintain against Mr. Kingzett and against any other opponent the accuracy in every respect of all the results obtained by me in my investigation of the subject of cacao oil, and at the same time I here state that I would give further consideration only to criticism supported by facts.

Mr. Kingzett's offered acid I decline, since I could not be influenced by the analysis of a body, as to the origin of which I had not personally satisfied myself.

Whilst, in conclusion, I assure Mr. Kingzett that I do not require instruction from him upon the criteria of an individual body and a mixture, I would refer him in any case upon the subject he is interested in to my original communication (*Archiv der Pharmacie*, 1883, p. 19).

M. C. Traub.

Bern, Laboratory of Professor Percenoud.

W. J. W.—(1) The test is worthless. (2) Gynogardic acid is an acid first separated from chaulmoogra oil by Moss. See *Pharm. Journ.*, [3], x., 251.

Inquirer (who should have sent his name and address) is recommended to consult his legal adviser as to the possibility of evading the provisions of the Pharmacy Act.

G. S. Boutall.—We do not think any useful purpose will be served by giving to the handbill in question further publicity by reproducing it in these columns.

G. Agar.—We are unable to insert requests for assistance in imitating specified proprietary preparations.

J. W. L.—See a note by Dr. Symes in last week's Journal, p. 819; also Dr. Thresh's communication in vol x. (1879), pp. 193 and 260.

A. E. Welch.—It is not legal for any unregistered person to sell by retail poisons included in the schedule to the Pharmacy Act.

"*Health.*"—(1) We are unable to identify the recipe referred to. (2) Rubini's preparation is said to be a solution of camphor in its own weight of 60 o.p. spirit.

A.P.S.—There is no recognized preparation, though a liquid extract and a tincture have been used, and sometimes the drug has been administered in powder. See *Pharm. Journ.*, vol. x. (1880), pp. 521, 541.

Omega.—(1) The coloration of the solution of acetate of morphia referred to is the result of some decomposition, though this has been stated not to affect the medicinal properties of the salt until the colour becomes intensely yellow. (2) The preparation should certainly not be substituted for the B.P. tincture. (3) Submit the questions to the Inland Revenue authorities. (4) A wine licence is necessary—see *Pharm. Journ.*, June 24, 1882, p. 1060. (5) The subject is not dealt with in the Draft Pharmacy Acts Amendment Bill. As to this and the following question see the Bill printed before, p. 644.

Communications, Letters, etc., have been received from Messrs. Symes, Buchanan, Winter, Paris, Cock, J. W., Associate.

THE PREPARATION AND COMPOSITION OF UNGUENTUM HYDRARGYRI NITRATIS.*

BY THOMAS MABEN,

Pharmaceutical Chemist.

In the course of an investigation in connection with olive oil and its adulterations, several reactions which I have noted seem to throw some light on the causes of the variability in the properties of citrine ointment, as prepared by the official process. These reactions occur in subjecting the oil to the action of a solution of mercuric nitrate in excess of nitric acid, in the presence of heat, and without anticipating what I may, at some future time, submit to you regarding the subject for which the experiments were initiated, I may cite the following results as furnishing some explanation of the causes of the variability referred to.

Effect of Acid Solution of Mercuric Nitrate on Olive Oil at Different Temperatures.

1. When pure olive oil is heated with the mercury solution to 180° F., moderate chemical action takes place, the mixture frothing up to a small extent only, and solidifying on cooling.
2. When the mixture is heated to 212° F. the chemical action is much more decided, the result in general appearance being similar to that in the former case, but with this difference, that a small quantity of a yellow semi-crystalline substance is precipitated.
3. The mixture heated to 300° F. gives very energetic action, the solidified cooled mass presenting much the same appearance as before, but with an increase in the quantity of yellow precipitate.
4. When olive oil adulterated with any of the common seed oils is heated with the reagent, the mixture at 180° F. assumes a reddish colour, due to the action of the nitric acid on the foreign oil; at 212° F., a slate-coloured precipitate, which seems to vary in quantity according to the extent of the adulteration, is thrown down, together with a quantity of the yellow precipitate already mentioned; at 300° F., the quantity of slate-coloured precipitate is increased, but no further change is noticeable.
5. The yellow precipitate is insoluble in ether and alcohol, but is slightly soluble in water, and gives mercurous reactions; it is evidently mercurous nitrate. The slate-coloured precipitate is unaffected by these solvents, but is dissolved by nitric acid, and is apparently mercurous oxide thrown down by the reduction of the mercurial salts in the presence of the foreign oils.
6. A portion of No. 1 treated with ether is found to be entirely soluble; portions of Nos. 2, 3 and 4, similarly treated, are found to be partially soluble only, the precipitates being insoluble.

In view of these reactions, there would be no difficulty in our assuming that substantially the same results would follow in the case of citrine ointment, but for the introduction of the new ingredient, lard. Actual experiment has shown, however, that the analogy is all but complete, as we shall find if we compare the *data* already given with the results obtained when the ointment is prepared at different temperatures, results which explain several phenomena that have not, so far as I am aware, been elucidated, while they tend to reconcile the conflicting statements which have been made regarding this preparation.

Effect of Different Temperatures in the Preparation of Ungt. Hydr. Nitrat.

A. When citrine ointment is prepared at 180° F. we have a beautiful, somewhat transparent, lemon-coloured ointment, of a soft consistence, and soluble in ether.

B. Prepared at 212° F., the ointment is rather less transparent, not quite so soft, and only partially soluble in ether, a small quantity of yellow precipitate being insoluble.

C. Prepared at 300° F., the colour is the same, but the ointment has a denser appearance, and is much harder. The yellow precipitate is, as in the last instance, insoluble in ether.

D. When the olive oil has been adulterated even to the extent of only 5 per cent., the appearance of the ointment is quite changed. Instead of a lemon colour, it has now acquired a distinct greenish hue, while with a larger percentage of foreign oil, this is still further intensified. The red colour visible in the case of the adulterated olive oil is not now so apparent, it being disguised on the one hand by the lard, and on the other by the mercurous oxide.

Coming now to the consideration of these facts, there are three points to which I desire to direct your attention, viz., the composition of the ointment, its colour and consistency, and its liability to deteriorate, regarding all of which there is no little difference of opinion.

I. *Composition.*—Pereira states that "by the action of the fatty bodies on nitrate of mercury, the latter is transformed into a yellow subnitrate of the protoxide of mercury, a small portion of elaïdate of mercury being also formed."*

Christison says the ointment "is believed to be a mixture of oleic and stearic acids, elaïdic acid and nitrate of binoxide of mercury."† Mr. Schacht, in an account of several experiments, says:—"A portion of best ointment treated with a large quantity of ether dissolved entirely. Samples possessing inferior external properties deposited a yellow powder perfectly insoluble in ether, which proved to be nitrate of mercury;"‡ his conclusion, therefore, evidently being that *good* citrine ointment contains *no* nitrate of mercury. Mr. Martindale, adopting, with most other authorities, Pereira's view, states that the ointment "contains a complex mixture of basic nitrate of mercury, elaïdin, fatty acids in combination with mercury, etc."§ These are only a few of the different opinions that might be cited, and the question seems to turn on this point, viz., Does the mercury in citrine ointment really exist in any quantity as nitrate, as the B.P. name implies, or is it entirely combined with the fatty acids? From the results that I have submitted to you it will be apparent that both views may be regarded as being correct. The B.P. directs no definite temperature to be observed, and till it does so pharmacists are left to their own judgment. If one ointment

* Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, April 11, 1883.

* 'Materia Medica,' 2nd edit., p. 769.
† 'Dispensatory,' p. 531.
‡ *Pharm. Journ.*, [1], vol. iv., p. 450.
§ *Pharm. Journ.*, [3], vol. xi., p. 912.

is prepared at 180° F., and another at 212° F., both may be citrine ointment, and excellent preparations, but both cannot strictly be said to be *unguentum hydrargyri nitratis.*

The theory which commends itself to my mind, as accounting for this double result, is that a reaction takes place somewhat after the following manner: The effect of the nitric acid is to resolve the fats into their proximate constituents, viz., glycerine, stearic acid and oleic acid, the latter, according to most authorities, being transformed into elaïdic acid. In the presence of these acids mercuric nitrate is, at a low temperature, split up, the mercury uniting with the elaïdic acid to form elaïdate of mercury. On the temperature being raised this salt is partly decomposed, but the excess of nitric acid being at the same time driven off, there remains only sufficient to combine with the liberated mercury to form mercurous nitrate, which is, as we have already seen, precipitated. Oleate of mercury is practically insoluble in ether, and it is highly probable that the palmitate and stearate will be of a similar nature in this respect, and this has led me to the conclusion that the mercury exists as elaïdate, until that salt is decomposed or partially decomposed by the higher temperature.

Perhaps it is too much to expect that this theory will meet all the difficulties of the case, but I submit it to you, as a probable explanation of the reaction that takes place.

If the ointment is prepared at a low temperature the excess of nitric acid will not be driven off. Most of you, if not all, will have observed an acid liquid at the bottom of the shop jar, or even sweating out of the ointment itself. This is certain to be present if the temperature does not exceed 180° F., and even at 212° F. the excess of acid is occasionally not all driven off. Mr. Donovan* complains of this excess in the B.P. preparation from a therapeutical point of view, and we can easily understand that needless irritation will be caused to a tender surface by its presence.

It is thus possible to have two distinct citrine ointments, the one containing fatty acids, elaïdate of mercury and mercurous nitrate, the other composed of fatty acids, elaïdate of mercury and excess of nitric acid. If we wish to follow Mr. Schacht's idea of a good ointment, we are certain to displease Mr. Donovan by excess of acid; on the other hand, if we eliminate the acid by increasing the temperature we at the same time cause the formation of mercurous nitrate. Further, if it is admitted that the B.P. means the ointment to contain nitrate of mercury in some form it is clear that it ought so to be prepared that it will really be what it professes to be. For these reasons, therefore, it is perfectly evident that the B.P. ought to state the temperature definitely, as until this is done the composition of the ointment is liable to vary, it being quite as likely to be *ungt. hydr. elaïdatis* as *ungt. hydr. nitratis.*

II. *Colour and Consistency.*—I have already anticipated, to a certain extent, the remarks that naturally fall under this head, and would simply repeat that at whatever temperature the ointment is prepared, the lemon colour is the same, provided pure oil is used. The only visible difference is that the lower the temperature the more transparent does the ointment appear to be. If the oil is impure, the colour is darker and of a greenish hue, owing to the action that has been already explained. Ointment prepared at a high temperature, say 300° F., is considerably harder than that prepared at 212° F., or 180° F., though there is little difference between the two latter.

III. *Deterioration.*—If citrine ointment becomes discoloured early, say within a few months, the presumption is that the oil was not pure, always granting, of course, that due precautions had been taken in its manufacture and preservation. This is more especially likely to be the case when the discoloration is homogeneous or regular and the ointment preserves its consistency. We have seen that the mercury is reduced by the action of the foreign oil. This reduction takes places rapidly at a high temperature, but we may justly infer that the same action goes on more slowly at normal temperatures. As an illustration of this, here are two specimens adulterated with equal quantities of the same oil,—10 per cent. rape. The one has been prepared at 180° F., and the other at 212° F., and while the former is of a bright yellow, the latter has the characteristic green hue. An ointment may therefore be satisfactory as regards appearance when it is newly prepared; but this is no guarantee that it will not deteriorate, as I venture to assert this yellow specimen will do ere long. This contingency (of impurity) has been very much overlooked in connection with the ointment, and it is quite possible that to it, rather than to unskilful methods of preparation, is referable in many cases its liability to deteriorate. Mr. Schacht's theory was that the reduction of the mercury was due to the evaporation, in course of time, of the nitric acid; and he proved it so far, by adding acid to a discoloured sample and restoring the ointment to its original appearance. This is correct enough, as far as it goes, because, by adding more acid you merely redissolve the mercurous oxide, and practically re-prepare the ointment; but it does not afford sufficient grounds for the general inference drawn from it. The difficulty lies in the fact that when those adulterated ointments are heated to 212° F., discoloration takes place, while this pure ointment retains its colour though heated to over 300° F. If, in the former case, all the acid has evaporated, much more must this be true in the latter, yet no discoloration is visible; on the contrary, it is, so far as appearance goes, the best specimen on the table.

In concluding this paper, let me say that there should be no difficulty in turning out an elegant and durable preparation by the B.P. process, and I am strongly of opinion that an ointment carefully made with pure oil and good lard, according to the directions there given (interpreting "hot" as at least the boiling point of water), will keep for a very long period indeed, without deteriorating in the slightest. With the exception of this indefiniteness as to temperature, the B.P. formula, which is practically that devised by the late Mr. Duncan, is as near perfection as it possibly can be.

In view of a new edition I would suggest that it be made complete in this respect, and that the temperature fixed ought not to be less than 212° F.—it might with advantage be even more—so that there may be uniformity, not only in the appearance of the ointment, but, what is of more importance, in its composition.

* *Pharm. Journ.*, [2], vol. vi., p. 541.

NAPHTHALIN AS A WOUND-DRESSING.*

BY G. R. FOWLER, M.D.

The most recent, as well as the most promising, addition to our means of combating sepsis in all its varied forms in wound treatment is that which has been brought forward by Lücke, of Strasburg. The agent proposed by Lücke is naphthalin, a product of the distillation of coal-tar, and it is to the claims of this article as an antiseptic in the treatment of wounds that attention is now invited.

Naphthalin, in a pure state, is a white substance, occurring in laminated crystals; its formula is given in works upon chemistry as $C_{10}H_8$. It forms wherever organic bodies, especially those containing an abundance of water, are burned. Coal-tar contains it in large quantities, and it is obtained by subjecting this substance to distillation. It passes over after the coal-oils, and it is produced by passing the vapour of coal-tar through red-hot tubes. It is derived from the residue of gas manufactories, and not unfrequently clogs up our gas pipes. In its crude state it is a brownish-yellow, sand-like substance, containing an indefinite quantity of the phenols. It may be purified by sublimation with charcoal, and, as before stated, when in a pure state is a white crystalline body. It has an odour decidedly like that of coal-tar, and a slightly aromatic taste; its specific gravity is 1·05; it is volatile at any temperature, but melts at about 176° F., and crystallizes upon cooling; it boils at 420° F. It is inflammable, and burns with a lurid, smoky flame. It is but sparingly soluble in water and in the secretions of wounds, but its gaseous vapour is given off readily at the temperature of the body, and especially when in contact with moist surfaces; it is likewise insoluble in alkaline and acid fluids; it is readily dissolved by ether, hot alcohol, hot concentrated sulphuric acid, and the different ethereal and fatty oils. It is deposited from its alcoholic solution in white lamellar iridescent crystals. In the sulphuric acid solution a sulpho-naphthalic acid is formed. Naphthalin combines with chlorine, producing two chlorides; these latter, upon further investigation, may prove serviceable and available as germicides. When exposed to a temperature of 300° F., naphthalin sublimes quite rapidly in thin scales, and the atmosphere of a room can be thoroughly saturated with it in a gaseous state by simply adding some of the crystals to water and heating it. If the latter be continued for some time, naphthalin will be precipitated upon the walls of the apartment. If crystals of naphthalin are simply strewn upon the floor, the same result will take place, only more slowly. Nearly all of the samples obtainable contain more or less of the phenols as an impurity. The following test for pure naphthalin has been suggested by Dr. Schulte, of Strasburg: Dissolve a small quantity of naphthalin in a weak solution of chloride of sodium; heat to a boiling point—cool, and filter. If the filtrate is made slightly acid and a watery solution of bromine is added, phenol being present in small quantities, a milky condition of the fluid appears; if present in larger quantities, a more dense white precipitate, the bromide of phenol, is formed.

Naphthalin produces no poisonous effects upon man and the higher animals when given internally or applied to large absorbing surfaces, but it is most efficiently destructive of low vegetable and animal organisms, such as fungi, spores, small insects, etc. The preservation of meats, after exposure to smoke, is partially due to the influence of this body. It, therefore, belongs to the class of germicides, and bids fair to prove of value as an aseptic and antiseptic in the treatment of wounds.

In my own experience with naphthalin I have noticed that when it is used in an aseptic manner, that is to say, when it is brought in contact with fresh wounds that have never been in a septic condition, they continue in an asceptic, and consequently in a healthy state; and that septic and unhealthy wounds, indolent ulcers, ulcerating cancers, growths, phagedenic chancres, etc., rapidly assume a healthy appearance when its antiseptic action is brought to bear upon them. This is due, without doubt, in the first place to an efficient protection of the wound from septic influences, and in the latter instances to a complete and thorough disinfection of the wound. Its application does not interfere with free drainage from wound surfaces; in a powdered state it may be applied directly to the cavity, or over the parts, after suturing the edges. Serum and blood will percolate through it precisely as they would through sand. As an additional advantage, it does not unite with wound secretions to form crusts or scabs.

I have found, as a simple and convenient method of employing naphthalin, that of using it in substance, finely powdered. After thoroughly disinfecting the wound—if it is not already aseptic—and surrounding parts with a solution of carbolic acid or chloride of zinc, suturing and making proper provision for drainage, I cover the parts to be dressed with a narrow strip of oil-silk previously dipped in a one to forty solution of carbolic acid, and having a perforation here and there to facilitate the egress of whatever secretions may accumulate beneath it, as well as to permit the vapour of the naphthalin to penetrate to the wound itself. This also serves the purpose of preventing the dressings from adhering upon removal. I then make a roll of absorbent cotton about ½ an inch in diameter, and in length sufficient to enclose the wound and an inch or more of the contiguous parts ; this is wrung out of the solution of carbolic acid or chloride of zinc, and disposed as a ring encircling the wound and adjacent surface. Within the space tuhs isolated, I sprinkle the naphthalin in a powdered state to the depth of a quarter of an inch or more, place a dressing of absorbent cotton over it, and apply a muslin roller over all. This dressing is not disturbed until the wound secretions make their appearance through and soil the bandages, or some other indications exist for their removal. In a recent case of Hueter's operation for resection of the head of the first metatarsel bone for hallux valgus, the dressings were first removed at the end of eight days. The parts were in a typically aseptic condition, and only the odour of naphthalin gas pervaded the dressings. In the case of cavities left after operations for the removal of suppurating buboes, necrosed bone, etc., simply packing the cavity in all of its recesses, after thorough disinfection, and applying a dressing of absorbent cotton is found to be sufficient. After operations within the vagina and other natural cavities having outlets, absorbent cotton, in the meshes of which naphthalin has been incorporated, either by saturating it with its ethereal solution and subsequently drying, or simply by rubbing in the powder, may be used. Dressing materials, gauze, etc., may be especially prepared in the same manner as like dressings are prepared containing carbolic acid and iodoform. The method above described possesses the merit of simplicity, however; as to its efficiency, I can bear testimony with great positiveness.

As to the possibility of any dangerous symptoms arising from its free use, I can only say that Lücke and Fischer, of Strasburg, have used it largely, and no disturbances of any kind whatsoever have followed its use. In my clinic at the Bushwick and East Brooklyn Dispensary I have now employed it in a large number of cases, in both young and old, feeble and strong ; filling large cavities and applying it unsparingly, I have always met with the best results following its use, and never with a single untoward sequence. I have found it convenient of employment ; its odour is not more objectionable than that of carbolic acid, and certainly not as disagreeable to the average nostril, nor as difficult to get rid of as that of iodoform.

* From a report read before the Kings Co. Medical Society. From the 'Proceedings.'

DEODORIZED TINCTURE OF OPIUM.*

BY R. ROTHER.

The most important active ingredients contained within a plant are frequently, if not generally, chemically allied, and are either derivatives of one another or of some common source. The odorous constituents, although generally characterized by extreme potency, become most usually dissipated by reason of their volatility, or if not evaporated, are changed by oxidation into less fugitive, less odorous, and also less active resinous bodies. Therefore, many plants when used in the fresh condition have different degrees of activity and quality than when consumed in a dried or in a prepared state. Modern pharmacy has isolated many of these special agents, and in some instances modified or attempted to modify the raw material in such a manner as to cancel or wholly abolish certain objectionable features.

It was found that opium contained a perturbing body, at one time supposed to be alkaloidal, but now presumed to be of a resinous nature. In order to avoid this substance in certain of its preparations, opium or its aqueous extraction was treated with ether, having in view the removal of this noxious impediment. Such a preparation is the so-called deodorized tincture of opium. The fact has been, however, ascertained that aqueous treatment alone, by excluding the resinous matter, yields a deodorized and otherwise analogous product, showing that the washing of the watery extract with ether is superfluous and wasteful. In order to prevent the possible solution of the resinous matter during the extraction of the opium and incidentally avoid the unnecessary ethereal treatment, but especially circumvent the decidedly objectionable and untimely application of heat needed in the extensive evaporation, the writer changed the operation accordingly. Most volatile oils, resins and semi-resins are soluble in fixed oily menstrua, aside from their various special solvents. Hence, the writer concluded that should there be a tendency in any of the opium resins or odorous principles to pass into aqueous solution, the presence of a fixed oily substance would be likely to prevent it. Vaselin was added to the heated mixture of opium and water, but since the vaselin did not promptly solidify in the cooling mixture, spermaceti was further incorporated with desirable effect. So thorough was the extraction of the activity and exclusion of the malodorous matter, and so admirably were the dregs gathered up by the solidifying fat, that the solution permitted of ready removal by simple decantation. The mixed decantates filtered clear and rapidly, and as no evaporation was necessary the tincture could be completed at once by the admixture of the requisite measure of alcohol. This magnificent result, in connection with the speed and facility of the operation and comparative cheapness of the product, encourages the suggestion to abandon the ordinary tincture of opium altogether. Should it be advisable to retain the narcotine remaining in the dregs, a small proportion of dilute sulphuric acid might be used to secure it in the tincture as soluble narcotium sulphate. From these results the following formula for a deodorized tincture of opium is deduced:

Take of

Opium dried and powdered	$2\frac{1}{2}$ troy ounces.
Vaselin, Spermaceti, of each	1 troy ounce.
Alcohol	7 fluid ounces.
Water sufficient.	

Upon the opium contained in a suitable capsule pour 12 to 14 fluid ounces of water and boil the mixture ten to fifteen minutes; then add the spermaceti and vaselin, stir them well together, let the mixture cool, and decant the liquid from the dregs. Upon the residue pour 8 fluid ounces of water, again heat the mixture, stir it well, and, after cooling, decant as before. Repeat this operation once more with 8 fluid ounces of water or sufficient to make the mixed decantates measure 25 fluid ounces. Mix the three decantates, let the mixture become cold, filter, and finally add the alcohol.

* From the *American Journal of Pharmacy*, February, 1883.

SCHIZOMYCETIC FERMENTATION.*

BY G. MARPMANN.

In this paper the author has collected all the facts known concerning the various kinds of fermentation. Specific bacteria fermentation is that in which, by reason of the growth of bacteria, reduction products are formed, whilst oxidation processes by means of the same agents, such as nitrification, are not fermentation. Nencki explains the reducing action of bacteria by their power of decomposing water, one hydrogen-atom of which reduces, whilst the hydroxyl-group is assimilated by the bacteria.

Glycerol.—Fitz describes three glycerol fermentations: (*a*) in the ethyl alcohol fermentation produced by a slender bacillus, probably identical with *B. subtilis*, in which neither butyric nor succinic acid, nor butyl alcohol is formed; neither can this bacillus decompose calcium lactate; (*b*) butyl alcohol alone is produced by a bacillus 0·005–6 mm. long by 0·002 mm. broad; (*c*) succinic acid is never formed by bacilli from glycerol, but Fitz found in blue pus a small micrococcus, which did act in this way. Schulze has found other bacteria, which besides forming ethyl and butyl alcohols, butyric and caproic acids, also produce a phorone of the composition $C_9H_{14}O$.

Tartaric Acid.—According to Gautier, Mediterranean wines under certain conditions rapidly become thick when exposed to the air; the red colour changes to a blue-violet, and a brown deposit is formed, as also acetic and lactic acids; the cause of this is a bacillus of varying length, but 0·0012 mm. broad. König found succinic acid amongst the products of the fermentation of tartaric acid: hydrogen ammonium tartrate yields butyric acid and ethyl butyrate, under the influence of *Ascococcus Billrothii*.

Sugar.—The mass resembling frog spawn, into which beet-sugar juice is frequently converted, is due, according to Cienkowski and v. Tieghem, to *Ascococcus mesenteroïdes* (0·0018–0·002 mm. thick), whereby sugar is converted into cellulose. The lactic ferment of sugar consists of a thin scum, built up of cells 0·001–3 mm. broad, and nearly double as long. These cells are active only as long as oxygen is present: consequently the conversion is indirect. This ferment, described by Boutroux, does not produce succinic acid, but the acid is formed from grape-sugar by *Bacillus amylobacter*, fully described by v. Tieghem. *B. amylobacter* exists in the cells of all milky-juiced plants; a butyric fermentation of albumin is caused by *B. subtilis*.

Nitrogenous Matter.—Normal urine is decomposed by *Micrococcus ureæ* (0·00125–0·002 mm. broad) with formation of ammonium carbonate; pathological urine is affected by other bacteria. The most important fermentation of albuminous matter is occasioned by *Bacterium Termo* (0·0015–0·002 mm. long), and it is this bacterium which induces the decay of all organic matter, and to which, as preserving the balance between animal and vegetable matter, our thanks are due. All the other schizomycetes are in some way or another harmful to us.

Ptomaines are produced by bacteria as yet undescribed, and the same bacteria also produce phenol, which is remarkable, as phenol is detrimental to their existence; also in decaying matter phenylpropionic and phenylactic acids, indol, cresol and scatol, etc., have been found. Reference is made to various fermentations, and to *Dispora caucasica*, which forms "kephir."

* From *Arch. Pharm.*, [3], xx., 664–673. Reprinted from the *Journal of the Chemical Society*, March, 1883.

The Pharmaceutical Journal.

SATURDAY, APRIL 21, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE PHARMACY ACTS AMENDMENT BILL.

In addition to the various expressions of general approval of the draft Pharmacy Bill that have already been agreed to by local associations, it will be seen from the reports published in this week's Journal that the Manchester Chemists and Druggists' Association and Chemists' Assistants' Association have signified their concurrence with the decision already arrived at in other local centres, with some few suggestions as to particular details. The meeting of the Manchester Association on the occasion referred to does not, indeed, appear to have been very numerously attended, if we may judge from the remark of the chairman, Mr. W. WILKINSON, that he had hoped to have seen a larger attendance in response to the invitation which had been issued to every chemist whose name appears in the Manchester Directory, and to the assistants and apprentices engaged in the trade. This circumstance might be construed as indicating an absence of any desire to object to the suggested provisions of the Bill, and as justifying the inference that they are regarded favourably; but even in that case it would have been desirable that an expression of opinion at so influential a centre as Manchester should have been supported by a greater number of those directly interested in the proposed legislation. There is, however, some reason to fear that a spirit of indifference was the real cause of the small attendance at the meeting, and that on this occasion as well as a former meeting, the men whose business it is to have regard for the interests of pharmacy were "not equal to the occasion," as Mr. WOOLLEY remarked at a late meeting of Council when speaking of the meagre response to the call for a meeting in Manchester, to consider the Pharmacy Bill. We can but express our regret that such should be the case at a time when united and consistent efforts on the part of members of the trade are so much needed.

Passing on to the actual proceedings of the Manchester meeting, the first point referred to is the proposed schedule of "poisonous articles," and though this part of the Bill was not definitely objected to, regret was expressed that it had been thought necessary "to introduce the principle of allowing unregistered persons to sell 'poisonous' articles." These words, quoted from the report of the meeting, put a construction upon the provisions of the second clause of the Bill which is somewhat erroneous and decidedly inconsistent with the fact that unregistered persons being now entitled, as they always have been, to sell the articles in question, no permission is needed for their continuing to do so. It would, indeed, be difficult, from a pharmaceutical point of view, to find any reason for attempting to interfere with established usage in that respect, and as a matter of political economy we should certainly not expect any such reason to be discovered at Manchester.

The real purport of the second clause of the Bill is not to grant permission to sell certain articles, but to regulate the sale of them out of regard for public safety, that being the only consideration upon which such a step can be submitted to the notice of the Legislature. The regret expressed at the Manchester meeting is therefore based upon a misconception of the true nature of the clause in question, no less than upon the erroneous assumption that the particular articles to which the clause would apply are part of the materia medica which appertain exclusively to the practice of the arts of pharmacy and medicine. The unfortunately mixed nature of the business carried on by chemists and druggists is no doubt, to some extent, an explanation of the erroneous opinion conveyed by the above expression of regret at the meeting in Manchester, but it is to be hoped that on reflection it will become evident that it is not by regretting or objecting to a provision for the public good that the trade interests of pharmacy are to be promoted.

Among the other suggestions put forward at the Manchester meeting, three relate to matters of detail, which could well be dealt with satisfactorily in Committee, if the Bill should ever arrive at that stage of maturity, and we therefore refrain from any comment on them. The last suggestion as to the title of Fellow of the Pharmaceutical Society being granted to pharmaceutical chemists who have passed or may pass the Major examination prior to January, 1886, and to those who may after that time pass a higher examination than that provided for in clause 16 of the Bill, is in accord with an opinion that appears to have prevailed at the meeting of the Chemists' Assistants' Association, and is one that merits careful consideration; for while we would deprecate any step tending to increase the present confusion of titles and signs of qualification, and would gladly see the title of "pharmaceutical chemist" made the qualifying title, it must be admitted that there is reason for giving all possible recognition to the voluntary action by which that title has hitherto been acquired.

The papers of Messrs. FRAZER and GILES, dealing with the subject from two diametrically opposite points of view, are in themselves so copious as to render any comment upon them superfluous.

SOLAR PHYSICS.

Eight years have now elapsed since the Royal Commission on Scientific Instruction and the Advancement of Science recommended the establishment by the State of an observatory for solar physics, which led, four years afterwards, to the appointment of a "Solar Physics Committee" and to the first grant of public money being made to be spent in this direction. During this time a growing interest has been manifested in investigations as to the constitution of the sun, and especially those dealing with the phenomena of sun spots and their possible influence upon this planet, concerning which speculation has sometimes run rather wild. A Report just issued shows that the Committee on Solar Physics is now vigorously grappling with the subject, and although the work done by it up to the present time has consisted principally in organization with a view to securing future results, the programme set forth covers a wide area and deals with more subjects than can even be mentioned here. There are, however, one or two passages in the Report to which reference may be made, and especially some "conclusions" of the Committee respecting solar phenomena—based upon the evidence furnished by series of sun pictures—which are, to a great extent, confirmatory of opinions previously expressed.

It appears probable that the varying phenomena of the sun's disc represent the play of a huge system of convection currents, the darker patches, or "spots," being the manifestation of gigantic down currents of comparatively cold matter from above, whilst "faculæ" and "red flames" may denote the corresponding up rush of hot matter from beneath. These convection currents would seem to be always present on the sun's surface, though the scale of the phenomena and the rapidity of the motion are on occasions greatly increased, giving rise then to the complex appearance which is associated with the outbreak of sun-spots. It is thought that it is in virtue of this convection system that a sufficiency of intensely heated matter is brought to the surface of the sun to supply the enormous quantity of radiant energy which it gives out continuously. It would therefore seem to follow that the amount of radiation from the sun's disc would be affected by the relative vigour of this convection system. All observations tend to the demonstration that greater agitation of the sun's atmosphere is coincident with epochs of maximum sun-spot frequency, and the results of some spectroscopic investigations by Mr. Norman Lockyer allow of the conclusion that at such times certain definite levels of the solar atmosphere are heated to a peculiarly high temperature. Further spectroscopic observations are required to clear up this point, but the evidence presented by the sun itself appears on the whole to be in favour of the above inference, and shows that our luminary is really most energetic in its radiation at periods of maximum sun-spot frequency. But it does not follow that this increased radiant energy of the sun always results in an increase of the temperature of the earth; for there are indications that it is also coincident with an increase in the number of great terrestrial atmospheric disturbances, and in some localities with an excessive rainfall, which would tend to lower the temperature. It is evident, however, that should this inequality of the sun's power prove to exercise any definite influence upon the meteorology of the earth, it would become of great importance to be able by the analysis of a sufficiently extensive series of sun-spot records to arrive at a true knowledge of the law of the sun's variability, so as to allow of the state of the sun in any future year being approximately foretold. The collection and collation of such records will therefore form an important branch of the future work of the Committee.

It is well known that Mr. Norman Lockyer has put forward views concerning the nature of the solar atmosphere, based upon his spectroscopic work, which are not in accord with those held by previous observers. Briefly, the ordinary theory is that the atmosphere of the sun is formed by a series of concentric layers of different elementary bodies, passing inwards from hydrogen, through a number of other elements common to the earth, to the "reversing layer" in which are present a large number of metals, and that the spectrum, which in the outer reaches is of extreme simplicity, gradually becomes more complex, because as fresh layers are encountered the outer ones do not die out, but are continued down to the photosphere. Mr. Lockyer, on the other hand, supposes that at the temperature of the sun the chemical elements with which we are acquainted are broken up into finer groups of matter, and that the terrestrial elements, if they exist at all in the sun, only exist in the outer, and therefore colder parts of the sun's atmosphere, from whence the vertical currents of the sun bring down the formed material to be dissociated in the lower reaches, after which, by virtue of its consequent reduced density, it reascends to again become formed material at the appropriate heat level. If the atmosphere were quite tranquil, and the spectrum of a section of it could be examined, Mr. Lockyer believes it would be seen to be divided into an almost innumerable number of layers, each with its appropriate spectrum, not extending very far above or below its normal position, as held in the previous theory, but confined to one heat level, whilst the spectrum would appear simpler as the photosphere was approached from without. The metallic elements, instead of existing as such in a so-called "reversing layer", resting on the photosphere, undergo, as previously stated, entire dissociation there; whilst their germs, becoming distributed throughout the atmosphere, cause the molecular grouping to grow more complex as the distance from the region of greatest heat increases. The appearance, under these conditions, in the spectrum of the sun, of FRAUNHOFER lines which are recognized as being characteristic of any particular terestrial element, Mr. LOCKYER explains by supposing that such a spectrum does not result from the vibration of the molecules of the particular element existing as such at any given height in the sun's atmosphere, but results from an integration of the vibration of the "germs" of that element existing, perhaps distributed, from the top of the atmosphere to the bottom. Professor STEWART suggests that if solar phenomena are correctly represented by this hypothesis, the alternate association at high, and dissociation at low levels of solar elementary matter would be expected greatly to increase the intensity of the solar convection currents, and thus the enormously strong currents which observation reveals might find a ready explanation.

With respect to the influence of the state of the sun upon the magnetism of the earth, there can be no doubt that the diurnal range of the earth's magnetism is greatest when there are most sun spots, and that there are at such times an unusually large number of magnetic storms with their accompaniments in the form of earth currents and auroral displays. From the fact, however, that the fluctuations in diurnal ranges, as a rule, lag in point of time behind the solar influences which produce them, it is inferred that they are not produced directly by solar magnetic influences, but indirectly by solar radiation. At present we can only mention that this may find an explanation in a new theory which Professor STOKES has propounded as to the connection between solar activity and auroræ, magnetic disturbances and earth currents, according to which auroral discharges are the immediate excitants of earth currents and magnetic disturbances.

Allusion was recently made in this Journal to the ludicrous position created by the circulation of volunteered reports on the water supplied to the metropolis. The subject was on Monday evening brought before the House of Commons in a question put by Mr. Firth to the President of the Local Government Board, as to whether his attention had been called to the fact that every month reports of London analysts on the character of London water, purporting to be addressed to him, were widely circulated, although not authorized or paid for by his department, but by the water companies, and whether as such a form of report was calculated to mislead the public and to give an appearance of official authenticity not consistent with fact he would either decline to receive any more of such reports or require their form to be altered. Sir Charles Dilke, in reply, said he agreed in thinking that such reports, purporting to be addressed to the President of the Local Government Board, are misleading, and that he should expect that after this expression of opinion they would be discontinued.

In order to grapple with the difficulty experienced in establishing a uniform system of pharmaceutical education in the Australasian colonies, so that the certificates granted by the different local pharmacy boards may become interchangeable, Mr. C. R. Blackett has suggested the holding of a conference in which the pharmacists of these colonies shall be represented. There appears to be considerable probability that the suggestion will be carried out.

* * *

At the date of the latest advices new Bills for the regulation of the practice of pharmacy were before the Parliaments of Queensland and New South Wales, whilst in New Zealand the Pharmacy Board was contemplating attempting some amendment of the Act at present in force in that colony.

* * *

At the recent "commencement" services of the Philadelphia College of Pharmacy, as the result of the examination held at the end of the term 1882–83, the degree of "graduate in pharmacy" was conferred upon 153 persons, including one lady. This was said to represent the largest proportion of passes of the largest graduating class, numbering 160, in the experience of the institution, which has now sent out upwards of two thousand graduates.

* * *

Although not on quite so large a scale, the operations of the New York College of Pharmacy are by no means insignificant, the last session having furnished 63 successful candidates for the degree of "graduate."

* * *

A new edition of the well-known 'Dispensatory of the United States' (Wood and Bache) has just been issued by J. B. Lippincott and Co., of Philadelphia. The work has been revised and to a great extent rewritten, to bring it into accord with the new edition of the United States Pharmacopœia, by Dr. H. C. Wood, Professor J. P. Remington and Professor S. P. Sadtler, and it speaks well for the energy of these gentlemen that although some new rivals have been announced they have been able to bring this standard work of about two thousand pages first into the field. We hope to have an opportunity on a future occasion of noticing the work more in detail.

* * *

Her Majesty has been pleased to confer the honour of knighthood upon Professor F. A. Abel, F.R.S., Dr. Lyon Playfair, F.R.S., and Dr. C. W. Siemens, F.R.S.

* * *

On Monday evening next, Professor Osborne Reynolds, F.R.S., will deliver before the Society of Arts the first of three lectures on "The Transmission of Energy." The lectures will constitute the fourth course of Cantor Lectures for the present session.

* * *

A meeting of the School of Pharmacy Students' Association will be held on Thursday, April 26, at 8 p.m., when a communication will be read on "The Synthesis of Uric Acid," by Mr. T. S. Dymond. Mr. Cripps will read a note on "The United States Pharmacopœia Process for the Estimation of Hydrocyanic Acid," and a "Report upon Pharmacology" will be made by Mr. H. G. Greenish.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

EVENING MEETING.

The last meeting of this session was held in the Society's rooms, 119A, George Street, Edinburgh, on the evening of Wednesday, April 11, at 9 o'clock.

Mr. Alexander Napier, President of the Branch, in the chair.

The minutes of the former meeting were read and confirmed.

The following donations to the Library were then announced:—

Register and Report of the Pharmacy Board of Victoria, 1883.
From the SECRETARY AND REGISTRAR.

Elementa Chemiæ, Hermani Boerhaave. 2 volumes. London, 1732.
From Mr. FRED STEPHENSON, Edinburgh.

Morphology and Physiology of the Cell, recent contributions to our knowledge of. By Patrick Geddes, F.R.S.E. 2 copies. From the AUTHOR.

On the motion of the President a cordial vote of thanks was accorded to the donors.

Mr. Thomas Maben then read a paper on—

THE PREPARATION AND COMPOSITION OF UNGUENTUM HYDRARGYRI NITRATIS.

The paper is printed on p. 857 and gave rise to the following discussion:—

The President, in moving a vote thanks to the author, said that the ointment had always been a troublesome one, but from what had been said by Mr. Maben it appeared possible to prepare an ointment of unvarying composition, provided that certain precautions were taken. He hoped that the members would freely express their opinions on the subject.

Dr. Inglis Clark said that the paper was one of great practical value, the subject having been wrought out in a way which had not been previously done, at least so far as the influence effected by the impurities was concerned. Referring to the impurities, he mentioned that this matter had already been drawn attention to in this Journal, and showed how imperative it is to ensure purity of the oil. Regarding the question as to whether discoloration is due to deficiency or excess of nitric acid, he pointed out that any advantage due to excess of acid and high temperature could also be had by using less acid with a lower temperature, and suggested that in addition to designating the temperature at which the action should take place, the B.P. should also reduce the quantity of acid to about 9½ ounces. The way in which Mr. Maben had explained the formation of mercurous nitrate was exceedingly interesting; it was evident from the insolubility of mercurous salts in ether, that the nitrate was not present in the ointment prepared at a low temperature. Altogether the paper was an able contribution to the literature of the subject, while it commended itself for its thoroughly practical nature.

Mr. Stephenson said that he was struck with the three specimens of ointment prepared from pure oil at different temperatures. That prepared at 300° appeared to be the best. It should not be forgotten, he said, that the Pharmacopœia did practically recognize a temperature in ordering the liquids to be mixed while hot, and if frothing did not take place to apply heat until the mixture did so. Speaking from his own experience he could say that the frothing took place at different temperatures, but the particular frothing which accompanied a well-made article took place, he was sure, at a higher temperature than 212°; probably 300° was nearer the mark. But independent of all this care the ointment did deteriorate, not on the surface, but through the lower layers, so to speak. Regarding the use of oils other than olive oil, he said that he had experimented with fine palm oil, which gave a beautiful ointment, and with trotter and neatsfoot oil, from the former of which he got a good result. The remarks regarding the existence of elaidate of mercury in this ointment were very interesting, and he hoped that it would be determined whether the mercury should be in combination with elaidic acid or nitric acid, or with both.

Mr. Gilmour said that the paper was interesting apart from its relation to citrine ointment; it contained some valuable reference to the effect of an acid solution of mercuric nitrate on oils, and he hoped that the author would continue this portion of his work on the drying as well as the non-drying oils. He had noticed in several experiments in oil-testing that when the oil was at a lower temperature than the acid solution, there was a material difference between the result so got, and that obtained when the temperatures were equal and high. On this point he would like to hear the opinion of the author of the paper.

Dr. Clark, in asking Mr. Maben if he had any experience of the use of vaseline in the preparation of the ointment, said that of late several medical men had prescribed such an ointment, and as it had been stated that it is very satisfactory and permanent, pharmacists had to do their best to produce a good-looking article. It had already been pointed out that an ointment made with vaseline could not have a similar composition (so far as mercury salts were concerned) to the Pharmacopœial preparation, but he might say that the ingredients did not even form a homogeneous mixture, also having the objectionable property of great acidity. Again referring to the question of temperature, he remarked that it was only necessary to melt the lard in the oil by means of a water-bath, and using 9½ ozs. of nitric acid to add the mercury solution cold, when abundant frothing took place during five or six minutes, the result being a very satisfactory ointment.

Mr. Stephenson said that he could speak of the use of vaseline from experience. He got a nice smooth, though high coloured ointment by using it, but on standing a few weeks he was surprised on going to it one day to find that its bulk had increased very much, the lid of the pot being forced up. He had no hesitation whatever in saying that the proposal was thoroughly unworkable.

Dr. Stevenson Macadam, on the invitation of the President, said that he was afraid he could not throw much light on the subject, having come in late and lost the more important points of the paper; but he wished to express his gratification at finding an old pupil continuing his studies in so practical a manner.

Mr. Maben, in thanking the meeting for the manner in which his communication had been received, said that he had seen the letter to which Dr. Clark had referred, the writer of which expected an ointment made with adulterated oil to be of an orange colour; this was a natural assumption, but experiment showed that the colour would be blue or green, according to the extent of the adulteration. Regarding the excess of acid, he would only repeat his opinion, that an excess was required to decompose olein into elaidin, and further that a high temperature is better than a lower for effecting the whole series of decompositions taking place in a well-made ointment. In reply to Mr. Gilmour, he said that he maintained the temperature until all action ceased. He had experimented with all the known adulterations of olive oil, and being still engaged in the work he would take advantage of the hint thrown out. Mr. Stephenson's experience of the use of vaseline so well refuted the statements of its suitability that he required to add nothing to what he had said. The suggestion was quite an unscientific one.

Mr. Patrick Geddes, F.R.S.E., then delivered a lecture on the "History and Present State of the Cell Theory," and the President of the Branch closed the session by a few valedictory remarks. The lecture and other business will be reported next week.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

THE PROPOSED CHANGES IN THE PHARMACY ACT OF 1868, AND IN THE EDUCATIONAL SYSTEM OF THE PHARMACEUTICAL SOCIETY, TOGETHER WITH SOME REMARKS ON THE PRESENT POSITION OF PHARMACY.

BY DANIEL FRAZER.

(*Concluded from page* 850.)

Having thus gone over the contents of the Bill, as well as noticed the omissions just discussed, I would like, with your permission, before proceeding to sum up and give my judgment on the case before you, to make some remarks on the present educational proposals of the London Council.

The report of the Committee on the Relation between Pharmaceutical Education and the Pharmaceutical Examinations was discussed and generally adopted by the Council exactly a year ago (see Journal of April 15, 1882). The report then carried was remitted to the original Committee to put into a practical form. The resulting report was laid before our Council on March 7, last, and adopted, after considerable discussion. I will now notice some of the more important innovations or novelties embraced in these reports, and leave you very much to form your own conclusions as to their practicability.

The most important of these is the sought-for establishment of a curriculum. This is to consist of sixty lectures in Chemistry and twenty on Physics relating to it—eighty in all, forty-eight lectures on Botany and forty lectures on Materia Medica; each of these lectures must occupy at least one hour in delivery. In addition to the lectures there is to be a three months' attendance at Practical Chemistry of not less than five hours a day. Some of the things embraced in this curriculum are such as these:—The Laws of Gravitation—Cohesion—Adhesion—Elasticity—Molecular Attraction — Comparative Hardness of Bodies—Physical Condition of Gases—Mariotte's Law—Light: its Nature—Polarized Light—The Spectroscope and its Uses—the Making of Barometers and Thermometers, etc. The time over which the curriculum is to extend—

Ten months	Two hours daily.
Five months	Three hours daily.
or	
Three months	Five hours daily.

All the recommendations embraced in both reports are, when finally adopted, to be "incorporated into the bye-laws, according to existing regulations, and to come into force on and after December 31, 1887."

In addition to the innovation of the curriculum itself there is the one already referred to in the first part of this lecture—the one rendering it necessary that the student attend in open shop for three years *after* registration before he can go up for the *first portion* of the qualifying examination. There is also this further innovation—*one year* at least must elapse between the passing of the *first part* of the qualifying examination and the date at which the candidate can enter for the second part of it.

All that I will add here is that in both the discussions that took place in the Council when these reports were submitted to it Messrs. Williams and Hampson maintained that the powers sought in respect to the age of the candidate, and to the breaking up of the examination into two parts, are illegal, and beyond the powers of the Council. On this point Mr. Williams is reported to have said:—"Probably certain clauses had been put into the new draft Bill which had been submitted for the approval of the Council at their last meeting with the view of enabling the Council to alter the examinations in the way indicated, but at present he was quite clear the Council had no legal power to do so; and so on that ground alone he should feel bound to vote against these recommendations."*

Mr. Hampson is reported to have said that "he believed the Act of Parliament had been unduly stretched already in imposing the condition that a candidate should be twenty-one, which was distinctly illegal, in his opinion;† and the division of the examination into two parts, as now proposed, he believed was utterly beyond the powers the Society now possessed."

I will not insult you by offering a single argument in vindication of my own, and, I hope, your condemnation of the curriculum and all its belongings.‡ But I do add this, my intense regret that Messrs. Hampson and Williams, in their opposition to even a portion of the recommendations—that of dividing the examinations into two portions—had not the support of our much respected representatives, Messrs. Young and Borland.

In connection with the proposed changes in our educational arrangements, I here seek your indulgence for a very few minutes while I attempt to give a brief summary of proposals on the subject, emanating from a gentleman outside the Council and even of the Society itself, but who is of much, and most deserved, influence with most, if not all, its members. These proposals reached the members of Council in the form of a printed letter in the autumn of 1881—after the withdrawal of the proposed Pharmacy Bill of that year. This letter has not been published, and may, so far as my knowledge is concerned, have since then been withdrawn or been superseded by a later and a quite different one.

The following are some of the recommendations contained in the letter:—

Preliminary Examination.—"This examination should be increased in scope and stringency. The following should be added to the present subjects of examination:—Algebra, Euclid, and French or German."

Minor Examination.—This is to qualify for "assistants" only, and the *Minor* shall not be permitted to be registered as a chemist and druggist as heretofore, nor to "commence business on his own account."

* Mr. Williams, in the debate on the educational proposals in April last year, is reported to have said that he "need not say that the examinations to be carried out under the scheme proposed would be of a totally different character to that ever contemplated by Parliament when the Pharmacy Act was passed. Mr. Schacht might say it was only one examination, but he contended it was distinctly three, and he could not mould three into one. He was quite sure it was never contemplated by Parliament when the Pharmacy Act was passed. They had already stretched the Act a long way when they made the original alteration of introducing the Preliminary examination and insisting that there should be three years between that and the Minor."

† Better late than never. When this restriction on the age of the candidate was proposed, my own hand was the only one held up against it. Mr. Mackay offered to second my motion if I would have accepted twenty years as the age, instead of putting no restrictions at all, as I wished. I have no access at present to a report of this meeting, but feel sure that the facts are as stated. If wrong I will be most happy to be put right.

‡ The Home Secretary and the Postmaster General are lecturers or professors in Cambridge. Does anybody know how many students attend their lectures, or, for that matter, anybody else's lectures there? There are lectures in the Middle Temple. How many who pass their examinations and become full-fledged barristers attend a single lecture there or elsewhere? Is it not the fact, that in the great majority of cases in Cambridge the whole work is done by a series of examinations? Is it not the case, that a man may, and sometimes does, pass all the examinations of the Temple, not only without attending any law lectures anywhere, but without being necessarily once in a law office or court? If it be so in these cases, how can the necessity of a curriculum for the pharmacist be vindicated before the Privy Council?

Major Examination.—Some knowledge of microscopy to be added to it.

Fees.

	£	s.	d.
Preliminary	3	3	0
Minor, as above	6	6	0
Major	6	6	0
Total Examination Fees . .	15	15	0
Life Membership Ticket .	5	5	0
(Or Annual Subscription, £1 1s.)			
	21	0	0

"'Assistants'—that is persons who have only passed the Minor examinations—should not be permitted to carry on business on their own account or to manage a branch business, or the business of a deceased registered person for executors, etc."*

The close of the paragraph from which I have just quoted is as follows:—"The names of 'pharmaceutical chemists only' should therefore be published in the official register of persons entitled to carry on business, except those chemists and druggists already on the register."

The writer of the letter further suggested as a possibility, but does not recommend it, that in case the existing Minors might complain of the proposed change, "they might be permitted to qualify as pharmaceutical chemists by passing a somewhat modified examination, provided that was passed within a certain time—say one year."

As I think I can safely leave you to form your own conclusions as to the recommendations just quoted, I do not add what mine are, but leave them to be guessed at; and I do so with full confidence that all here at least will guess aright.

I wonder whether some of you are thinking of Cowlairs and Queen Street Stations, and of the rope that unites the two? It cannot surprise me though you were so thinking, for my yarn on the Pharmacy Acts Amendment Bill has been so spun out that even I, myself, had begun to think that it might turn out to be as endless as that often-circling but never-ending rope. But the longest lane has always a turning, and my story will have an ending. The only difficulty I now feel is, which of the many strands of my wearisome yarn should first be dealt with. As "the safety of the public" is the ground on which the present demand for further legislation in pharmaceutical matters is demanded, it had better come first in our review.

On this point, then, I demur to the assertion that the "public safety" calls for such further legislation as our Council is now seeking. I do not think it does, and I ask what evidence can be produced that it does? Have the public demanded it? Has the press advocated it? Certainly not. The Veterinary College at Lincoln, an ill-informed coroner here and there at long intervals, and an excitable doctor whose patients ventured to doctor themselves rather than trust him with their case, neither singly or unitedly, form "the public" for whom laws are passed by Parliament. Is there a particle of evidence to prove that the "safety of the public" has been jeopardized through the defective education of the existing pharmacists of the country? I unhesitatingly say no. And if this be so with us—thirteen or fourteen pharmacists of all ranks—how is it with the non-pharmacists who have invaded our territory? Has our most able law-adviser, Mr. Flux, has the indomitable Mr. Barclay, with all the lynx-eyedness of himself and of Mr. Haydon, been able to bring before the country any evidence of the abuse of the trust awarded by law to the stores for the selling of "poisons" and the dispensing of "medical prescriptions?" I answer:—I believe that no such evidence is producible. We may, therefore, dismiss the plea of the "safety of the public" as calling for this Bill.

"Protection of Trade" may probably be thought by many of you a fitting theme to be here dealt with. There is no theme so popular with the letter-writers in the Journal of the Society. When anything goes wrong—when the inevitable corn is trod upon, or when the pharmaceutic shoe pinches anywhere, up goes a letter to the Journal or to the *Chemist and Druggist* asking why the Council takes no steps to protect the interests of the afflicted letter-writers.

For a very simple reason. The Council are helpless in most of the cases for which their support is invoked. The Council can only step into the breach when the law has been invaded. So it is with Parliament. Parliament will only step in in the interest of the public, and not in that of the pharmacist. If there is any conflict at any time between these two interests, that of the pharmacist will undoubtedly go to the wall and that of the public will be cared for.

What led to the enactment of the Irish Act of 1875? Let it speak for itself:—"And whereas, a great deficiency exists throughout Ireland of establishments and shops for the sale of medicines and compounding of prescriptions, and great inconvenience thereby arises to the public in many parts of the country," etc.

How did this deficiency in the supply of shops and establishments for the supply of medicines and the making-up of prescriptions arise? Through the over-education and the over-protection of Irish apothecaries. The education to qualify for passing was so high and so expensive that few entered the ranks, and there were whole districts and villages without apothecaries. Coupled with this was the strict protection to the apothecaries in the compounding of "medical prescriptions." There were druggists in abundance everywhere, but none of them had this privilege; and hence the "great inconvenience" to which the public were subjected, and which led to the passing of the Irish Act.

"Like causes produce like results."

It is to a like restriction in this country that the present policy of our Council is directly tending. I strongly oppose the increasing of the stringency of the present examinations and the increased cost of them, on two grounds. First. Because I believe they are high enough already. I again insist upon it that no case has been made out for an increase in the character or the cost of the examinations. Second. I oppose the increase because of its inevitably thinning our ranks—that thinning that has begun to attract the attention of those of our number who ever give such matters even a passing thought. That this thinning process will go on as a sequence to the passing of the present Bill—if it ever be carried—is not denied by even our officials. The Vice-President of the Council, Mr. Atkins, at a late dinner of the London assistants, and where Mr. Carteighe presided, is reported to have said that "he was glad to address young men—the assistants of to-day but the pharmacists of to-morrow. He envied them their age. He thought that whatever might be the changes of the future there were fair days in store for them. Their numbers might be reduced, but there would be a more elevated few possessing a higher degree of culture."

Yes, the "upper ten" of our ranks perchance may become the "upper five." Such a policy may profit the wealthier houses, but it will assuredly injure their less fortunate brethern. I do not say that this is the aim of the promoters of the measure under discussion, but I most unhesitatingly affirm that this will be the result. The toilers and moilers—the rank and file of the Society—unable to procure apprentices or assistants to carry on their business, will be left out in "the race for riches;" and they going to the wall, the "upper ten" or the "upper five," as the case may be, will get one portion of their lost trade, and the store and the grocer will get the balance!

* The etcetera here means the widow and orphan children of the deceased!!

The Government, warned by the effect of the restrictive principle in operation in Ireland before the passing of their Pharmacy Act, will take care that no such restriction shall be allowed in this country.

The London *Times* (February 14, 1881), writing on the then proposed Medical Amendment Act, wrote:—

"The Bill of Mr. Hardcastle is one which no British Parliament could ever sanction. Under the disguise of providing for *medical education*, it is a measure of scarcely veiled trades unionism," etc.

Were our Amendment Bill to reach the stage which Mr. Hardcastle's did, could the *Times* more accurately or concisely describe it than by applying this very language towards it? Especially applicable would this description of it be were it applied in connection with the educational proposals of the Council. And if so applied to it, how long could you expect it to survive the castigation? Rather than run such a risk, better even yet, I say, withdraw the Bill; and instead of acting on the educational resolutions so lately adopted, pass one to reduce the Preliminary fee to £1 1*s*., and to make the Minor the only pass examination needed to qualify as "pharmaceutical chemists."

Soberly and seriously I mean all this, and had our Councillors but the faith to try the experiment, sure I am they would ere long see a more contented and better-to-do constituency than they can hope to see under the "spotless ideal" scheme of education that Mr. Schacht considers so "exactly correct."

Though last, not least, the stores must not be overlooked in my summing up. I have already so largely referred to them that what I add here need not detain us long. We cannot close them; we must rest content with their existing side by side with us. Is their existence an unmixed evil after all? I think not. The underlying principle on which they are conducted, and which has led to their success as trading companies, is the "ready cash" one; no credit given, no day-books kept. This may lead to a large measure of reform in this matter with others, and if so, we may share the common good derived by others through the operation of the principle of ready cash, small profits and quick returns. When an omnibus proprietor wishes to run an opponent's 'bus off the line he runs one of his own right in front of it and one behind. Well, you find that the stores are underselling you in proprietary and other articles. They are selling our specialties at rates that can yield them such bare returns for the capital invested, that I do not despair of their giving up very large portions of it. Meanwhile they are making rich by having remunerative prices for the staple articles of their trade. You add some of these to your business and undersell the stores in them. Do not attempt to compete with them in selling your own standard articles at prices under those of their own makers, because if you do you will gain nothing by it. On such a topic, the just remuneration of us pharmacists, ponder well the wise words of the old Glasgow citizen and professor, Adam Smith.*

* "Apothecaries' profit is become a bye-word, denoting something uncommonly extravagant. This great apparent profit, however, is frequently no more than the reasonable wages of labour. The skill of an apothecary is a much nicer and more delicate matter than that of any artificer whatever; and the trust which is reposed in him is of much greater importance. He is the physician of the poor in all cases, and of the rich when the distress or danger is not very great. His reward, therefore, ought to be suitable to his skill and his trust, and it arises generally from the price at which he sells his drugs. But the whole drugs which the best employed apothecary, in a large market town, will sell in a year, may not perhaps cost him about £30 or £40. Though he should sell them, therefore, for £300 or £400, or at a 1000 per cent. profit, this may frequently be no more than the reasonable wages of his labour charged, in the only way in which he can charge them, upon the price of his drugs. The greater part of the apparent profit is real wages disguised in the garb of profit."—'Wealth of Nations,' book 1, cap. 10.

Every dog has its day, and the stores are having their days of prosperity just now; but days of adversity are sure to come to them, as they do to all some time or other. Very many of the stores started under most favourable auspices have had to close their doors, and be sure, there are "more to follow." But do believe this—they will not be put down through any action of Parliament. So do not invoke its aid for such a purpose until you can prove that by shutting the stores and drug-dealing grocers up you will thereby be acting in the interests of the public, and not in your own merely. I have one more morsel of comfort to give you on this subject. Stores are not new—they have been born and they have died in the past, as they will doubtless do in the future. Here is the advertisement of one of these, exactly as it appeared in the columns of the *Glasgow Mercury*, of December 1, 1789:—

JOHN SWANSTON,

At his Shop a little West from the Candleriggs,

BEGS leave to acquaint his Friends and the Public, that he has just now imported, from the first markets in Britain, a complete Assortment of the following Articles, which he is selling, WHOLESALE and RETAIL, at very moderate prices, for ready money.

A parcel of fine Bohea, Congou, Souchong, Hyson, Gunpowder TEAS, in the original packages, from the Indiahouse.

Lemons, China Oranges, Wine Grapes, St. Katharine's Prunes, Turkey Figs, Jar and Muscatel Raisins, Currants, Almonds, Pistachia Nuts, Cashue Nuts, and Walnuts——Fine ENGLISH SUGARS, best Raw and Powder Sugars——Refined Liquorice in small boxes.——Patent Cocoa, Cocoa Shells, Churchman's Patent——Chocolate, Best Raw and Ground Coffee.—Red and White Port, Lisbon, and Sherry WINES—Florence Oil—Best French and English Vinegars—Pickled Mushrooms, Walnuts, Capers, Cucumbers, and French Beans; India Soy, Mushroom Ketchup, French Olives, Anchovies.—SPICERIES of all kinds.—Truffels and Morrels, Best Mustard, Hartshorn Shavings, Maccaronie, Vermicelli, Rice whole and ground, French Barley, Saloop, Sago, Millet, Isinglass, Basket Salt—Best French and Poland Starch, Blues of all kinds—Best Wax and Sparmaceti Candles, all sizes, Green and White Wax Tapers, Mogul Cards; Spanish Door Mats; Punch Ladles and Strainers.

Bailie's Patent Blacking Cakes, BING's and WALKER's Blacking Balls—A neat assortment of GLASSWARE—CONFECTIONERY of all kinds, Citron, Orange, and Lemon Peel, Red and Black Current Jellies, Marmalade, and Virgin Honey.—Oliphant's Powder and Pomatum, Lavender and Hungary Water, Essence of Peppermint, WARREN's Milk of Roses, STOUGHTON's Elixir, Pectoral Lozenges of Tolou, Hemmit and Ruspini's Tincture and Dentifrice, GREENHOUGH's Tincture for the Teeth and Toothache, Dragon Roots and Teeth Brushes, White Almond and Cream Wash Balls, Italian and Windsor Soap, Almond Powder, Essential Salt of Lemons, Best Swan-down Puffs, &c., &c.——Best New KENTISH HOPS.

A few GOLDEN PIPPINS and NONPAREIL APPLES.

From the frequency with which his advertisements, even in those early days, appeared, it must be supposed that John Swanston did a roaring trade in his day—but, alas! his name and his fame have long, long since disappeared from the roll of Glasgow citizens. Not so with another early, but only a rarely advertising firm—and one that, unlike our hero of the ancient store, did not proclaim themselves as "selling at very moderate prices for ready money only."

John Swanston and his successors, if he had any, are all unknown to fame now; not so with the other firm—the M'Aslan and Austin of 1789, are now flourishing more than ever, though under the more euphonious title of Austin and M'Aslan! Surely there is a moral not to be easily cast aside in this?

That Mr. Swanston was not the sole poacher on the supposed sacred territory of the chemist and druggist of his times, the following extracts from *The Glasgow Mercury* at the respective dates quoted, amply prove:—

(*From* "GLASGOW MERCURY" *of Wednesday, February* 13, 1788.)

J. WHITELAW,
HAIR-DRESSER AND PERFUMER,
At his shops, No. 36, opposite the Old Guard, Trongate, and No. 184, opposite Bell's Wynd, High Street,
GLASGOW;
Where the PUBLIC may be supplied, on the most reasonable terms, with the following articles, viz.

. . . . The Essential Salt of Lemons, for taking ink spots or iron-moulds out of linen, lawns, cambric, &c. Each box, 1 s.—Refined Liquorice, for Coughs and Colds.—Milk of Roses, Tooth Powders and Brushes.—The very best Blacking Balls and Cakes, for Boots, Shoes, &c. at 1 s. or 6 d. each.

(*From* "GLASGOW MERCURY" *of Tuesday, April* 28, 1789.)

MR SPILBURY'S DROPS.

. . . .

N. B. Mr Spilbury's Drops are vended in bottles of 5 s. and 1 l. 2 s. Also his Treatise on the Scurvy, Gout, Diet, &c., fourth edition, price 2 s. with a hundred cures relative to those disorders, and other irritating painful maladies arising from impurities of the blood, &c.—Sold by James Duncan, bookseller, Trongate, Glasgow: P. M'Arthur, bookseller, Paisley; William Muir, Kilmarnock; Mr. Boyd, Dumfries; and by the general vendors of medicines in Great Britain and Ireland.

(*From* "GLASGOW MERCURY" *of Tuesday, July* 8, 1794.)

Just received,
By Messrs. DUNCAN and CHAPMAN.*
Trongate, Glasgow.
A FRESH SUPPLY OF THE
CHEVALIER RUSPINI'S STYPTIC.

. . . .

The Chevalier has every week instances of its wonderful effects.

Where also may be had,

Ruspini's DENTIFRICE POWDER for keeping the Teeth and Gums in a state of beauty and purity, 6s. per box, duty included.

——— TINCTURE for do. 6s. per bottle, duty included.

——— ELIXIR for the cure of the Toothache, 6s. per bottle, duty included.

——— BALSAMIC STYPTIC for curing internal and external Bleedings, 8s. 6d. per bottle, duty included.

(*From* GLASGOW MERCURY" *of Tuesday, July* 8, 1794.)

A CERTAIN CURE FOR CORNS.
INFALLIBLE
GERMAN CORN PLAISTER.

. . . .

This is the celebrated Plaister that gained so much reputation in Germany; and has been sold in London upwards of 50 years with the greatest reputation.

Price 1s. $1\frac{1}{2}$d. the box, duty included.

Sold in London wholesale and retail by T. Axtell, Bookseller, No. 1, Finch-lane, near the Royal Exchange, Cornhill. Also, by appointment of the Proprietor, by Mr. Baxter, South Bridge, Edinburgh; and by ANGUS M'DONALD, jeweller, Glasgow.

You see by these extracts that proprietary articles were, in those olden times, sold by almost everybody but druggists; and so, after all, perhaps it is the corresponding traders of our day that have to complain of us invading their territory, and not we of them invading ours!

It may now very properly be asked what is to be the upshot of all this commotion, what the fruit of all these boilings up in the pharmaceutical caldron into which we have so long been looking to-night? For years the uneasy heads, that wear not crowns, of pharmacy, "troubled with thick-coming fancies" of dire disaster to our calling, through the competition of the stores with it on the one hand, and with dreams of crowds of entrants to our ranks through "cram" on the other, have at last entered the field of Parliamentary warfare with sword unsheathed and flag unfurled, to do battle with both their dreaded foes.

Through their Pharmacy Acts Amendment Bill the Council hope to deal a death-blow to the first, and to all such; and through their educational resolutions, they count upon obtaining an easy victory over the last. If they do succeed in getting all the powers they are now seeking, then the doom of the stores has come, and the days of "cram" are over, and a right merry dance of exulting professors, and of jubilant councillors, in the halls of 17, Bloomsbury Square would speedily ensue to gladden the heart, and cheer the spirits of the most worthy of all Secretaries and the most faithful of all Registrars.

But if they do not succeed—if Parliament should refuse to pass the Act, and the Privy Council withholds its sanction from the Resolutions—what then? It may be difficult even to surmise what Parliament may positively do, but I do not think that there can be any difficulty in settling beforehand two things, at least, that it will not do. It will not legislate for our interest, at the sacrifice of that of the public; and it will not give our Society powers to override those of the Privy Council itself.

Not till it pass an analogous Act regarding its own powers—the transference of its powers of administering existing laws and of enacting new ones, to the Cabinet, even with a Gladstone or a Salisbury at its head,—will Parliament grant our Council the powers sought in their Act and their Resolutions.

But what is very likely to happen is this: Our "glory" will be preserved or perhaps enhanced, but it will be done at the expense of our purse. All our existing titles, and more if we ask them, will be sacredly preserved to us, but our trade will be divided. None but entrants through the portals of Bloomsbury Square will be allowed to emblazon over their doorways any one of all our legally-sanctioned titles; but "licensed to sell poisons and poisonous articles" will most likely be seen written in more sombre colours over the humble doorway of the grocer and the general dealer. That is what I expect—the extension of the principle of clause 2, expanded to embrace all the poisons of schedules 1 and 2. Not only so, but I think it not improbable that the Chancellor of the Exchequer will seek to couple this new licence with the old one of patent medicines, and double the amount for the double privilege, thus at once "dishing" the existing monopoly in "poisons," the wished-for monopoly in patents containing poisons, and greatly enhancing the revenue of the country. My reasons for thus thinking that some such results as these may follow from our rushing into Parliament are abundantly simple.

1st. "The safety of the public." That has been so much cried about by our Council and the Trade Association, as well as by odd men here and there at intervals, that the Government imagine they must do something. That something need not be much. Possibly it may be thought by them that the "public safety" will be sufficiently conserved by their establishing over the country numbers of such licensed premises as I have named, and enforcing the labelling *as poisons*, or *as poisonous*, of all restricted articles. This would be sufficiently secured by the infliction of a heavy penalty for its infraction, or by liability to have the licence withdrawn for the second or third offence. Even less than this may be deemed adequate protection of the public. The labelling only, as provided for in clause 2 of the projected Act, may be all the security the Government shall deem necessary.

2nd. Warned by the evils that arose from the restriction of drug establishments where the public in Ireland could have their prescriptions dispensed, and which called for the passing of the Act of 1875 to remedy the evil, the Government will take care not to sanction such fresh legislation as would lead to a similar inconvenience and evil to the public of this country. That the convenience of the public as well as their safety will be most jealously guarded by Parliament may well be deemed certain, when we remember the action the Privy Council took when it refused, at the request of our Council, to add the mineral acids to either of the existing poison schedules. And that

* Printers and Publishers of *The Glasgow Mercury*, etc.

the sought for legislation and the accompanying changes in our educational system would tend directly to the reduction of the number of pharmacists and of "shops for the sale of medicines and compounding of prescriptions" throughout this country, as did similar legislation in Ireland, is not only asserted, as we have already seen, by the Government Inspector of Examinations, but is even allowed, as we have also seen, by the Vice-President of our own Council—Mr. Atkins.

And now with a word of warning I am done. If on consideration of the facts and arguments I have at such unpardonable length placed before you, you should come to think with me that the continued protection of our titles may be the only shred of protection left to us at the close of the struggle that our Council backed up by that of the Trade Association have entered upon with the stores, then "Be strong and quit yourselves like men," be up and doing, and on the twenty-third day of May next let your voice be heard in Bloomsbury Square—not for war, but for "peace, retrenchment, and reform"—that is, withdraw the Bill, cast out the resolutions, and rest and be thankful with such protection and privileges as ye now enjoy.

If you and others nearer the centre of influence do this, and you succeed, then I will not despair of seeing brighter days for the pharmacist than he has seen of late, and that too without loss to that ideal "pharmacy" for which not a few of our men of science and men of "culture," appear willing to sacrifice its bone and sinew.

The tide has of late been running against you—but patience, brother! and it will turn, as all tides have turned for willing and patient workers, and the waters will yet swell up to the brim, and the pharmacists of the future will float at least as prosperously on their breast as ever their predecessors did.

LIVERPOOL CHEMISTS' ASSOCIATION.

The twelfth general meeting of the above Association was held at the Royal Institution, on Thursday, March 29, 1883, the President, Mr. Councillor Woodcock, in the chair.

The minutes of the previous meeting were confirmed, and the following donations announced:—The *Pharmaceutical Journal*, from the Society, and the 'Annual Report of the Law Students' Association,' from the Association.

Mr. Michael Conroy, F.C.S., read a communication upon—

Insect Powder and Insect Flowers.

BY M. CONROY, F.C.S.

Probably most of the insect powder sold in this country is that ground here from closed Dalmatian flowers (*Pyrethrum cinerariæfolium*); but there is also a large quantity of the foreign ground powder imported, which, owing to its brighter yellow colour is preferred by many, and consequently finds a ready market. The imported flowers, are commercially known as "closed," "half open," and "open," the first consisting of unexpanded flowers, while the two latter kinds consist of the expanded flowers, many of which are deficient in, or have entirely lost the active florets, and are consequently of much less value than the closed flowers as an insecticide. There is still a further distinction caused by the popularity and increased demand for this powder, the result being that the flowers are now specially cultivated, so that now both wild and cultivated varieties are offered. The wild kind, however, is the most esteemed, and fetches a higher price owing to it being much more energetic in its action. The imported powder arrives here chiefly in kegs and tins, and most of it is of a bright yellow colour, such as English grinders find it impossible by any legitimate means to match. Some foreign dealers, more honest than others, euphemistically call this "dyed insect powder," while others term it "yellow closed," but as many prefer this article to the duller coloured English ground powder, it cannot be generally known that this bright coloured foreign powder is largely adulterated with yellow colouring substances. It has already been shown that it is frequently dyed or rather adulterated with chrome yellow, though personally I have never found it in any sample; but the samples on the table, which are of a very rich colour, are largely adulterated with fustic, and are being now offered at a price at least 10*s.* below what is now paid for the unground flowers. This fraud has been practised for some time past, and though a strong advocate of free trade principles, I would recommend dealers in this article to avoid the foreign powder until, at least, it is sent here in a genuine state.

Mr. Conroy then exhibited samples of the various kinds of flowers and powders as imported.

A vote of thanks was passed to Mr. Conroy for bringing this communication forward.

Mr. Charles Symes, Ph.D., then read a paper entitled "Some Facts concerning Filtration."

The paper will be printed in a future number.

A lengthy discussion, in which Messrs. Davies, Conroy, Mason, T. F. Abraham and A. C. Abraham took part, followed the reading of this paper, and a vote of thanks was passed to the author, who replied to some of the criticisms, and thanked the members present for their attention to his remarks.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION.

A meeting of members of the above Association and other registered chemists, was held at the Memorial Hall, Albert Square, on Friday evening, April 13. Mr. W. Wilkinson, Vice-President of the Association, occupied the chair, and in the course of some introductory remarks referred to the fact that at the last ordinary meeting of the Association the proposed Pharmacy Act Amendment Bill had been thoroughly discussed by the members present, but it was thought desirable to give every registered chemist in the city and suburbs an opportunity of expressing his views on the proposed enactment before forwarding resolutions to the Council of the Pharmaceutical Society. With this object in view every chemist whose name appeared in the 'Manchester Directory' had been invited on the present occasion, and, further, it had been intimated to each, that all engaged in the trade as assistants or apprentices would be cordially welcomed. Under these circumstances, he hoped to have seen a larger attendance.

The proposed Act was then read, clause by clause, and fully discussed, and the following resolution was proposed by the Chairman, seconded by Mr. Jackson, and carried unanimously:—

"That this meeting of members of the Manchester Chemists and Druggists' Association and other registered chemists and druggists of Manchester and district, having considered the Draft Pharmacy Act Amendment Bill, proposed by the Council of the Pharmaceutical Society, hereby expresses its approval of the same if amended in accordance with the following suggestions:—

"It regrets that it has been thought necessary to introduce the principle of allowing unregistered persons to sell poisonous articles.

"In clause 4 it should be more distinctly expressed that the bottle or other vessel containing the poison should itself, as well as the outer wrapper, bear the word 'poison' with the name and address of the seller.

"If in clause 5 it be a 'second offence' to sell a different patent medicine containing poison unlabelled, this clause requires amendment.

"In clause 6 the word 'and' should be substituted for 'or,' in line 4.

"Pharmaceutical chemists who have already or shall have passed the Major examination prior to January, 1886, to have the title of Fellow of the Pharmaceutical Society. This title to be also conferred upon all who shall subsequently pass a higher examination than that provided for in clause 16 of the Act."

The Secretary was requested to forward a copy of the above resolution and suggestions to the Council of the Pharmaceutical Society.

A paper by Mr. Alfred H. Jackson, B.Sc., on "The Educational Value of Pharmaceutical Studies," had been announced, but in consequence of the lateness of the hour the reading of this paper was postponed till a future meeting.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The eleventh meeting of the session was held on Wednesday, March 28, in the rooms of the North British Branch. Mr. P. Boa, President, in the chair.

The minutes of last meeting having been read and confirmed the Chairman called upon Mr. W. Aitken to read a paper on—

Photography—Dry Plate Process.

The author, in opening the subject, briefly referred to "light," with regard to photography generally, after which he explained what was meant by the "dry process" of to-day, as the coating of glass plates with an emulsion containing the sensitive salts in the form of the bromide, iodide and chloride of silver. He also considered the properties and peculiarities of gelatine, and noticed the photograptive properties of bromide of silver, drawing attention to the various conditions under which a slow or a rapid emulsion may be formed. He then explained the camera and the conditions necessary for making the exposure, and described the process of development by the pyrogallic and ferrous oxalate methods, giving the reactions which occurred, and afterwards briefly described the manner of procuring the prints. An interesting collection of pictures was exhibited, comprising a series of photos of the finish of the Derby, views of Niagara Falls, several transparencies, as well as some amateur work, apparatus, etc.

An interval of ten minutes after the reading of the paper gave the members an opportunity of examining the specimens, and thereafter, on the motion of Mr. McEwan, a hearty vote of thanks was awarded to Mr. Aitken.

The discussion which followed was taken part in by Messrs. Boa, Crowden, Henry and Turnbull, and a vote of thanks was accorded to Messrs. J. D. Robertson and McEwan for the loan of some fine specimens of photographic art. Some formal business having been disposed of and the Chairman having intimated that the Annual Business Meeting would be held on Thursday, April 12, the meeting was closed.

Proceedings of Scientific Societies.

CHEMISTS' ASSISTANTS' ASSOCIATION.

Pharmaceutical Politics.

BY R. W. GILES.

(*Concluded from page* 855.)

The conduct of the Bill through Parliament exercised all Mr. Bell's tact to reconcile the crotchets of critics of all shades of opinion, from the friendliness of English sympathizers to the direct opposition of Scotch doctors. I had the satisfaction of giving evidence in its favour, when I also had an opportunity of observing the dexterity with which Mr. Bell, as chairman of the Committee, managed the hostile witnesses. It showed me how poor the chances of the Bill would have been if the chairman had been less thoroughly conversant with the points of the case. *A Bill* was passed on June 30, 1852, but not *the Bill* which had been introduced a year previously. In fact it would be difficult to recognize any common principle in the two drafts. On the following day Parliament was dissolved and, Mr. Bell's constituents having been disfranchised for yielding to solicitations which Jupiter did not scorn to use and Danae could not resist, Mr. Bell never sat in another. It was "touch and go" with the first Pharmacy Bill!

As originally introduced by Mr. Bell, the Bill provided that it should be unlawful for any person to exercise the business or assume the name of pharmaceutical chemist unless he was upon the register of pharmaceutical chemists in the manner prescribed by the Bill. As it left the Committee and subsequently became law, it simply confirmed the Charter and constituted a sort of upper grade of "pharmaceutical chemists," who alone were privileged to use that title; but it left the practice of pharmacy as much open to unqualified persons as it had been before.

This was a lame and impotent, and it may be added an illogical conclusion; but in spite of its manifest shortcomings I shall class the passing of this Act as the third great epoch in the history of modern English pharmacy. Let us see how much it actually effected.

1st. It gave legislative sanction to the pharmaceutical profession, placing it upon common ground with the other medical corporations and practically securing it from ever being put under their domination. Thus it was a death-blow to future aggression from that quarter.

2nd. It recognized the fact that the public welfare demanded the enrolment of a qualified class of pharmaceutical chemists; it took measures for creating such a class; and it sanctioned a system of examinations for the purpose of testing their qualifications.

3rd. It entrusted the examination of pharmaceutical chemists (as sanctioned above) to members of their own profession, to be appointed by the Pharmaceutical Society.

4th. It adopted the principle of registration for pharmacists and commissioned the Society with the custody of the register, and generally constituted it the executant of its provisions.

Thus, though it fell far short of what had been asked for, it contained the germ of everything that could be desired.

It will be observed that in the preceding sentences I have (without design) twice applied the term "profession" to the business of a pharmaceutical chemist. It appears to me that the Act of 1852 impressed that character upon it, and that any other word would have been less appropriate. At the same time it must be acknowledged that a great deal of trafficking clings to the skirts of pharmacy, which cannot be distinguished from any other description of retail trading. Pharmacy is, therefore what the individual pharmacist makes it, and if the majority make it a trade, it is not to be expected that the public will look upon it as a profession.

Much fault was found with the Act of 1852, which was stigmatized as a miserable deception, and the blame of its inefficiency was cast upon the Society, Nothing could be more unreasonable. The Society were responsible for the Bill they introduced, but Parliament was responsible for the mutilated form in which it left their hands. "One man may lead a horse to water, but a dozen men cannot make him drink," and the same rule applies to Bills brought into Parliament. The objectors made the mistake of looking at the Act as if it had been final, in which case it would have deserved all their condemnation. Regarded as the first step in pharmaceutical legislation it was most encouraging, securing for the Society a *point d'appui* from which to operate upon a future occasion. Later Acts may confer greater powers, but no subsequent Act can effect such a radical change in the political status of the Society. The Act was accepted in this light by Mr. Bell and his colleagues, shrewd men whose calm judgment was not easily disturbed, and who managed the affairs of the Society in critical times without ever losing their heads or making a mistake. I wish I knew where to look for their equals now.

The years immediately succeeding were not eventful; the calm succeeded the storm. In 1853 the Council were harassed by a quibbling objection, raised in a cantankerous spirit by one of its own members, to the validity of a bye-law passed with the liberal intention of admitting into the Society, without examination, all chemists and druggists who had been in business before the Act, and who could produce certificates of fitness satisfactory to the Council. The contention was pertinaciously carried through the Courts from 1853 to 1855, when final judgment was given in favour of the Society, with costs against the appellant, in the Court of Exchequer Chamber. The only useful purpose served by this troublesome and costly litigation was to obtain an *obiter dictum* of the judge deciding the vexed question of pharmaseutical *v.* pharma*k*eutical in favour of "c" soft.

In 1856 Lord Campbell, in his place in the House of Lords, called attention to the prevalence of criminal poisoning and appealed to the Government for further legislation to regulate the sale of poisons. The subject was taken up by the press, and some Bills with that object were brought into Parliament by independent members, but nothing was accomplished in the way of legislation.

In the same year (1856) a Parliamentary Committee reported upon the adulteration of food and drugs.

These movements, though but inchoate, were symptomatic of the direction of popular and parliamentary feeling, and their effect upon the Pharmacy Bill, 1868, and their probable effect upon future Bills in Parliament, must not be overlooked.

The Medical Act, 1858, was the next event affecting, though indirectly, the development of pharmacy. The only provision bearing upon this point was one which assigned the duty of publishing the national Pharmacopœia to the "General Council of Medical Education and Registration," authorized by the Act. This change is greatly to be regretted, for if the publication of the Pharmacopœia had been suffered to remain for a few years longer in the hands of the College of Physicians it might reasonably have been expected that the Pharmaceutical Society would have established its claim to be officially associated with the work. But now it is to be feared that this special enactment, occurring so recently as 1858, may prove an obstacle to an early rectification of what I must characterize as an objectionable anomaly; for there can be no harm in saying in words what the General Medical Council have more emphatically expressed by their acts, viz.: that they are totally incapable of performing the duty that has been imposed upon them. The Pharmacopœia is essentially an official pharmaceutical laboratory book; and what could be more ridiculous than to entrust its compilation to a corporation which (in its corporate character) has never seen the inside of a pharmaceutical laboratory, and to withhold any share in it from those whose lives are spent either in the laboratory or in the after-manipulation of pharmaceutical preparations. Of course the Medical Act theory has utterly broken down in practice. We all know perfectly well, and the Medical Council have been constrained to acknowledge in the preface to the Pharmacopœia, that the work was actually done by our own Professor of Pharmacy, Dr. Redwood, than whom no man is more capable, or equally deserving of the respect of pharmacists for a long life devoted to useful pharmaceutical work. The present arrangement for publishing the Pharmacopœia is a perpetual reproach to English pharmacy, and a painful contrast to the practice in other countries. You may remember that in the year 1874 the Council sent two representatives to attend the International Pharmaceutical Conference at St. Petersburg. One of the questions proposed for discussion was, "Has not the time arrived for instituting an International Pharmacopœia?" Was there not something burlesque in the Society sending two grave and reverend pharmacists all the way to St. Petersburg to consult about a "Pharmacopœia Universalis" for all Europe, when they are not allowed to share in the production of their own? The making of Pharmacopœias is like charity, and should begin at home. This is a grievance that should never be lost sight of until it is remedied. And indeed the pharmacists have the remedy in their own hands. They have only to "strike," and say that they will not help clandestinely, and they must be consulted officially; for I venture to say the Medical Council would not dare to submit to general criticism a Pharmacopœia which had not previously been subjected to pharmaceutical revision. Some may wonder that this important question has not been dealt with by the Pharmacy Bill; but a little consideration will show that a Pharmacy Bill is not the proper place in which to introduce amendments to a General Medical Act. I understand that a new Medical Bill is now before Parliament, and I am strongly of opinion that the Council of the Pharmaceutical Society should seize the opportunity to press this question of the Pharmacopœia temperately, but firmly, in the proper quarter, so that it may now be put upon an honest footing. The present arrangement involves something very much like wearing other men's clothes, which is not a dignified guise for the Medical Council, to say nothing of the unseemly spectacle of pharmaceutical nakedness.

Passing over some minor legislation, which exercised the vigilance of the Society, but left no permanent mark upon pharmaceutical politics, we come to the year 1863, in which year the Medical Council proposed a new Medical Bill intended to amend the Act of 1858. The chief feature of this Bill which demands our consideration was a proposal to include pharmacy amongst the departments of medicine placed under the control of the Medical Council. It also contained a wholesale prohibition against the sale of secret remedies, which exhibited a very small acquaintance with the habits of the people or the temper of the Legislature on the part of those who made it. There is no reason to suppose that the proposal to bring pharmacy within the scope of the Medical Act was dictated by any hostile or aggressive spirit. On the contrary, the Bill marched, in many respects, on the same lines as the Pharmaceutical Society; but the time was not ripe for amalgamation. Nor has the time yet arrived when pharmacy can be incorporated with medicine upon reciprocal terms, and until that can be it is better that pharmacy should continue to walk alone. But I think the time will come, and probably some of you may live to see it, when such a union may take place with advantage to both. Upon the objection of the Society all the clauses affecting pharmacists were struck out of the Bill before it was presented to Parliament, and in lieu thereof the Medical Council adopted the following resolution, viz:—

"That a communication be addressed to the Secretary of State for the Home Department, drawing his attention to the present defective state of the law regarding the practice of pharmacy, under which any person, however ignorant, might undertake it, and expressing the opinion of the General Medical Council that some legislative enactment was urgently called for to ensure competency in persons keeping open shop for dispensing medicines and for the compounding of physicians' and surgeons' prescriptions."

Nothing could jump better with the purposes of the Pharmaceutical Society. The Resolution in effect said to Parliament, "You made a great mistake in not giving the Pharmaceutical Society the powers they asked for in 1852, and the sooner you repair your blunder the better." The Council of the Society were not slow in taking up the ball. In the following May, 1864, they submitted a draft Bill to the Annual Meeting, by which it was unanimously adopted. The United Society of Chemists and

Druggists, which had been formed in 1861 for protecting the trade interests of its members (which it imputed were neglected by the older Society), also promoted a Pharmacy Bill; and the two Bills coming into collision before a Parliamentary Committee, shared (as might have been expected) the fate of the Kilkenny Cats, except that there was not even a tail left between them. In plain English both were rejected, but it will point a moral to compare the leading features of the two Bills.

Bill (No. 1), promoted by the Pharmaceutical Society, proposed that after a certain date it should be unlawful for any person to practise pharmacy unless duly qualified as thereinafter provided.

Bill (No. 2), promoted by the United Society, proposed that all retailers and dispensers of "dangerous drugs" (as per schedule), and all persons keeping open shop for retailing drugs, should be examined by examiners appointed under the Act, and that certain specified regulations should be observed in the sale of active poisons.

Now I beg you to note who was responsible for the first suggestion of imposing regulations upon duly qualified pharmacists in the matter of the sale of poisons. It was not the Society, which had been accused of being the personification of high pharmacy (as though that were a crime), but the rival society which had set itself up as the poor druggist's friend, as the upholder of the trade interests of the struggling many, as distinguished from the advocate of the opinions of the favoured few. We shall have occasion to see presently how the popular feeling of the same "many" was appealed to in order to coerce the Council into breaking their engagements with Parliament in relation to this very question of compulsory poison regulations which the action of the United Society upon this occasion had helped to force upon them.

Mark also, as an important factor in the case, the action of the Parliamentary Committee to whom the consideration of the two Bills had been referred. The Committee reported—

1. "That no compulsory examination or registration under the Bills referred to the Committee should be required of persons now carrying on the trade of chemists and druggists.

2. "That the Bill do provide that no other person shall, after a day to be fixed by the Bill, sell dangerous drugs to be scheduled in the Bill, unless he be examined and registered.

3. "By the adoption of the second resolution as an amendment to a proposal that persons compounding medicines from the prescriptions of medical men should also be examined, your Committee decided against the principal provision contained in the Chemists' and Druggists' (No. 1) Bill, and they accordingly resolved to proceed with the Chemists' and Druggists' (No. 2) Bill."

Now legislation is a practical matter; and how can anyone blame the Society, after this experience, for yielding to the pressure on all sides for poison regulations? They do so because they take no trouble to inform themselves of the facts. It is so easy (and apparently so pleasant) to censure. As Byron said—

"A man must serve his time to every trade
Save Censure: Critics all are ready made!"

In further proof of the disinclination of the Council voluntarily to interfere with the discretion of pharmacists, listen to the following extract from a letter addressed officially by the President of the Pharmaceutical Society to the President of the United Society, on March 7, 1866, viz.:—"I think you will agree with me that a mere Poison Bill, fettering us with registration of sales and attendance of witnesses, prescribing a particular form of bottle in which poisons might be kept and sold, and a particular corner in our shops in which they should be placed, would be only an encumbrance to the statute book, inoperative as regards the public, and especially objectionable to men who, if they be properly qualified to deal in dangerous articles, will each, according to the special circumstances of his case, adopt precautions far more conducive to the public safety." The writer of this trenchant passage was Mr. Sandford, who is popularly credited with the desire to force poison regulations down the unwilling throats of his brother pharmacists. Let me take this opportunity of expressing my best wishes for Mr. Sandford (in which I am sure you will heartily join) on his recent retirement from business.

I cannot, however, agree with his vigorous denunciation. Let it be granted that every properly qualified man, who is also prudent, does use suitable precautions—the pharmaceutical millenium has not yet arrived, and all keepers of open shops for the sale, etc., of drugs are not properly qualified, and we may venture to doubt if they are all sufficiently prudent. At any rate, we have a reasonable suspicion that in hundreds of shops no precautions are taken at all. The "laudanum" bottle stands in friendly contiguity to "tinct. rhubarb." by reason of similarity of colour, and the "pulvis antimonialis" is alliteratively located next to the "pulvis antim. tart." If this arrangement does not obtain in the front shop, who shall guarantee that it does not prevail in the dark store at the back, where paper labels sometimes fall off and sometimes become illegible, and where what Captain Marryat called the "Rudimans" are relegated to the tender mercies of the apprentice and the porter? Before too much reliance is placed upon "men properly qualified to deal in dangerous articles" means must be devised for eliminating the disturbing element of "human fallibility" inseparable from the necessary institution of apprenticeship. I have said before, legislation is a practical matter, and it deals with what is, not with what ought to be. If all men did voluntarily what they ought to do, there would be no need for penal legislation of any kind, but I believe it to be a perfectly legitimate function of the Legislature to compel those who require compulsion. The most harrowing fatality by accidental poisoning that has occurred within my recollection would have been impossible if these regulations had been observed, and it occurred in a pharmacy second to none in the United Kingdom. In fact, I scarcely remember a case of fatal mistake in a pharmacy which would not have been prevented by the adoption of the poison regulations which were actually prepared by the Council. All this clamour about "compulsion" is rather childish. It would be as rational to feel aggrieved because "duly qualified pharmacists" are subject to the "compulsion" not to pick pockets. It looks very much like Falstaff's famous excuse—

"What upon compulsion! No—Were I at the strappardo, or all the racks in the world, I would not tell you on compulsion. Give you a reason on compulsion! If reasons were as plenty as blackberries, I would give no man a reason upon compulsion. I!"

The moral of the story is that Falstaff, of course, had not a reason to give.

Untimately, after much negotiation and some concessions, the United Society agreed to co-operate with the Pharmaceutical Society in support of an amended Bill prepared by the Council of the latter, which was submitted to Parliament on May 11, 1868, under the title of "A Bill to regulate the Sale of Poisons and alter and amend the Pharmacy Act, 1852." The poisons regulations had been inserted in deference to the requirements of the Government and as the condition of Government support. They were materially enlarged in Committee, and when the Act issued from the Legislature, its leading features were as follow, viz.:—

1. That it shall be unlawful for any person to retail, dispense or compound certain "poisons" as per schedule unless such person be a pharmaceutical chemist under the Act of 1852, or otherwise registered as a chemist and druggist under this Act.

[As these "poisons" included articles of every day use in medicine, *e.g.*, prussic acid, opium and all its preparations, etc., this provision practically, though not expressly rendered it unlawful for unqualified persons to practise pharmacy.]

2. From and after the passing of the Act all persons (not having been previously in business as chemists and druggists, or, etc.), shall pass an examination before being registered under the Act.

3. The Pharmaceutical Society was constituted executant of the Act.

4. For the purposes of the Act the Society was authorized, from time to time with consent of the Privy Council, to prescribe regulations as to the keeping, dispensing and selling of "poisons;" and all persons practising pharmacy under the Act were required to conform to the said regulations under a penalty of £5 for each offence.

Parliament contemplated the possibility of individuals offending against the last quoted provision, and therefore attached to it what jurists call a "sanction," in the shape of the penalty alluded to; but apparently Parliament did not contemplate the possibility of the Society itself failing to fulfil its obligations, and it unwisely, as the sequel showed, omitted to attach a "sanction" to that command. But no one has ever questioned the intention of the Legislature, which is plainly deducible from sec. 1 and sec. 15 of the Act. It was understood on all sides that the Society was charged with the duty of prescribing regulations. It was so understood by the Council of the Society, who shortly after the passing of the Act set about framing them—it was so understood by the Privy Council, who were pressing in their request for the regulations to be submitted to them for approval—it was so understood by the Government, who, as soon as they found the Society would not act, brought in a Bill to amend the Pharmacy Act, 1868, by taking the initiative in the matter of poison regulations out of the hands of the Society and placing it entirely under the control of the Privy Council. Thus in a moment the Society found itself at issue with all those powers whose goodwill it had conciliated by years of persistent well-doing; and it is to be feared that the ill impression remains as a black mark against the conduct of the Society and may rise up like Banquo's ghost to shame its next appearance in Parliament. I will not dwell upon the unpleasant topic, but this epitome of the history of pharmacy would be incomplete if I did not record that an angry organized opposition was stirred up against the "poison regulations," though their most furious opponents did not deny that similar precautions (and it was open to them to indicate what they should be) were indispensable; that the Council were weak-kneed and limp in the back and contrary to their convictions withdrew them as regulations to propose them as recommendations, in which form, being entirely emasculated of all potentiality they were accepted at the Annual Meeting, not without a vehement protest on the part of a large minority. You have seen what Mr. Sandford's opinions were, but he behaved on this occasion with a straightforwardness which was both characteristic and commendable. It was no longer a question of opinion, but of fulfilling an engagement, and Mr. Sandford was the only member of Council (if I am not mistaken) who never faltered in the determination to give effect to the Act in the sense in which the Society had accepted it. Mr. Sandford, like myself, is one of a past generation, and had probably read in an old-fashioned book of which a copy may be found in the Library at Bloomsbury—

"Blessed is he that sweareth unto his neighbour, and disappointeth him not; though it were to his own hindrance."

At all events, he acted upon that principle. By a happy chance the Government Bill was withdrawn for want of time at the annual "slaughter of the innocents" on July 17, 1871; and as no other penalty had been provided, the Society was able to congratulate itself that it had lost nothing—but honour.

We have now reached the fourth epoch marked by the Pharmacy Act, 1868, which, so far as legislation is concerned, brings us down to the present time, in which we stand with one foot upon the past and one advanced to the future. Let me now briefly summarize the powers conferred upon the Society by its several public instruments, viz.:—

1. The Charter (1843) granted incorporation to a voluntary Society and defined the conditions of membership, which in future was restricted to persons engaged in pharmacy who should have been duly examined.

2. The Pharmacy Act, 1852, confirmed the Charter. It also constituted a new class of "registered pharmaceutical chemists," which should in future be recruited solely from persons who should give evidence of qualification satisfactory to examiners appointed by the Society; but this Act conferred no substantial privileges upon this new class.

3. The Pharmacy Act, 1868, gave legal status to a second class of "registered chemists and druggists." The qualification of this class (after making provision for vested interests) was also to be ascertained by examiners appointed by the Society; but it was provided that the test examination should be less stringent than that in force under the Act of 1852 for testing the qualification of pharmaceutical chemists, that it should be what has been known as the "Minor" examination. The registered chemists and druggists are therefore a lower grade than the pharmaceutical chemists, but both are equally entitled to be registered under this Act. The privileges of pharmaceutical chemists and of chemists and druggists are therefore at the present time practically the same.

No person not registered under this Act may use any title conferred by this or the former Act, nor may such person deal in any retail manner with certain "poisons" scheduled to the Act. But there is nothing in the Act to prevent unqualified persons from setting up open shops for compounding prescriptions or practising pharmacy, provided they do not call themselves pharmaceutical chemists, or chemists and druggists, and do not meddle with the scheduled poisons.

We are now prepared to consider the merits of—

4. The Pharmacy Bill, 1883.—This Bill differs from former Acts in expressly prohibiting the practice of pharmacy by unqualified persons. The words used are (section 9) "It shall be unlawful to sell by retail or to keep open shop for retailing, dispensing or compounding medical prescriptions, or," etc., unless the seller shall have complied with the requirements of the Act.

The next important enactment is to be found in section 16, viz.: "Every person who, after December 31, 1886, shall obtain a certificate of competent skill and knowledge and qualification under section 6 of the Pharmacy Act, 1868, shall be entitled to be placed on the Register of pharmaceutical chemists and shall be eligible for election to membership of the Pharmaceutical Society of Great Britain according to the Bye-Laws thereof."

[Section 6 of the Pharmacy Act, 1868, prescribed the Minor examination which entitled the examinee to be registered as a chemist and druggist (not as a pharmaceutical chemist), and section 18 of the same Act declared registered chemists and druggists to be eligible as members of the Society. The Bill proposes to make the Minor examination the sole test of qualification, and attaches to it the rank and title of "Pharmaceutical Chemist," with option of membership of the Society as before. The title of chemist and druggist is therefore abolished for the future, and will cease when the present holders under the the Act of 1868 are extinct. But, inasmuch as the Act of 1868 is not repealed, it will not become possible for future interlopers, be they grocers, drysalters, or others, to assume the lapsed title of chemist and druggist, and by so doing to mislead the public as to the character of their business or the extent of their qualification. Beyond that the public must look after itself on the principle of "caveat emptor."]

Next in order of importance come sections 12, 13, 14, referring to examinations; authorizing the Society to make bye-laws which will enable it to prescribe a "curriculum," and to make other changes which experience has shown (or may hereafter show) to be desirable. Section 13 directs that the Preliminary examination shall be passed before apprenticeship, that is to say that the Preliminary examination shall be preliminary.

Section 3 places wholesale dealers in articles in part 1 of the schedule A. to the Pharmacy Act, 1868, under restrictions somewhat analogous to the regulations imposed by the same Act upon retailers.

Section 4 extends to patent medicines the provisions of the Act of 1868 as to the labelling of poisons.

Section 2 is an extension of the poisons regulations of the former Act to a new class of poisonous articles, but without restricting the sale of such "poisonous articles" to registered or examined persons.

Section 8 provides that the public shall have the same security in branch shops as is enforced in other cases.

The remaining enactments are subordinate and accessory.

You have now before you all that is necessary upon which to form an opinion of the merits of the Bill, and you can come to a conclusion as well as I. I shall deal with this part of the question briefly and broadly, leaving details to be threshed out in discussion as far as time permits. It appears to me that the pervading feature of the Bill is—symmetry. It gets rid of the confusion attending the present variety of titles, viz.: Pharmaceutical Chemist, Member of the Pharmaceutical Sciety and Registered Chemist and Druggist, the relative values of which have proved incomprehensible to the public, who therefore have not learnt to attach any particular value to either; and it substitutes the one title of "Pharmaceutical Chemist," which will depend for its future estimation upon the quality of those who hold it. In this respect the Bill marches upon the lines of the first Bill promoted by the Society in 1850. In respect to the poisons regulations it removes certain of the exceptions which existed under the older Act; and while there seems to be nothing to object to in the slight restraint imposed upon wholesale transactions, which has been called for by a recent *cause célèbre*, the assimilation of patent medicines to other wares is a resonable step. The provision relating to branch shops rests upon the same basis of symmetry, and I cannot understand that any objection can be made to it. The powers in relation to examinations possess the same characteristic, for they will enable the Pharmaceutical Society to regulate its examinations and the course of study incidental to them in harmony with the principles upon which almost all other examining bodies act. But the most distinguishing feature of the Bill is, that in an intelligible and symmetrical manner it connects its enactments with its preamble, thus:—"*Whereas* it is expedient that pharmacists should possess competent skill, *therefore* let no man presume to act as pharmacist who has not given proof of such skill." The preamble was the the same in former Acts, but the enactment was inconsequent, and ran thus:—"*Whereas* it is expedient that pharmacists should possess competent skill, *therefore* let us leave them in their ignorance and allow persons who give proof of such necessary skill to call themselves Pharmaceutical Chemists!" It is true that the later Act of 1868 was less absurd than this, but it was a halting and unsatisfactory measure, needing to be reconsidered and amended as soon as circumstances should permit.

Finally, Should the Bill of 1883 receive your support? That is the practical question. Well, if pharmacists know their own mind, there can be no doubt of the answer. For forty years they have been asking for this very thing. During those forty years no one has come forward to assert that any other object ought to be substituted; and the experience of forty years has but confirmed the policy expounded in 1841 in the general terms "to benefit the public and elevate the profession of Pharmacy, by furnishing the means of proper instruction." This Bill is the result of that forty years' experience, which has shown that "voluntaryism" is incompetent to bring "proper instruction" home to the general body of pharmacists. In one particular only has the Society seemingly deviated from the principles laid down by its Founders. Those worthy men, in a spirit of optimism justified by their own high principles, broke loose from the precepts of tradition, and decided to dispense with everything in the nature of a "curriculum" in the case of those who presented themselves for examination. It would have been impossible in those early days to have done otherwise without postponing indefinitely the work they had taken in hand; but later experience and the systematic development of "Cram" have forced first the examiners and through them the Council back into the time-honoured grooves, which change of opinion finds expression in section 12 of the new Bill. This is after all but an adaptation of means to altered circumstances and implies no abandonment of principle.

There are other topics upon which I should have wished to make some remarks, if it had not been for the absorbing interest now centred upon legislation. Especially I should have liked to say something upon prices, as an important element of pharmaceutical politics. I should have been glad of the opportunity to speak particularly upon the relation which prices of dispensed medicines ought to bear to retail sales, upon which I hold some decided opinions; but these topics sink into insignificance by the side of the momentous question of pharmaceutical legislation, added to which I have already trespassed most unconscionably upon your patience by the unlooked for length to which these observatious have extended.

At the close of the reading of the paper, the discussion was adjourned.

A meeting of the Association was held on Wednesday evening, April 18, when the adjourned discussion upon Mr. R. W. Giles's paper on "Pharmaceutical Politics," was continued.

Mt. R. Winfrey proposed, and Mr. Phillips seconded, the following resolution:—

"That this meeting of members of the Chemists' Assistants' Association, having considered the 'Draft Pharmacy Acts Amendment Bill,' does in the main approve of such proposed legislation, and trusts the Pharmaceutical Council will receive the necessary support from all sections of the trade to enable them to promote the passing of the Bill by Parliament."

After a long discussion, in which the President, Messrs. Parkinson, R. H. Parker, W. S. Cooper, jun., Wallis, Allcock, Kerr, Luff, Parke, Hartridge, Cracknell, Hadfield, Roper and Millhouse spoke in favour of the resolution, it was put to the meeting by the President, and carried unanimously.

The majority appeared evidently in favour of instituting an honorary examination in addition to the proposed qualifying one.

Parliamentary and Law Proceedings.

Alleged Death through a Cough Mixture.

The adjourned inquest on the body of the child, Arthur Long, whose death was alleged to have been caused by morphia contained in a cough mixture (see before, p. 856) was resumed at the Town Hall, Brighton, on Thursday, April 12.

The mother upon being recalled admitted that she had given the child a "Steedman's powder" shortly after the first dose of the mixture. She had given similar powders on many occasions, but had not noticed the direction accompanying the packet that no other medicine should be given whilst using these powders.

Dr. Ross being recalled said he inquired what had been given to the child directly he saw it, but could not say whether he heard anything about the powder. He did not think the point was of much importance. He believed that a "Steedman's powder" contained James's powder and calomel, but no morphia; if he had thought the powder contained morphia or opium he would have given more attention to it.

Dr. Stevenson, of Guy's Hospital, was next called, and said he had received a stoppered bottle which contained some human viscera, the stomach and its contents, and part of the intestines, and a second bottle, which contained other viscera, one kidney, a part of the liver, and the urinary bladder and its contents. There were no unusual appearances in this viscera. It was to all appearances healthy, there being no signs of disease. The stomach was empty of food. He had analysed this viscera. He found in the stomach and intestines in the first bottle distinct traces of antimony, and also a trace of morphia, but in an unweighable quantity. He also found a trace of some other matter, possibly mercury. The other bottle contained the liver, kidney and bladder, which showed distinct traces of antimony. He believed there was also a trace of morphia, but the quantity was so small he could only obtain one reaction, and he would not swear to it. A third bottle contained some medicine, in which was present morphia and antimony. The whole bottle, when full up to the neck, would hold $2\frac{1}{4}$ fluid ounces. The quantity which it actually contained was a little over 1 ounce. The quantity of morphia in the whole bottle if it had been full would be very nearly $\frac{1}{6}$ of a grain of acetate of morphia. One drachm, or one medical spoon, would contain $\frac{1}{110}$ part of a grain of the hydrochlorate of morphia. There was also present a small quantity of antimony, equivalent to about 10 minims of antimonial wine of the British Pharmacopœia in each fluid drachm. He thought that four medicinal teaspoonfuls of the medicine administered in two doses would be sufficient to kill a child of that age. He could not say positively. Asked as to the contents of a Steedman's powder, he said there were two kinds, Steedman's and Stedman's. He had analysed both, but could not charge his mind as to which was which. There were two active ingredients in each, calomel and a preparation of mercury, and one contained morphia and the other a proportion of opium. His analysis had been disputed, and he had examined them again and was sure he was correct in stating this. They both contained morphia as active ingredients, and each contained as much as $\frac{1}{120}$ part of a grain of morphia.

After some further evidence had been given,

The Jury returned a verdict, "That the child died from an overdose of morphia and antimony, through the injudicious administration of various medicines," and added that they were of opinion that chemists in dispensing patent drugs should give more detailed and clear instructions as to their use.—*From the Sussex Daily News.*

BOOKS RECEIVED.

A Manual of Chemical Analysis as applied to the Examinations of Medicinal Chemicals. Third Edition. By Frederick Hoffmann, A.M., Ph.D. and Frederick B. Power, Ph.D., Philadelphia: Lea, Son and Co. 1883. From the Authors.

Agenda du Chimiste. Paris: Hachette and Co. 1883. From the Publishers.

Five Hundred Practical Trade Receipts for Chemists and Druggists. London. 1883. From the Author.

Cacao: How to Grow and How to Cure it. By D. Morris, M.A., F.G.S. Jamaica; and London, S. W. Silver and Co. 1883. From the Publishers.

What to do in Cases of Poisoning. By William Murrell, M.D., M.R.C.P., etc. Third Edition. London: H. K. Lewis. 1883. From the Publisher.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Pharmacy Acts Amendment Bill.

Sir,—Readers of the Journal had last week an opportunity of reading the opinions of two gentlemen concerning pharmacy and the new Bill. Mr. Frazer's opinions will not, I believe, be shared by the majority of chemists. Free trade is undoubtedly the great bulwark of England, but I cannot see that free trade in pharmacy is at all desirable,—no more, in fact, than is that of dynamite. A little has been obtained with each appeal to the Legislature and no doubt we shall get a little more if this Bill is progressed with, if not perhaps all we ask for. If we have to qualify ourselves we have a perfect right to some amount of protection. There will be sure to be opposition to the clause which will touch the legality of stores carrying on a chemist's business; but I do not think that the whole Bill will be endangered because we ask that a loophole in the 1868 Act should be stopped. In fact the different courts of law were undecided whether it was intended by the last Act or not.

The dispensing by stores is more of a vital interest to the chemists of London and a few more large towns; it is not a heart-burning question to the majority of country chemists.

There is far too much reticence observed in asking for extended privileges; we ought to assert them. I maintain they are really for the benefit of the public. Thousands of people place themselves in the hands of chemists; and it is well shown that the trust is not misplaced, by the scarcity of mistakes which occur.

I hope that the new Bill will be well supported by all chemists, and pressure should be brought to bear on it by writing to their representatives in Parliament.

With the new Bill in view and the likelihood of one qualification only being recognized in the future, the severity of the Major examination should be reduced for present Minor men, and not increased, by introducing estimations of solutions for total alkaloids and then for the quinine and such like, in a limited space of time. The present Minor is more difficult than the Major was a few years back, which gives the title of "pharmaceutical chemist" to so many of our present Major men.

Pharmaceutical chemists are a most heterogeneous crowd, with qualifications of all kinds, the worth of which can only be decided by the date of the diploma, whilst there are some who have no qualification, *i.e.*, by examination, at all. The sooner we have one bold front the better.

Darlington. An Associate.

The Registration of Sales of Poison.

Sir,—It would seem sometimes as if, with all our vaunted educational advances and our compulsory examinations, there are still a great many who cannot read, or reading cannot understand, the English of our Poisons Act, in so far as it concerns that portion of the 17th clause which reads, "and on every sale of any such article the seller shall . . . make . . . an entry in a book . . . to which entry the signature of the purchaser . . . shall be affixed."

One would scarcely think it possible for this to be misunderstood, so plainly is it worded. Yet, when entering a sale, I am so often told that "Mr. A—— never requires my signature because he knows me;" or, as is very frequently the case with photographers, that "Mr. B—— never made me sign for cyanide after the first time," that I determined to get official opinion on the legality of such sales. Accordingly, I wrote to the Secretary of the Pharmaceutical Society, and I give below his reply, just received, that those who have hitherto unwittingly broken the law may have no excuse for its further violation.

Extract.—" . . . 'and on every sale' can have no other meaning than that the process (registration) should be gone through every time any of the articles are sold."

Manchester. H. Kemp.

ACETIC ETHER.

Sir,—As Dr. Clark assumed, I did notice the discrepancy between Professor Redwood's figures and my own.

I think Dr. Clark will at once see the cause (if, indeed, he has not already done so) if he looks at his figures as published in the Journal. He will find that the quantity of rectified spirit given is 10 ounces, not 10 fluid ounces, which it should have been.

I did not, at the time of writing, observe that the same number of c.c. was given as the equivalent of 10 ounces of spirit and 10 fluid ounces of sulphuric acid. I have not yet had time to estimate the amount of acetic ether in the sample I have now on hand, but am quite prepared to find that it contains alcohol, and, indeed, have done so. I may say that I have not made any of the preparation in question for some years. Indeed, having made it and finding its gravity to agree almost exactly with the authority which I consulted, I assumed, not, perhaps, unnaturally, that I had got a pure article, and when I found a house which supplied an article free from acid and of the same gravity, I was satisfied to buy from them, and have done so since.

Liverpool. ALFRED C. ABRAHAM.

PARRISH'S SYRUP AND POTASSIUM CHLORATE.

Sir,—A few days ago, after a mixture consisting of 1 drachm of chlorate of potassium with 4 ounces of Parrish's chemical food had been dispensed some little time, the red colour of the syrup was noticed to have entirely disappeared.

The physician who prescribed the mixture was not aware that such would be the result, for upon seeing the bleached syrup when next visiting his patient he brought it, together with the prescription, back again to the pharmacy for an explanation. He (and his patient too) expected a red mixture, and evidently thought that the chemist was at fault, and not that the chemicals had been at work. Upon finding that the former was not to blame, but that it was the potassic chlorate among the latter which caused so much havoc to be made with the colouring matter, he discarded it, and ordered the simple (?) compound syrup.

Upon making another quantity in the same proportions the red colour gradually disappeared, and in a few hours had passed to that of a pale straw. A portion of the chlorate of potassium remained undissolved.

A cursory examination being made, it was thought that the free phosphoric acid acting upon the chloric radical, eventually reducing it to hydrochloric acid and liberating nascent oxygen, might probably be the cause of the bleaching effect, free hydrochloric being found in the bleached syrup. The original red syrup, however, was found to contain hydrochloric acid. It would appear likely that the cause might be traced to the decomposition of some secondary chlorine compounds, as there is a strong smell of chlorine upon uncorking the bottle containing the mixture even now, the chlorate of potassium being entirely dissolved or rather assimilated.

As there may be some who, not having noticed the above fact, might in such a case be misjudged of having used syr. ferri phosph. instead of syr. ferri phosph. co., they being now forewarned will be forearmed.

I hope that this letter will be the means of again opening up the instructive, interesting and useful dispensing column which lately has been closed, to the regret of many of the apprentices, associates and members of your Society, and that it will lead to further investigation of the subject.

13, *Baker Street, W.* T. H. PROSSER.

PHARMACEUTICAL ASSISTANTS IN INDIA.

Sir,—As an advertisement has recently appeared in the *Pharmaceutical Journal* inviting applications from chemists' assistants for a situation in India, may I be allowed to insert a few remarks upon the general subject, as I have very good reason for believing that considerable misapprehension exists as to the true value of the rupee, and also the cost of living in India.

There are many reasons why a chemist's assistant should be well paid on coming out to India, *e.g.*, the climate is unhealthy and an unnatural one to a European, so much so that instead of a man getting acclimatized through living out here a few years, it is just the reverse; he finds the climate tells upon him the longer he remains. Expenses, taken all round, are 100 per cent. heavier than in England. An assistant is expected to do more than he is in a similar position at home; in addition to long hours, he has night and Sunday duty recurring much more frequently than at home, because often he is single handed, and the so-called chemist, his employer, is not always in truth a chemist. Again, he may have three or four servants to keep, and must do it in unfurnished quarters.

The rupee, nominally two shillings English, is really one shilling and sevenpence (a fraction more or less is neither here nor there), so that to remit £10 home, if he is so inclined, means to put aside 127 rupees,—a rather heavy premium, twenty-seven rupees on a hundred.

He would be a clever man who could manage to save the cost of his passage home in a year on 150 rupees a month. What reward then does he expect for his three years' exile on 100, 125 and 150 per mensem? 100 or 125 rupees a month is mere beggary for a European in this country, a statement which will be re-echoed by every assistant in the land. I am only astonished that any respectable firm should offer such. No man should dream of coming out here on less than 150 per mensem the first year. He ought to get 200 rupees. An assistant cannot throw up his berth just as he likes here; he is practically the slave of his employer, and whether he likes or dislikes his duties or situation, must finish his term, and it behoves him, therefore, to secure for himself the best terms he can. A master may easily find an excuse to act without an incompetent (?) or unsuitable assistant; the latter cannot so easily slip the noose! MINOR.

PHARMACOGRAPHIA.

Sir,—In a paper by Professor Henry E. Armstrong, Ph.D., F.R.S., on "Turpentine; its Nature and Adulterations," published in your issue of January 20, 1883, occurs a passage, which I have only just now observed, but which I desire to amend, as it might be misinterpreted. Professor Armstrong has occasion to refer to me, and assigns to me the title "American Editor of the 'Pharmacographia.'" This title, which was probably not meant in a literal sense by Professor Armstrong, does not belong to me. There have only been two editions, in English, of the 'Pharmacographia,' both published by Macmillan and Co., of London, the editors of the first edition being Professor Flückiger and Mr. Daniel Hanbury, and of the second edition, Professor Flückiger alone. No reprint or edition has ever been published in the United States.

The notes which I have been enabled to place at the disposition of Professor Flückiger, as a contribution towards the second edition, were too insignificant both in nature and extent to deserve editorial honours.

New York. CHARLES RICE.

Errata.—In the paragraph in the "Month," on p. 797, col. ii., respecting the use of stillingia, Dr. Sims's formula should have been given as follows:—

Fl. ext. of Smilax sarsaparilla,
" " Lappa minor,
" " Phytolacca decandra,
" " Stillingia sylvatica, āā ℥ij.
Tinct. of Xanthxylon Carolinianum, ℥j. M.

On p. 838, col. ii., line 2 (in some copies), *for* "Bailey," read "Baily."

On p. 839, col. ii., line 5 (in some copies), *for* "10 per cent.," read "6½ per cent."

S. and D. McKinney.—The kola nut is the fruit of *Sterculia acuminata*, and its seeds are known to contain a considerable quantity of theine. We are not aware that any formula for a pharmaceutical preparation has been published. An analysis of the nut will be found in a paper on the "Food Value of the Kola Nut," by Professor Attfield (*Pharm. Journal*, [2], vi., 457).

Minor Associate in Business.—The subject of the first part of your letter is dealt with in the Bill in the sense that you wish; the subject of the second would probably be arranged by bye-law.

D. Buchanan.—We are unable to identify the leaves sent.

Herbalist.—(1) *Lamium purpureum.* (2) *Anemone nemorosa.* (3) *Cardamine sylvatica.* (4) *Fegatella conica.* (5) *Ranunculus Ficaria.*

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Samuel, Boa, Willing, Sell, Davenport, Hocken.

"THE MONTH."

The proverbial April showers have this year been conspicuous by their absence, and in spite of the warm sun and the fact that the time of the singing of birds is come, the floral harbingers of spring have not yet assumed their wonted beauty. The cold nights and keen north-east winds have in many places nipped the young buds, and probably by lessening the supply of sap have prevented the proper development of the flowers. At the Botanical Gardens, Regent's Park, the almond trees and mezereon can hardly be said to have blossomed, so few and short lived have been the flowers. In the Economic House, however, the cassia and cinnamon plants have presented a very pretty appearance, the graceful panicles of small white flowers and the young leaves tinged of a brilliant crimson forming quite a picture. At Mr. Ware's nursery, Tottenham, several interesting medicinal plants were observed in blossom. Among these were *Adonis vernalis*, only recently introduced into medicine, *Anemone Pulsatilla*, *Mandragora officinalis* and *Sanguinaria canadensis*.

In sheltered nooks in the South some early flowers may be met with, but even in the Isle of Wight a correspondent could only find this month one hundred and twenty-three species as against one hundred and fifty-eight at the same date last year. Among those noticed by him were *Genista tinctoria*, *Helianthemum vulgare*, *Sanicula europœa* and *Pedicularis sylvatica*. *Smyrnium Olusatrum*, a plant which was formerly used in medicine, under the name of Alexanders, may now be found in sunny places by the seaside in the South of England, just opening into blossom, and the pinkish flowers of the butterbur, *Petasites vulgaris*, may be met with by the sides of streams and in damp places, where later on its leaves will form a far more conspicuous object.

In the Winter Garden, at Kew, *Smilax China* is now in flower. The flowers are small and green, but the red tints of the young shoots, the leaf-stalk and peduncles, as well as the bronze shades of the bright shining foliage, render the plant a pretty object. The woody tuberous root forms the China root of commerce, an article now rarely imported.

In the open ground at Kew several medicinal plants are in bloom. The purplish blossoms of the asarabacca (*Asarum europœum*) and the American wild ginger (*Asarum canadense*) are so hidden underneath the leaves that they might easily pass unobserved. The anthers in these flowers, sessile on the style and terminating in pointed appendages, are worth notice. The former species is sometimes found in botanical gardens, labelled *A. canadense*, but the latter is easily distinguished when the two grow together by its larger hairy leaves and larger flowers with reflexed sepals. The broad leaves of the colchicum now form a conspicuous object and are in the best condition for the herbarium. *Podophyllum peltatum* is opening its leaves after the fashion of a miniature umbrella and the white flower buds are just peeping forth. Several rare British plants may also be looked for in blossom this month. *Doronicum Pardalianches*, *Leucojum vernum*, *Myrrhis odorata*, *Corydalis solida* and *C. lutea*, *Fritillaria Meleagris*, *Muscari racemosum*, *Allium triquetrum*, *Ornithogalum nutans*, *Geum rivale* and *Claytonia perfoliata* are all now in blossom at Kew and should be looked for in the localities where they grow wild. The horsetails, too, are now sending up their fertile stems, so different in appearance from the barren ones produced in the early summer as to be scarcely recognized by the tyro in botany. *Equisetum arvense*, in clayey fields and by roadsides, and *E. maximum*, near ponds and in damp places, are the most noticeable species at this time of year; the latter is distinguishable at sight by its much larger size, the heads bearing the sporangia being often 2 inches long and more than ½ inch in diameter. The curious elaters borne by the spores are best seen by examining them in the dry state with a hand-lens or microscope, as when wetted they curl round the spores and are much less noticeable.

Adenandra fragrans, the leaves of which were offered as buchu in the London market a short time ago, is now in flower at Kew. The curious glandular bodies at the apex of the stamens, which give the name to the genus, are curved back between the petals when the anthers open, while at the base of each petal there is an erect cylindrical staminode or abortive stamen tinged with pink. Whether or no these appendages are useful for attracting insects does not appear to be known.

The yellow root, *Xanthorrhiza Apiifolia*, a North American tonic bitter, containing berberine, official in the U.S.P. of 1870, but now expunged, is also at present flowering freely at Kew, forming a fine mass in the dell near the flagstaff, where the cool damp soil suits it perfectly. It is a small bush with yellow creeping underground stems, which send up abundance of suckers and thus form a large clump. The leaves are irregularly pinnate and the minute flowers are borne in rather large branching spikes of a dark purple colour.

From Mr. Lynch, the Curator of the Botanical Gardens at Cambridge, we learn that the mastic tree is now in flower there, a somewhat rare occurrence. *Anemone Pulsatilla* and *Cochlearia officinalis* are in full bloom and the sumbul plants are pushing up strongly, quite uninjured by the bitterly cold winds. Among many other rare British plants, *Selinum carvifolium* is now being cultivated successfully at these gardens.

At a recent meeting of the Linnean Society, the leaves of *Arum italicum* were exhibited, obtained from a new British locality. Swanage, Torquay and Folkestone Warren have already been added to the list of localities where the plant occurs in Britain, and doubtless it will be found in many other places on the South Coast by those who will take the trouble to look for it. The leaves are of a shiny glossy green, quite different from the dull green hue of *A. maculatum*; the spadix is yellow and the spathe much more membranous, and the plant flowers in May and June.

At a recent meeting of the Hertfordshire Natural History Society, Professor Attfield communicated some observations on the sap of the birch tree, in addition to those already published in this Journal. A suggestion having been made to him that the sugar contained in the sap was probably the result of the action of some schizomycetous fungus or other ferment, a specimen of sap was re-examined by Mr. Dunstan, at the request of Professor Attfield, and the presence of a ferment capable of transforming starch into sugar was recognized. When estimated by Messrs. Dunstan and Dimmock's process (*Pharm. Journ.*, [3], ix., 733), it was found that the quantity of this ferment contained in one gallon of the sap was capable of converting into sugar 21 grains of dry starch. It appears probable that like other ferments this one may become active on reaching a certain temperature and become inactive below it. An investigation in this direction might reveal some interesting results. Some experiments made about ten years ago by Mr. W. S. Clark, the President of the Agricultural College of Massachusetts, showed that the composition of sap differed remarkably according to the date of its flow, and also in the time at which it began to flow, and in the rate of pressure exerted. The temperature of the soil and of the atmosphere also gave rise to variation in amount. The relation which the structure of the wood in different trees and the time of flowering bear to the flow of the sap are other points worthy of investigation.

Probably most botanists have observed the central purplish flower in the umbel of the carrot, but may not have noticed whether it was sterile or fertile. In the *American Journal of Pharmacy* (1882, p. 585), Professor Maisch remarked that the central flower was usually barren in the United States as in Germany. In the same Journal (1883, p. 163) it is now stated that the flower is usually represented as fertile in Europe and sterile in the United States. Mr. Thomas Meehan, however, points out in the *Proc. Acad. Nat. Science*, Philad. (1882, p. 221), that while in the first umbel expanded the purple flower is fertile, this is not the case with those in the umbels from lateral shoots.

In Hanbury's 'Science Papers' (p. 238, fig. 5), a seed named *Te-tsaou-tow*, is figured, and doubtfully referred to "*Dialium ? Leguminosæ*," of which at that time the plant was unknown. In the last number of Hooker's 'Icones Plantarum,' the plant yielding these seeds is figured and described, having been previously named by Dr. Baillon. It belongs to the genus *Gymnocladus* and is named *G. Chinensis*, Baillon. Specimens of the pods have been sent to Kew from Fokien, by Mr. F. S. A. Bourne, of Her Majesty's Consular Service. These pods are 3 to 4 inches long and hard and horny in the dried state, but capable of swelling up greatly in water. In China they are used for washing purposes, the outer shell being steeped for two days in water and the liquid resulting from it used as soft soap or dried into hard soap (*Gard. Chron.*, April 21, p. 499). The use of the seed is not stated.

The cultivation of drug-yielding plants seems to form an important feature in the Botanical Gardens at Saharunpur (*Nature*, April 19, p. 588). During the past year *Fraxinus ornus*, *Guaiacum officinale* and *Rheum palmatum*, var. *Tanguticum*, one of the supposed sources of Chinese rhubarb, have been added to the gardens. Dr. Duthie proposes to cultivate either on the hills or at Saharunpur, aconite, aloes, buchu, calumba root, colchicum, digitalis, gentian, jalap, liquorice, scammony, colocynth and others. This will be done with the view of supplying drugs for the use of the medical department, for which extracts of henbane and taraxacum have already been made from plants cultivated in India. It seems that the cost of maintaining these gardens has hitherto much exceeded the income derived from them; it may be hoped, therefore, that this new departure will bring about a different state of things.

Attention has recently been drawn in the United States to the medicinal properties of *Polygonum hydropiperoides*, a plant which Dr. Eberle in his work on 'Materia Medica and Therapeutics speaks of as the most active and certain of emmenagogues. It was also held in estimation by Professor M. B. Wright, of Cincinnati, who prescribed it with considerable success. The form of administration most in favour appears to be the fluid extract, which is given in doses of 5 to 30 minims three or four times a day mixed with wine or glycerine. The activity of the drug is supposed to be due to the same active principle as previously isolated from *P. Hydropiper*, L., by Dr. C. J. Rademacher, in 1871 (*Pharm. Journ.*, [3], ii., 426). *Polygonum hydropiperoides* is said to have a decided stimulant, even vesicant property, when rubbed into the skin, whence its common name of smartweed. The *American Journal of Pharmacy* gives Michaux as the authority for the species, but according to Gray's 'New Manual of Botany,' that species is not acrid. The plant intended, therefore, is probably *P. hydropiperoides*, Pursh., which is described by Asa Gray under the name of *P. acre*, H.B.K., and differs from the English species, *P. Hydropiper*, in having larger leaves, erect flower spikes, whitish flowers and smooth, shining, sharply triangular achenes.

The results of an examination of the Californian "manroot" (*Megarrhiza Californica*), used by the Indians as a drastic purge in dropsy, was reported recently by Mr. W. M. Young to the Californian College of Pharmacy (*Proceedings*, p. 52). He confirms the presence of very bitter glucosidal principle, called by Heaney (*Pharm. Journ.*, [3], vii., 393) "megarrhizin" and said by him to closely resemble colocynthin, which was found to be purgative in doses of a quarter of a grain. Mr. Young also found another glucoside, resembling saponin, and possessing the power of dilating the pupil; this he has named "megarrhin."

A fluid extract of the flower heads of red clover (*Trifolium pratense*) having been introduced in the United States as a remedy for whooping cough and scrofula, and an infusion as a wash for ill-conditioned ulcers, Mr. Grazer, submitted some flower-heads to analysis. He found two resins (one soluble in alcohol and with a yellow colour in caustic potash solution; the other soluble in ether and with a green colour in caustic ammonia) as well as a peculiar acid principle; but he does not appear to think that there is any principle present to which a special therapeutic action could be attributed.

A singular effect of corrosive sublimate, first observed by Salkowski, has recently been confirmed by Prévost and Trutiger, of Geneva (*Lancet*, April 14, p. 640). They have found that it causes the lime to be removed from the bones to the extent of 2 to 4 or sometimes 8 to 10 per cent. and to be deposited in the cortical substance of the kidneys, so that the kidneys appear almost as if petrified, while the bones, at least in the case of rabbits, become so altered that the epiphyses of the long bones are at length movable on the shaft. This decalcification takes place to the greatest extent when the doses of the poison are such as to cause death in three or four days, but are too small to kill in twenty-four hours.

The alkaloid pelletierine, which has recently been introduced into medical practice as a tænifuge, appears to require caution in its use. A case is mentioned in the *Medical Press and Circular* (April 11, p. 316), in which a dose of 8 grains is said to have caused alarming symptoms. The patient had vomiting and diarrhœa, and the body became cold and exsanguine, and only recovered from the state of collapse after medical treatment for a hour. It is not stated whether the pure alkaloid or the tannate was used, but it is singular that similar cases have not been reported before, if the symptoms were not due to idiosyncrasy.

In the new volume of the *St. Bartholomew's Hospital Reports*, there is an interesting paper by Dr. Lauder Brunton and Dr. T. Cash, on the influence of various alkaloids and alkaloidal salts in arresting the process of oxidation set up by the vegetable protoplasm of the potato and by blood, as indicated by the degree of coloration produced when tincture of guaiacum was brought into contact with potato infusion or diluted blood to which one of the chemicals had been added. The authors state that in comparative experiments it was observed that oxidation in a potato infusion was diminished most powerfully by strychnine; then by quinine and conine; next almost equally by morphine, codeine, cinchonine and atropine; next by nicotine, and then by veratrine. Aconitine did not seem to affect the oxidation. On the other hand, caffeine, picrotoxin and digitalin appeared to hasten the oxidation. When blood was used cinchonine showed the greatest power of retarding oxidation, then came veratrine, morphine, quinine, codeine and atropine, whilst strychnia appeared to have much less power than in the case of potato infusion. Of the salts of morphia, the acetate and bimeconate had almost no action, whilst the hydrochlorate and iodide appeared to accelerate oxidation.

Dr. R. Külz has been engaged upon an investigation of laserpitin, the bitter principle found in the root of *Laserpitium latifolium*, popularly known in Germany as "white gentian root," with the object of determining its composition and also whether it is allied to such bitter principles as peucedanin, athamanthin, and ostruthin, occurring in other umbelliferous plants (*Archiv*, xxi., 161). The laserpitin was obtained in large colourless prisms by exhaustion of the finely sliced root with light petroleum spirit, distilling off the greater part of the solvent, and leaving the coloured residual liquid to evaporate spontaneously. The crystals were insoluble in dilute solutions of caustic alkalies and acids, freely soluble in chloroform, ether, benzol, and carbon bisulphide and much less soluble in alcohol; they melted at 118° C., and the mean of a number of analyses corresponded closely with the formula $C_{15}H_{22}O_4$. Laserpitin forms a crystalline compound with acetic acid ($C_{15}H_{22}O_4 . C_2H_4O_2$), and acetyl, nitro, and brom derivatives were also obtained. Treated with strong sulphuric acid it is decomposed, with formation of methyl-crotonic acid, and with alcoholic hydrochloric acid the isomeric angelic acid is produced, whilst fusing with caustic potash gives the former, and boiling in a solution of it gives the latter, the other substance formed being a resinous body which has been named "laserol." None of the decomposition products obtained by the author corresponded with those obtained under similar conditions from peucedanin, ostruthin or athamanthin.

The seeds of *Nigella sativa* have again been subjected to a chemical examination, this time by Dr. Pellacani (*Archiv f. exp. Path. und Pharm.*, xvi., 441). The author reports the isolation of two alkaloids, nigelline and connigelline, which resemble the active principles of jaborandi in their physiological action. To the presence of these two alkaloids the therapeutic effects of the seeds, as observed by Dr. Canolle, are to be attributed.

The leaves of four species of cinchona, grown in California, have been submitted to an examination by Mr. Haffenberger, who reports (*Proc. Cal. Coll. Pharm.*, p. 53) that he has obtained an average of 2 per cent. of alkaloid from the leaves of *C. Calisaya*, 1·8 per cent. from those of *C. succirubra*, and 0·66 and 0·70 per cent. from those of *C. officinalis* and a hybrid respectively. In the calisaya leaf the bulk of the alkaloid, 4 per cent., was found in the midrib, and only 0·76 per cent. in the lamina. The alkaloids from this species consisted of quinine, quinidine, cinchonine and cinchonidine, the quinidine constituting about one-half of the whole. These results resemble those obtained in an analysis of cinchona leaves made some years ago by Mr. J. E. Howard (*Pharm. Journ.*, [2], v., 368).

During the past month *Andrographis paniculata* has been offered in the London market for chiretta. The demand for bitters, owing to the scarcity of hops, seems to have led to an increase in the number and quantity of such drugs imported, as many as 906 bags of calumba root having been offered at the last drug sale in London.

More than a ton of Calabar beans were also put up for sale and 41 bales of scammony root, a drug which has lately been scarce and dear and of which it was stated that the exportation had been stopped by the Turkish Government. From some specimens recently received it would appear that boldo is known in Chili as "boldu." This is a lauraceous plant, *Cryptocaryx Peumus*. The leaves are ovate and leathery, whitish below, with an odour resembling that of bay leaves.

For some months past an oil has appeared in the London markets under the name of Japanese cod liver oil. According to the *Oil, Paint and Drug Reporter* (Dec. 20, p. 1353), it is made from various species of fish, and is extracted during the process of treating fish scrap for fertilizing purposes. The reason of its introduction into this country is said to be that it was refined and used in Japan as an illuminating oil before the introduction of petroleum into that country, but that now another market has to be sought for it in consequence of the lower price of that oil. It resembles ordinary cod liver oil in colour and odour, but is said to be more affected by cold. It is put up in cans each containing 2 to 5 gallons.

Alicante saffron has already a bad name in commerce and it seems probable that the misplaced ingenuity of those who manufacture the drug will lead ultimately to the destruction of the trade in it. A new adulteration of this commercial variety of saffron has been described by Dr. J. Biel, in *Pharm. Zeitsch. f. Russland.* It consists of marigold florets (*Calendula officinalis*) coloured with dinitrocresylate of sodium, then impregnated with oil and rolled up lengthwise, and mixed with 4 to 30 per cent. of true saffron. The adulterated saffron colours water yellow and gives an amount of ash equal to that of the true drug. It is detected by imparting to petroleum spirit a lemon-yellow colour, the colouring matter of saffron not being soluble in that liquid. Dinitrocresylate of sodium, giving a colour like that of saffron, being cheap and apparently innocuous, has for some time past been used for colouring liquids.

Herr Hirschsohn has published a paper (*New Remedies*, April, p. 99) in which he speaks favourably of an antiseptic dressing consisting of an oakum made from old tarred ropes saturated with chloride of zinc. A dressing containing 15 per cent. of zinc chloride is prepared by boiling the thoroughly carded oakum for half an hour with ten or fifteen times its weight of a 10 per cent. solution of zinc chloride in a closed kettle; afterwards pressing it between two hinged boards, drying it in thin layers and carding it; or it may be preserved uncarded in waxed paper. If a 10 per cent. dressing be required, a 7 per cent. solution of the dry salt is used, and for a 5 per cent. dressing the strength of the solution is reduced to 3½ per cent. It is pointed out by the editor of *New Remedies* that as oakum would often contain too much tar, ordinary tow might be substituted with advantage.

A comparatively new line of investigation in pharmacy has been taken by Mr. W. E. Saunders, who gives in the *American Journal of Pharmacy* (April, p. 161) a description of insects injurious to drugs. Although an imperfect communication, inasmuch as the descriptions are not sufficient for the identification of the insects, it yet contains some valuable practical remarks. He states that the little brown beetle so common in the cummin seed and many other drugs, while they become uncomfortable, seem to thrive just as well with camphor as without it; the little beetle which feeds on cantharides, while it dislikes camphor, is not killed by it. The vapour of chloroform, however, rapidly kills them.

In the last number of the *Journal für praktische Chemie* (vol. xxvii., p. 231) Herr Heinrich Struve publishes some interesting results obtained in the dialysis of various animal and vegetable substances containing albumen, using an animal membrane that had been treated with ether as a septum and chloroform water or ether as the dialysing liquid. The antiseptic properties of the chloroform were found to be effectual in preventing decomposition, so that the operation could be prolonged during a considerable time without change taking place. Amongst other substances experimented upon was the milk of women and cows, and it was found that by the use of chloroform water in the dialysing operation the whole of the albuminoid substances dissolved in the milk could be separated from undissolved casein and butter. A portion of the undissolved casein constituted the enveloping material of the milk globules and this separated with the cream, whilst the other part remained in the "skim" milk. Herr Struve's observations and experiments have led him to the conclusion that the digestibility of any particular milk is in inverse relation to the quantity of this undissolved casein which is not taken up in the formation of the milk-globule envelope, and he, therefore, endorses the recommendation of Dr. Biedent that in the artificial nourishment of infants, at first, only the cream of cows' milk should be used.

In a paper read before the Applied Chemistry and Physics Section of the Society of Arts (*Journ. Soc. Arts*, April 20, p. 545), Professor R. W. Atkinson called attention to the subject of the formation of diastase from grain by the action of moulds, as illustrated in the production of the Japanese fermented drink, "saké." The first steps especially of the manufacture as described, which include the preparation of the diastatic material, appear full of interest to the pharmacist at a time when preparations containing diastase and other ferments are in such great demand. The preparation of *koji* diastase differs in a very marked manner from the malting process. In the case of malt the degradation of albuminoid matter in the barley grain, which results in the formation of diastase, is the effect of a vital process or germination, whilst in the case of *koji*, the first step is to destroy all vitality in the rice grain by removing the husk and embryo and then steaming it. The rice after this treatment is placed in contact with growing mould, the mycelium of which penetrates the substance of the grain and there acts upon the starch and nitrogenous matter, liberating carbonic acid and producing certain soluble nitrogenous bodies, which are capable of converting starch jelly into sugar and dextrin. After the rice has been mixed with the fungus spores it is spread out on trays, which are arranged in underground chambers, kept at a temperature between 79° and 84° F., the heat developed during the growth of the fungus being ample for this purpose. The action does not give rise to the evolution of any ammonia, possibly because the fructification of the mould is avoided except when a fresh supply of spores is required. In the freshly finished *koji*, the soft and swollen grains of rice appear bound together into lumps by fine white silky filaments. Water at a temperature of 113° F. almost entirely dissolves it, leaving only the cellulose skeleton of the grain and mycelium. Treated with cold water a considerable portion dissolves, forming when filtered a golden yellow solution possessing in a marked degree the property of converting starch into sugar. It is worthy of notice that the conversion does not, as in the case of malt, stop short at the production of maltose, but that hydration of the maltose readily takes place, with the formation of glucose. Professor Atkinson is unable to give any very definite information as to the nature of the mould employed. The powder sown is of a yellowish-green colour, and appears to be a mixture of spores, principally of species of *Penicillium* and *Mucor*; this is confirmed by the fact that it is used also in the production of yeast, and that it sometimes gives rise to the butyric fermentation.

In a recent valuable communication on the salts of caffeine (see before, p. 103) M. Tanret cast a doubt upon the existence of true saline compounds of caffeine with the organic acids, and especially disputed the formation of an acetate, valerianate, citrate or lactate. As this was contradictory of some published experience, Professor Schmidt, of Halle, requested Dr. H. Biedermann to work out the subject, and in the current number of the *Archiv der Pharmacie* there is a paper containing descriptions and analyses of a number of definite salts of caffeine, including the formate, acetate, butyrate, and valerianate, as well as the hydrochlorate, hydrobromate, nitrate, sulphate, aurochloride and platinochloride. According to Professor Schmidt the salts may, as a rule, be obtained by dissolving the caffeine, with a moderate amount of heat, in the respective concentrated acids; upon cooling the salts usually crystallize out, but if not, crystals of the salts may be obtained by keeping the solutions over chloride of calcium. It is admitted, however, that these salts are all very unstable, splitting up when brought into contact with water or alcohol, and that they are therefore quite unsuited for medicinal use.

The essential oil of angelica root has been the subject of an investigation by M. L. Naudin. He states (*Comptes Rendus*, xcvi., 1152) that when obtained by distillation in the vapour of water it is a mobile liquid, sp. gr. at 0°, 0·875, with an odour of angelica much less delicate than that possessed by oil from the seeds. When freshly distilled it is colourless, but it becomes yellow if exposed to the light. It absorbs oxygen and resinifies slowly. Experiments showed that the oil of angelica root is composed of a single terpenic carbide, boiling at 166° C., and with a density of 0·870, which M. Naudin calls "β-terebangelene," mixed in the commercial oil with various polymers, formed by the action of heat during the distillation and augmenting in quantity with the age of the oil. The essential oil of angelica seeds also consists of a single carbide, "terebangelene," boiling at 175° C., and much more alterable by heat than its isomer from the roots.

In the production of œnanthol from castor oil by distillation, Stanck found that a highly elastic sticky substance resembling caoutchouc remained behind in the retort. Professor A. R. Leeds (*Ber.*, xvi., 290) has made a further examination of this substance, which he obtained by distilling castor oil *in vacuo* until all the œnanthol had passed over. On washing with ether and alcohol the stickiness and elasticity disappeared, and on analysis the formula of the substance was found to be $C_{42}H_{68}O_5$, which agreed with that obtained by Stanck. The substance thus purified was saponified with potassium hydrate and the filtrate precipitated by hydrochloric acid, by which means a light brown oil was obtained, which was insoluble in water and only slightly soluble in alcohol and ether. When purified from ether its formula was found to be $C_{36}H_{68}O_7$. The solution from which this substance had been precipitated contained no glycerin. The oil was fractionally distilled, and the portions distilling at 120°, 180° and 220° C., collected. These oils formed no salts with either potassium or sodium. Thus the experiments of the author do not confirm the view of the constitution of the substance taken by Stanck, namely, that it was an acryloxy-compound which was capable of yielding pyroricinic acid ($C_{36}H_{60}O_3$) and acrolein.

The vapour density of sulphuryl chloride (SO_2Cl_2) has been studied by Messrs. Heumann and Köchlin (*Ber.*, xvi., 602) with extremely interesting results. These observers find that at the temperature of boiling aniline (184° C.) the vapour density is normal (4·5); but at the boiling point of sulphur (442° C.) the vapour density is only 2·36, that is to say, that at this temperature sulphuryl chloride is dissociated into sulphur dioxide and free chlorine, thus, $SO_2Cl_2 = SO_2 + Cl_2$. These gases were detected and separated by passing the mixture over lead peroxide, by which means the sulphur dioxide was retained as lead sulphate, and the chlorine which passed on was detected by the liberation of iodine from potassium iodide. The same observers have determined the vapour density of chlorosulphonic acid ($SO_2.OH.Cl$), a substance possessing interest from the fact that its discovery by Williamson led to the present view of the constitution of sulphuric acid as a compound of two hydroxyl groups with one molecule of sulphur dioxide. Williams (*Journ. Chem. Soc.*, vii., 304) had previously shown that the vapour density of this substance at 216° C. was rather more than half the normal calculated density, and he accounted for this by supposing that the compound was at this temperature dissociated into hydrochloric acid and sulphur trioxide, thus, $SO_2.OH.Cl = SO_3 + HCl$. Heumann and Köchlin have confirmed the correctness of the vapour density determination, but consider that the explanation is not in harmony with the general behaviour of chlorosulphonic acid. A determination of the vapour density at 442° C. gave 2·09 instead of the normal 4·04, which these observers explain by the following decomposition:—$2(SO_2.OH.Cl) = SO_2 + Cl_2 + SO_3 + H_2O$, and they further consider that at 216° C. this same decomposition occurs, but at that temperature it is only partial. This explanation appears to be in harmony with previous observations.

A new synthesis of anthracene has been made by Messrs. Anschütz and Eltzbacher (*Ber.*, xvi., 623) by the action of aluminium chloride upon a mixture of benzene and acetylene tetrabromide, thus, $2C_6H_6 + C_2H_2Br_4 = C_{14}H_{10} + 4HBr$. The reaction may be represented as the removal of four atoms of hydrogen from the benzene by four atoms of bromine in the acetylene tetrabromide, the two benzene residues, $2(C_6H_4)$, being then held together by $2(CH)$ constituting anthracene, $C_6H_4\begin{matrix} \diagup CH \diagdown \\ \diagdown CH \diagup \end{matrix}C_6H_4$.

A new and delicate test for aldehydes has been discovered by Messrs. Penzoldt and Fischer (*Ber.*, xvi., 657), which is based upon the fact than in presence of a caustic alkali, aldehydes give a violet-red colour with an alkaline solution of diazobenzenesulphonic acid. The reaction is more delicate if sodium amalgam be added. The authors recommend the following method of applying the test. One part of freshly prepared diazobenzenesulphonic acid is dissolved in 60 parts of cold water rendered alkaline with caustic soda. To this solution is added the substance to be tested for an aldehyde, previously mixed with dilute caustic soda solution. A small fragment of sodium amalgam is added, and the liquid allowed to stand for about twenty minutes. If an aldehyde is present an intense violet-red coloration is produced. This reaction is easily given by a solution containing 1 part of oil of bitter almonds (benzoic aldehyde) in 3000, and has been obtained by the authors with acetic, valeric, and œnanthylic aldehydes, also with furfurol and glyoxal. Chloral does not give the reaction. Acetone and acetic ether give a red colour, but without the characteristic violet tint which is yielded by an aldehyde. The reaction is not given by phenol, resorcin or pyrocatechin. It is somewhat remarkable to note that the reaction is given by grape sugar, which does not give the reaction for an aldehyde with other reagents for this substance, as sodium bisulphite or "fuchsin sulphite." The present test is said to be more delicate than this latter reagent, which is a solution of fuchsin decolorized by sulphurous acid. The authors consider that this reaction points to the fact that grape sugar is probably a ketone-alcohol, as has been suggested by other observers. The composition of the violet-red colouring matter is unknown.

It is well known that when pure zinc is mixed with sulphuric acid and water very little hydrogen is evolved, but upon the addition of a small quantity of platinum perchloride the action proceeds energetically. Ballo has shown that similarly the metal magnesium is incapable of decomposing pure water, but on the addition of a trace of platinum perchloride hydrogen is copiously given off and hydroxide of magnesia deposited. The observer of this reaction recommends (*Ber.*, xvi., 694) the use of platinized magnesium as a general reducing agent. A dilute alcoholic solution of nitrobenzene was treated with a drop of platinum perchloride and a small piece of metallic magnesium. Hydrogen was rapidly disengaged and hydroxide of magnesia precipitated. The solution after filtering gave the usual reaction for aniline, and the nitrobenzene was wholly reduced. This method of testing for nitrobenzol has this advantage over the ordinary method with an acid and zinc or iron, that the aniline is liberated in the free state and can at once be detected in the filtrate without the addition of potash and subsequent filtration as is necessary in the latter method.

In considering the analogies that exist in one or two instances between selective absorption of light and selective absorption of radiant heat, Professor Tyndall has been led to discover experimentally "a hitherto unobserved resemblance between carbonic acid and bisulphide of carbon" (*Chem. News*, April 13, p. 169). As is well known, when by means of an electric current a metal is volatilized and submitted to spectrum analysis, the "reversal" of the bright band of the incandescent vapour is commonly observed, this being due to the absorption of the rays emitted by the vapour by the partially cooled envelope of its own substance which surrounds it. The author finds that an analogous phenomenon is manifested in respect to radiant heat in the case of hot carbonic acid gas and cold carbon bisulphide. Carbon bisulphide is the most diathermous body known for all ordinary sources of radiant heat, a thin layer of it transmitting 90 per cent. of the radiation from hydrogen gas; but under the same conditions it transmits only 25 per cent. of the radiation from carbonic acid gas, the remaining 75 per cent. being absorbed. This result goes to confirm the accepted atomic structure of these bodies.

Rather more than five years since Messrs. Cailletet and Pictet, working independently, demonstrated the possibility of liquefying oxygen and nitrogen, but the conditions under which the experiments were performed precluded more than a momentary evidence of their success. It remained still to effect the liquefaction under conditions which would allow of the products being examined more minutely, and this is now reported to have been accomplished by Messrs. Wroblewski and Olszewski (*Comptes Rendus*, xcvi., 1140), who have availed themselves of the intense cold produced by the vaporization in a vacuum of liquid ethylene, which under the pressure of one atmosphere boils at a temperature of about $-105°$ C. The critical point of oxygen occurs, however, at a much lower temperature than this. In a series of experiments the gas was found to commence to liquefy at a temperature of $-131{\cdot}6°$ C. under a pressure of 26·5 atmospheres; at $-133{\cdot}4°$ C. under 24·8 atmospheres, and at $-135{\cdot}8°$ C. under 22·5 atmospheres. Liquid oxygen is described as being colourless and transparent like carbonic acid, very mobile, and forming a very distinct meniscus. Nitrogen is said also to form a colourless liquid, with a perceptible meniscus. The experimenters, in addition, succeeded in freezing bisulphide of carbon at a temperature of about $-116°$ C.; whilst alcohol became viscous at about $-129°$ C., and solidified at about $-130{\cdot}5°$ C., forming a white substance.

INDOPHENOL.*

BY ALBERT H. SAMUEL.

Indophenol is the name given by Mr. Horace Koechlin, of the Lörrach Print Works, Baden, to a new colouring matter, the formation of which he has discovered in the course of a series of experimental researches, in conjunction with Dr. Otto Witt, on the action of nitroso compounds on phenols.

Dr. Witt has published from time to time his researches on the combinations and variations that could be formed, resulting in the production of new blue and violet colouring matters, which are most interesting to those who desire to see the various steps which have led up to the discovery of these new substances.

Dr. Raphael Meldola, an accomplished English chemist, nearly three years ago published an account also of his own personal researches in a similar direction quite independently of Dr. Witt, resulting in forming new compounds of brilliant *violet* colouring matters, and he would seem to have been on the verge of eliminating indophenol, as he worked in pretty nearly the same direction as that which led to the successful discovery accidentally made subsequently by Mr. Horace Koechlin, and it is to the skill and perseverance of Mr. Koechlin that the full credit of this discovery is to be awarded, as well as the manner of practically applying same in printing and dyeing.

Mr. Horace Koechlin and Dr. Otto Witt were prosecuting their researches in the direction of endeavouring to produce a *violet* dye from the action of nitroso-dimethyl-aniline hydrochloride upon α-naphthol.

There are two isomeric modifications of naphthol known to chemists as α and β, and distinguished from each other by the fact that α-naphthol gives a violet coloration when chloride of lime is added to its aqueous solution and β-napthol gives no such coloration with chloride of lime.

Mr. Horace Koechlin's idea was to print a mixture of the ingredients on the fabric in the usual *acid* solution. By accident, on this occasion, however, the solution used, instead of being *acid*, happened to be an *alkaline* one, and Mr. Koechlin at once observed that instead of obtaining the expected violet colour, a *blue* colour was the result. This was so unexpected that he was induced to follow up this striking modification, and after making further experiments on other phenols, he found that this series of aromatic alcohols or phenols are all more or less capable of forming *blue* colouring matters when acted upon by nitroso compounds in an *alkaline* solution, and as it was thought by Mr. Koechlin that these substances might be used as substitutes for the natural production indigo, they received the generic name "indophenols," there being seemingly no other reason for the prefix indo, but this one.

Immediately following these interesting and important results, Mr. Horace Koechlin, in Lörrach (Baden), in conjunction with Dr. Otto Witt, of Mullhouse (Alsace), took out German letters patent for the manufacture of these new blue colouring matters, in which they describe two distinct methods of preparing the same, viz.:—

First Method.

By the action of tertiary aromatic nitrosamines on an alkaline or ammoniacal solution of one of the phenols. The reaction is a very slow one, but can be greatly accelerated by introducing into the mixture a reducing agent, such as zinc in powder, glucose, etc.

The nitroso compound selected by the patentees was nitroso-dimethyl-aniline.

As these names do not convey a clear idea of the process to those who are not conversant with these complex substitution products, it may be as well, perhaps, if I endeavour to explain what is the chemical nature of a tertiary aromatic nitrosamine.

An *amine* is a name given to a class of compounds de-

* Read before the Liverpool Chemists' Association.

rived from ammonia by substitution of alcohol radicals for one or more of the hydrogen atoms in same.

Thus ammonia is chemically known as—

$$NH_3 \text{ or } N\left\{\begin{array}{l}H\\H\\H\end{array}\right.$$

By substituting the alcohol radical *methyl* (CH_3) for one of the atoms of hydrogen we get—

$$N\left\{\begin{array}{l}CH_3\\H\\H\end{array}\right. \text{ or } CH_5N - \text{or methyl-}\textit{amine.}$$

if two atoms of the H are replaced by methyl (CH_3), we get—

$$N\left\{\begin{array}{l}CH_3\\CH_3\\H\end{array}\right. \text{ or } C_2H_7N - \text{dimethyl-}\textit{amine}$$

and if the whole three atoms of H are replaced—

$$N\left\{\begin{array}{l}CH_3\\CH_3\\CH_3\end{array}\right. \text{ or } C_3H_9N_3 - \text{or trimethyl-}\textit{amine}$$

Now aniline may also be considered as an *amine*, in which one of the H atoms is replaced by the alcohol radical phenyl (C_6H_5).

Thus:—

$$N\left\{\begin{array}{l}C_6H_5\\H\\H\end{array}\right. = C_6H_7N - \text{aniline}$$

as above explained *dimethyl-aniline* would then be—

$$N\left\{\begin{array}{l}C_6H_5\\CH_3\\CH_3\end{array}\right. \text{ or } C_8H_{11}N$$

and nitroso-dimethyl aniline—

$$N\left\{\begin{array}{l}C_6H_4NO\\CH_3\\CH_3\end{array}\right. = C_8H_{10}N,NO$$

nitroso-dimethyl aniline is therefore a *nitrosamine.*

Now I have stated that indophenol is prepared by the action of a tertiary aromatic nitrosamine on a phenol in an alkaline solution, and to those who are not acquainted with these phrases the words ' tertiary aromatic" may also need explanation.

The series of organic compounds in question is called by chemists *aromatic*, from the fact that many of its members occur in essential oils, balsams, gum resins, etc., all possessing an *aromatic odour.*

I have already shown the constitution of an amine. Now, if only *one* of the atoms is replaced by a radical, it is called a *primary* amine; if *two*, a *secondary* amine, and if all three atoms are replaced by radicals the compound resulting is called a *tertiary* amine.

You are, I hope, now acquainted with the chemical constitution of a tertiary aromatic nitrosamine. The chemical constitution of the phenols will not, I think, need any explanation, as they are, comparatively, compounds whose chemical formula are simple.

The phenols mentioned by Koechlin and Witt in their patents are ordinary phenol, resorcin, orcin, and the two naphthols already described.

The patentees wish it to be known that their new dyes, the indophenols, differ materially from those previously discovered by Dr. Meldola in his investigations, the latter being formed in *acidulated* solutions with *boiling*, whereas the *indophenols* are produced at the *ordinary* temperature and in *alkaline* solution.

The *second* method employed by the patentees to produce indophenol is as follows:—

First, to reduce the nitrosamine and then to oxidize it in an alkaline solution of the phenol.

For this purpose they dissolved acidulated nitroso-dimethyl-aniline in water and reduced it with zinc powder to the form of paramido-dimethyl-aniline by agitation at a temperature of from 45° to 50° C. The clear liquid is then separated from the surplus zinc and zinc compounds and mixed with a mixture of α-naphthol and oxidizing agents, such as bichromate potass and soda lye. When the contents are completely mixed a weak solution of acid is slowly added and the dye is formed immediately, and is completely precipitated.

With naphthol the dye obtained is *pure blue*, with phenol it is more of a greenish shade, and it varies according to the phenol employed.

Indophenol in powder, as met with in commerce, is formed of the sodium salts. It has both acid and basic properties. Its compounds with acids are light dirty coloured, and soluble in water. Its metallic salts, on the contrary, are bright blue coloured substances and insoluble in water. Indophenol dissolves in alcohol with a blue colour, but is insoluble in water. It is partially soluble in organic acids, and also in *dilute* inorganic acids, but *concentrated* inorganic acids destroy it. Reducing agents transform it into a comparatively colourless compound, called *leuco*-indophenol or white indophenol, a reaction which occurs in other colouring matters. The colour is immediately reproduced by an oxidizing agent and even by the oxygen of the atmosphere.

The *leuco*-indophenol is *indophenol* reduced by a salt of tin in an acid solution. This form of indophenol is a very important one to the calico printers, as it enables them to print with indophenol in combination with other colours (as is constantly necessary in printing fabrics) without the same becoming mixed, and the colours are reproduced subsequently by oxidation and steaming.

The formulæ for printing are given by Mr. Koechlin and were published in a recent number of the *Chemical News.* In conversing with those printers who are using indophenol, they state there are several difficulties yet to be overcome if the substance is to obtain any extensive use as a substitute for indigo and other *blues.* They complain of its being of too delicate a nature, for one thing, that is to say, the steaming must be dry and not exceed half an hour, which will not suit the other colours that are printed with it, and, consequently its use in combination with other colours is much limited on this account. Again, it is not a fast colour in comparison with indigo, and stands washing only moderately, although it has been reported as being unaffected by sunlight or washing.

As to its present practical application in England the information on these points I have been able to glean shows that its use at present is decidedly limited, that it is not applicable practically for dyeing purposes, and that where used in printing it can only be used with safety by itself and not in combination, which limits its application still further. I am informed, however, that it is largely used in the extensive printing establishments on the continent, namely, at Mulhouse, Alsace, and at Elberfeld, in Prussia. No doubt it would come into equally extensive use here, if our practical men were more intimately acquainted with it, as naturally our continental neighbours must have a great advantage in a knowledge of applying it, inasmuch as the patentees are on the spot and are no doubt interested in it, not only as their own discovery but also as a personal commercial success.

The patentees claim a third method of producing indophenol, namely by forming the dye itself on the material to be printed upon.

They describe *three* ways of effecting this:—

1st. They steep the material in a naphthol salt, and after drying, print with a concentrated solution of nitroso-dimethylaniline hydrochloride, in an alkaline solution in which are mixed some reducing agents, such as glucose, zinc, etc. The colour is developed after the usual steaming.

2nd. The material is first steeped in a solution of the reducing agent, and then printed with a concentrated solution of nitrosodimethylaniline and naphthol salt and steaming.

3rd. Bleached calicoes can be printed without previous preparation with a concentrated solution of amido-dimethylaniline and naphthol salt, steamed and then run through a solution of potass. bichromate and washed

The full development of the colour comes out in the bicromate bath.

The patentees claim that there are two special characteristics in which indophenol differs from the violet and other colours obtained by Dr. Meldola and others in prior researches, namely, that the latter are all more or less *fluorescent* and unchanged or dissolved by acids, whereas in the indophenol blues there is an entire absence of fluorescence and they are extremely sensitive to acids.

As already stated, these new dyes, indophenols, are soluble in weak acid solutions, but decompose after a short time, more quickly the higher the temperature is, and form brown substances, the chemical constitution of which is little known.

As regards the chemical constitution of indophenol the patentees state that at present they are only able to express their conjectures, supported by experimental evidence. They find, they say, unexpected difficulties in the way, and therefore their analytical data are incomplete.

They entertain, however, the following formula of indophenol as being probable:—

Indophenol produced by Action of a Tertiary Aromatic Nitrosamine on Phenol.

$$\left.\begin{matrix} CH_3 \\ NCH_3 \\ NO \end{matrix}\right\vdots C_6H_4 + C_6H_5OH$$

Nitrosodimethylaniline. + Phenol.

$$= C_{14}H_{14}N_2O + H_2O.$$

Indophenol (from phenol) Water.

If naphthol instead of phenol be used the formula must be altered accordingly.

Indophenol produced by Action of Oxidation of a Reduced Nitrosamine on Naphthol.

$$\vdots\begin{matrix} CH_3 \\ N\,CH_3 \\ NH_2 \end{matrix}\vdots C_6H_4 + C_{10}H_7OH + 2O$$

Dimethylparapheny-lendiamine (reduced nitrosamine). Naphthol. Oxygen.

$$= C_{18}H_{16}N_2O$$

Indophenol (from naphthol). + $2H_2O$ Water.

There seems to be an impression that this new dye indophenol, and the substance known as artificial indigo, are one and the same thing. This of course is not so.

Artificial indigo is the result of an elaborate series of researches commenced, I believed, by Adolph Baeyer more than twenty years ago. He prepared it from cinnamic acid, which he treated in the first place with nitric acid, forming ortho-nitro cinnamic acid. In second place he converted the latter into the dibromide, and third, he further treated the latter with caustic soda, forming ortho-nitrophenyl propiolic acid, and by a reducing agent, converted the latter into *indigotin*, which is the pure colouring matter of indigo.

The calico printers use this ortho-nitrophenyl propiolic acid in the form of a paste, of which I have also a specimen on the table, which is printed, I understand, on the cloth with an alkali and reducing agent such as grape sugar, and subsequently steaming the fabric to reproduce the colour.

With grape sugar, however, the process of reducing was found not to work well as it required *heat*, and there was the risk of the production changing to indigo *white*, and it was found difficult to stop this reaction at the right moment.

To obviate these difficulties, Dr. Caro, of Mannheim, proposed as the oxidizing agent, xanthate of soda, $NaC_2H_5COS_2$. Using this the reaction can be effected in the cold, and thus the risk of destroying the colour can be avoided.

My personal inquiries lead me to state that neither artificial indigo nor indophenol have as yet found much favour with our English printers, and for dyeing purposes they both seem at present to be *hors de combat* altogether.

Both substances, however, are capable of improved developments, and just as alizarine has now almost superseded the use of the natural product *madder*, so it may be quite possible in a not very distant future to see these new artificial blues becoming formidable competitors with the natural product indigo, and when we recollect that from statistics obtained by Dr. Roscoe about eighteen months ago, he showed that the saving effected by the use of alizarine instead of madder is over £4,000,000 per annum, we can appreciate the necessity of our scientific and practical chemists leaving no stone unturned in the further prosecution for improved results on these blues, with a view of ultimately having their labours crowned with a similar success.

Germany and France at present have considerable advantages over us, in the facilities and financial encouragement given to their chemists by their governments, in supporting their chemical researches, and until this state of things is remedied in England, and also our patent laws remodelled, we must expect to see ourselves constantly outstripped in the race of discovery of these new chemical developments, and reconcile ourselves to the *un*pleasant fact that although we supply the raw material, we are forced to be in the main simply consumers of these dyes, leaving the field of production, and the consequent commercial benefits derived therefrom, in the hands of our continental neighbours.

SALICYLIC ACID AS A REMEDY FOR CORNS.

Dr. Traill Green, writing to the *Medical and Surgical Reporter*, speaks highly of the results obtained in the treatment of hard and soft corns with salicylic acid. He has adopted a formula recommended by Mr. Gezou, which is as follows:—

"℞ Salicylic acid	30 parts.
Ext. cannabis indicæ	5 parts.
Collodion	240 parts.

Dr. Green says:—"The collodion fixes the acid on the diseased part, and gives speedy relief by protecting it from friction. The cannabis indica acts as an anodyne, and the acid reduces and loosens the corn, so that it comes off in four or five days, adhering to the collodion. The remedy is applied with a camel's hair pencil, and if the corn is not well cured, the application may be repeated. In four or five days the patient should use a warm foot-bath and rub off the collodion. If any portion of the corn remains the acid should be applied again, and the treatment continued until the whole of the corn has disappeared. The skin will be soft and smooth, as in the healthy state.

"The mixture dries immediately, and does not prevent for a moment the use of the stocking.

"I have used salicylic acid in the treatment of bunions with like good results.

"Collodion as found in the shops makes a good mixture, but I have found a flexible collodion preferable, as it makes, with the other ingredients of the remedy, a denser fluid. The extract of cannabis should be the solid extract.

"I am sure no remedy has ever been proposed which is so useful in those painful affections of the feet as salicylic acid."

OIL OF GAULTHERIA.*

W. P. Underhill, who has distilled this oil since 1874, gives the average yield as 10 pounds from a ton of the leaves, the highest yield being 14, and the lowest 9 pounds of oil. The larger yield is obtained when the season is dry. The cost of the leaves delivered at the mill is 1½ cents per pound, and it is very difficult to obtain leaves at that price. Since it will require about 200 pounds of leaves to make 1 pound of oil, the cost of the latter is 3.00 dollars for the leaves alone. The author does not believe that the large sleazy leaves of New Jersey yield more oil than the stiff, hard and brittle leaves of New Hampshire.

* From 'Proc. N. H. Phar. Assoc.,' 1882, p. 34. Reprinted from the *Amer. Jour. of Pharm.*, April, 1883.

The Pharmaceutical Journal.

SATURDAY, APRIL 28, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed* "*Pharm. Journ.*"

EXPLOSIVES AND MATERIALS FOR MAKING EXPLOSIVES.

THE opinion that we ventured to express a fortnight since, as to the far-reaching effect of the provisions of the new Explosives Act and the necessity for the exercise of caution by chemists and druggists in the supply of articles capable of being used as materials in the manufacture of explosives, has received confirmation in a letter which has been issued by the Home Office to local authorities, with an instruction to bring the subject matter of it under the notice of all pharmaceutical chemists, chemists and druggists, drysalters, oil and colourmen, and manufacturers of or dealers in chemicals within their districts. The object of this circular is to direct attention to the importance of exercising special and vigilant observation with a view to preventing the acquisition, by persons intending to use them for improper purposes, not only of explosives, but of materials from which, if possessed of a little technical knowledge, they would be able to manufacture explosives. In order to assist in the exercise of the desired observation, a memorandum, drawn up by Colonel MAJENDIE, is appended to the circular, in which it is pointed out that independently of the purchase of explosives specially adapted for blasting, and therefore, generally available for destructive purposes, by persons who may not be reasonably supposed to require them for industrial operations, suspicion should attach to the acquisition in notable quantities of any materials adapted for the making of explosives, if the person seeking to purchase the same is unknown to the seller, or is not known to require such materials for trade or other legitimate purposes. Many of the substances falling within this category are dealt with in the ordinary course of the chemist and druggist's business, as will be seen from the following list of those which are specially enumerated:—Nitric and sulphuric acids, especially in their more concentrated forms, glycerine, potassium and sodium nitrates, chlorates (especially potassium chlorate), picric acid and the picrates, phosphorus, orpiment, iodine, metallic mercury and nitrate of mercury, the last three even in comparatively small quantities. As a stimulant to sharpen the powers of observation it is announced that a reward of £100 will be given to any person (not belonging to the police force) who furnishes information that shall lead to the discovery and conviction of an offender who may be engaged in the illegal manufacture of explosives, provided that the case is one where the Secretary of State is satisfied that the illegal manufacture constituted a serious infraction of the law and was being carried on for an illegal purpose.

Almost simultaneously with the appearance of the circular above referred to, the *London Gazette* contained three Orders in Council, made in accordance with section 43 of the Explosives Act, 1875, which provides that Her Majesty may in this way prohibit the manufacture, *keeping*, importation, conveyance and *sale*, either absolutely or except in pursuance of a licence, or subject to restrictions, of any explosive which may be deemed of so dangerous a character as to require that the Order should be made in the interest of the public safety. The three Orders apply respectively to "stores licensed for mixed explosives," "premises registered for the keeping of mixed explosives" and the keeping of explosives for private use, and with the necessary variations of language they contain practically the same provisions, except that the last-mentioned includes fresh restrictions as to the quantity of explosives that may be kept for private use. The provision most likely to affect some of our readers, and which is common to all three Orders, is that henceforth it will be *unlawful to keep* in any licensed store or premises registered for mixed explosives "any explosive which is *not an authorized explosive* or "which *is an explosive of the fifth (fulminate)* "*class.*" The next provision is that "authorized explosives," other than those of the "fulminate class," with some exceptions in favour of cartridges made with gunpowder and fireworks kept for private use, may not be kept in licensed stores or registered premises or for private use, except in pursuance of a certificate, granted by the chief officer of police or some person authorized by him, that the person holding it is a fit person to keep, during the continuance of the certificate, such explosives as are specified in it.

For the purpose of obtaining a definition of the terms "authorized explosives" and "fifth (fulminate) class," as used in these Orders, it is necessary to refer to an earlier Order in Council, made on the 5th of August, 1875, soon after the passing of the Explosives Act of that year, and for the purpose of completing the information relating to the Act which has already appeared in this Journal and in the Society's Calendar, it may be useful to summarize it briefly. In this Order, for the purposes of the Act, explosives are divided into seven classes, named respectively, (1) "gunpowder," (2) "nitrate mixture," (3) "nitro compounds," (4) "chlorate mixture," (5) "fulminate," (6) "ammunition," and (7) "fireworks." In Class 1 the term "gunpowder" means exclusively the substance ordinarily so-called. The 2nd or "nitrate mixture class" includes any preparation, other than gunpowder, formed by the mechanical mixture of a nitrate with carbon or any carbonaceous substance not possessed of explosive properties, whether sulphur be added or not, and is represented by "pyrolithe," "pudrolithe" and "poudre saxifragine." Class 3, the "nitro compound class," includes chemical compounds possessed of explosive properties or capable of combining with metals to form an explosive compound, produced by the action of nitric acid, or of a nitrate mixed with sulphuric acid, upon carbonaceous substances. There are two divisions in this class, nitroglycerine being typical of the first, and gun cotton and the picrates of the second. Class 4, the "chlorate mixture class," includes any explosive containing a chlorate. In Class 6, the term "ammunition" means an explosive of any of the foregoing classes or of the "fulminate" class, when enclosed in any case or contrivance, or otherwise adapted or prepared so as to be used as a cartridge or charge for small arms, cannon or other weapon, or for blasting, or as a safety or other fuze, a fog signal, percussion cap, etc. Class 7, the "firework class," comprises firework composition and manufactured fireworks, including coloured fires.

The foregoing six classes constitute the "authorized explosives" which it will be lawful under the terms of the Orders just made to keep in "licensed stores," "registered premises," and for private use, to the extent specified in the permissive certificate. The 5th, or fulminate class, which, as well as unauthorized explosives, it will be *illegal to keep*, is thus defined. The term "fulminate" means any chemical compound or mechanical mixture, whether included in the other classes or not, which from its susceptibility to detonation is suitable for employment in percussion caps or other appliances for developing detonation, or which, from its extreme sensibility to explosion or its great instability, is especially dangerous. The class consists of two divisions, the first of which includes such compounds as the fulminates of silver and mercury, and preparations of them; any preparation consisting of a mixture of a chlorate with phosphorus, or certain descriptions of phosphorus compounds, with or without carbonaceous matter; and any preparation consisting of a mixture of a chlorate with sulphur, or with a sulphuret, with or without carbonaceous matter. The second division comprises such substances as the chloride and the iodide of nitrogen, fulminating gold and silver, diazobenzol and the nitrate of diazobenzol.

It only remains to add that under the Explosives Act the local authorities have considerable powers of search and seizure, section 73 giving power to search for ingredients of an explosive as well as the explosive itself. Further, section 23 imposes upon the occupiers of stores and registered premises the obligation of taking all due precautions for preventing unauthorized persons having access to the premises.

THE NORTH BRITISH BRANCH.

On another page will be found an account of the proceedings at the Annual Meeting of the North British Branch of the Pharmaceutical Society of Great Britain, which was held in Edinburgh, on Tuesday last. The Annual Report presented by the executive of the Branch on that occasion shows that under Mr. Alexander Napier's presidency the operations of the Pharmaceutical Society in the North have been carried on with vigour and efficiency, and with results that furnish good ground for congratulation. Especially has this been the case with respect to the Evening Meetings, the past session having been remarkable for the number of interesting and valuable papers brought forward. The Library and Museum have been augmented, and the figures quoted in the Report show that their value is becoming increasingly appreciated by students, upwards of fifteen hundred persons having visited the Museum during the year, and the Library having been well used. For several years past the executive of the North British Branch has endeavoured to meet one of the principal difficulties attending pharmaceutical education in the provinces in a practical way, by making arrangements for enabling students to attend regular courses of lectures on scientific subjects allied to pharmacy upon special terms. This privilege has again been secured during the past year, and the Report specially states that the students who availed themselves of it have shown, by the position they have taken in the classes that they are at least equal to the other students with whom they have been associated.

In one respect the proceedings on Tuesday last presented a novel feature, namely, in relation to the election of the Council which is to conduct the business of the North British Branch during the next twelve months. In previous years this body has consisted of fifteen members; but in accordance with the report of a committee, appointed to inquire into the rules and precedents which have hitherto regulated the election and proceedings of the Council, the voting papers issued this year contained an intimation that it had been decided to increase the number to twenty-one, of whom fourteen would retire annually. This step has been taken with the view of securing a fuller representation of the provinces, and it will be seen by a reference to the list of gentlemen elected that the object has been fairly well attained.

The unanimity with which the services of the retiring President and other officers were recognized was equally gratifying and well deserved. In its new President the Branch will have the advantage of the services of a gentleman well acquainted with the business, Mr. Nesbit having just served a term of office as Vice-President, whilst the gentleman who succeeds him in that position bears a name which is already honourably associated with the history of the Society.

BOTANICAL LECTURES AND PRACTICAL DEMONSTRATIONS AT THE GARDENS OF THE ROYAL BOTANIC SOCIETY.

It will be noticed by reference to the advertisement of the School of Pharmacy of Great Britain in the present number of this Journal, that Professor Bentley will commence his Course of Lectures and Demonstrations on Systematic and Practical Botany, at the Gardens of the Royal Botanic Society, in Regent's Park, on Saturday morning next, May 5, at 8 o'clock. The lectures will be continued on the succeeding Friday and Saturday mornings, at the same hour, till the end of July.

It may be useful to call the attention of Members and Associates of the Pharmaceutical Society who have not yet paid their subscriptions for the current year to the official notice that the Secretary is unable to receive subscriptions after Monday next.

* * *

On Tuesday evening, the Council of the North British Branch, and their friends, according to an annual custom, met at dinner in the Windsor Hotel, Edinburgh, the company numbering about forty. Mr. Nesbit presided, and Mr. Henry Bellyse Baildon acted as croupier, and the dinner appears to have been a decided success.

* * *

The statement that the fire by which the Parliament House of Quebec has been destroyed owed its origin to imperfect electric light fittings, has elicited a letter to the *National Zeitung*, from Dr. Werner Siemens, of Berlin, containing a timely warning as to electricity used for lighting purposes becoming a source of danger from fire. Passing by the fact that the steam or gas engines necessary for the production of the electric current may have been the cause of this fire, he points out that the special apparatus requisite for electric lighting is quite capable of originating a conflagration unless constructed with the greatest care and knowledge. If the calibre of the wires has been wrongly calculated for the current, they may become red hot; whilst the lamps themselves, if improperly fixed, may become a source of danger. Dr. Siemens alleges, what appears very probable, that numerous companies now engaged in the extension of electric lighting do not possess the necessary knowledge or experience, and, in aiming to make electric light as cheap as possible, are overstepping the limits of safety. But he is of opinion that when proper precautions are taken, electricity is much less dangerous than any other mode of illumination.

* * *

The Committee of the International Pharmaceutical Exhibition, to be held in Vienna in August next, has issued a notice that it has taken the necessary steps to secure for all foreign firms the admission into the country of goods to be exhibited free of duty, and their return carriage free of cost. In order also to meet the wishes of intending American exhibitors it has been decided to extend the time for applications from extra-European countries to May. As the forthcoming exhibition will be the first pharmaceutical exhibition of any kind that has been held in Austria, it is naturally exciting considerable attention. It seems, however, almost a pity, in view of the international character which it is desired to give to it, that the notices are sent out written in the German characters that are as a rule so unfamiliar and perplexing to natives of other countries.

* * *

A circular has been issued, signed by the President and Treasurer of the American Pharmaceutical Association and the Presidents of the Pharmaceutical Associations of twenty-two States, calling a meeting of the retail druggists of the United States for the purpose of organizing a national convention, having for its object "to discuss and take action upon the many and growing evils that affect the retail trade." It is not intended that this organization shall at all interfere with the functions of the American Pharmaceutical Association, but work in harmony with it, and it is proposed to hold the meeting in Washington, D.C., on the day previous to the meeting of that Association in September next.

* * *

At a recent meeting of the Société de Pharmacie, convened specially to consider a report which was intended to serve as a preliminary chapter to the forthcoming edition of the Codex, it was decided that instead of attempting to define a tablespoonful as a measure of weight or of volume, it would be preferable to propose to medical men to agree that when they prescribe a tablespoonful they are to be understood to order a quantity equal to fifteen grams of distilled water.

* * *

At the same meeting the size of the normal *compte-goutte* was defined that the diameter of the tube at the point from which the drop falls should measure three millimetres exactly. An opinion was also expressed that the practice of measuring certain very volatile liquids by drops should be abandoned.

* * *

According to a Parliamentary paper issued last week the number of births registered in England and Wales during the year 1882 was—males, 452,829; females, 436,111: total, 888,940. The number of deaths registered during the same time was—males, 266,034; females, 250,749: total, 516,783. The total population, estimated to the middle of 1882, was 26,406,820.

* * *

An inquest was held at Dulwich, on the 20th inst., on the body of Mr. William Leatham Andrews, Pharmaceutical Chemist, who had been found dead in his shop, having apparently just returned from a walk. The medical evidence attributed the death to rupture and diffusion of blood in the pericardium.

* * *

At the next meeting of the Chemical Society, on Thursday, May 3, papers will be read on "A New Oxide of Tellurium," "Tellurium Sulphoxide," and "A New Reaction of Tellurium Compounds," by Messrs. Edward Divers and M. Shimosé; "A Simple Modification of the Ordinary Method for Effecting the Combustion of Volatile Liquids by Glaser's Method with Open Tubes," by Mr. Watson Smith; and "On Acenapthene," by W. R. Hodgkinson, Ph.D.

* * *

The Annual General Meeting of the Chemists' Assistants' Association will be held on Wednesday evening, May 16th.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH.

EVENING MEETING.

Wednesday, April 11, 1883.

(*Continued from page* 846.)

After the discussion on Mr. Maben's paper, the President called upon Mr. Patrick Geddes, F.R.S.E., Demonstrator of Botany, Edinburgh University, to deliver a lecture on the "History and Present State of the Cell Theory." In the course of the lecture the labours of Grew, Malpighi, Bichat, Brown, Schleiden, Schwann and recent investigators were reviewed. By means of a series of elaborate diagrams and other illustrations, the lecturer showed the identity of the animal and the vegetable cell, and gave an interesting account of recent investigations and theories. A *résumé* of the lecture will be given shortly.

Dr. Inglis Clark, in moving a vote of thanks to Mr. Geddes, said that everyone would be struck by the manner in which a very intricate subject had been made interesting. He had listened to the lecture with great pleasure, because it contained many points which were matters for reflection, and considering that a great deal of the subject matter was the result of research on the part of the lecturer, he was sure that the audience would join him in thanking Mr. Geddes for the manner in which he had brought the subject before them.

Mr. Stephenson seconded the motion, and Mr. Baildon, in supporting it, remarked that the lecture had been a very fascinating one. Beginners on the subject felt something very "dreech" about the bare details and long names, but when the beautiful history of the progress of discovery was told, the whole matter took shape and became thrilling with interest.

The motion was very heartily responded to by a large audience.

The President of the Branch then made the following remarks:—

"Gentlemen,—Our twenty-ninth session this evening comes to a close, and it may not be out of place to review it very briefly in its scientific, educational and trade aspects. At the first meeting on November 8 the business of the session was as usual commenced with a few opening remarks from the chair, after which a paper by Mr. D. B. Dott, F.R.S.E., on 'The Solubility of Morphia Salts,' was read. This included a valuable contribution to what is already known on the obscure subject of solubility generally, and particularly in reference to morphia salts. At our second meeting we had an interesting paper by Mr. Robert Aitken, on 'The Pharmacopœial Extracts of Aloes and their Preparation,' and also one giving details of a method for preparing syrup of phosphate of iron, by which the acidulous rather than the basilous radicle is precipitated; this was contributed by Mr. D. Gorrie. At our third meeting, Mr. Gilmour gave us an insight into the new edition of the United States Pharmacopœia, which raised an entertaining discussion, and Mr. Peter MacEwan read a note on 'Pungent Liniment of Iodine.' On the same evening, Mr. H. B. Baildon presented a fine bust of his father to the Society. This bust is a fitting memorial of one who was highly esteemed by those connected with this Branch, and who by the dignity of his personal and professional life did much for the elevation of pharmacy. The fourth meeting took place in February, when we had the pleasure of listening to a lecture by Dr. Matthew Hay, on 'The Methods for the Separation of Alkaloids.' This paper was principally devoted to the methods employed in original research, but independent of its purely scientific worth it contained much matter applicable to the everyday work of the pharmacist. At our fifth meeting, Mr. Maben showed a hot-air chamber which he has had in use in his own laboratory, and on the same evening Dr. Inglis Clark made a valuable communication on 'Acetic Ether;' the most valuable portion of this paper is that in which Dr. Clark proposes a modification of the process of purification, and which Professor Redwood regards as 'a great improvement on that described in the Pharmacopœia.' I need not remark on the papers which we have had the pleasure of listening to this evening. I have to congratulate the members of the Branch that so many of the papers have emanated from themselves, and I have to urge on those who are able to devote a little of their limited leisure in the course of the summer to the preparation of papers for our next session. Our special thanks are due to those members of professions allied to our own for the highly appropriate subjects on which they have lectured to us; and further, I am sure that you will all join with me in thanking all the gentlemen who have addressed us during the session." The President then referred to the "Pharmacy Acts Amendment Bill," and the educational requirements which would be entailed by it. In this respect he likened the Bill to the "Scottish Universities Bill," and remarked that Scotland at the present time is ripe for an advance in education. Having glanced at the commercial aspects of pharmacy at the present time, he concluded by thanking the members for the courtesy accorded to him in his discharge of the duties of the chair.

Mr. Stephenson proposed a vote of thanks to the President for his conduct in the chair, which was cordially responded to by the audience.

In the course of the evening it was intimated by the Secretary of the Branch that a paper by Mr. Hugh Macullum, Hong Kong, with specimens illustrative of an investigation in a case of malicious fish poisoning, had been forwarded but had not come to hand.

ANNUAL MEETING.

The Annual Meeting of the Branch was held in the Society's rooms, Edinburgh, on Tuesday, April 24, at 12 o'clock noon.

Mr. Alexander Napier, President of the Branch, took the chair, and called upon the Secretary to read the—

Annual Report.

The Council of the North British Branch of the Pharmaceutical Society again have the pleasure of submitting their Annual Report.

The operations of the Branch continue to be carried on with efficiency as hitherto.

The library and museum have been considerably augmented during the past year; several valuable donations have been made to the chemical portion, which has been greatly enriched thereby. Your Council would specially refer to a fine bust of the late Mr. H. C. Baildon, which has been presented by his son, Mr. H. B. Baildon, and which will prove a pleasing memorial of the valuable services which their late respected friend rendered to the cause of pharmacy, especially as represented by this Branch. The museum continues to be largely taken advantage of by students; the total number of visits during the past year being 1565, made up of 953 day visits and 612 evening visits. From the library, nearly three hundred volumes have been lent out, while a large number of volumes have been used for reference. These facts are a satisfactory indication that the educational facilities afforded by the Society are fully appreciated by our students.

In connection with the issue of special tickets for lectures in subjects allied to pharmacy, your Council are pleased to note the honourable positions taken by several students. This circumstance affords an opportunity of comparing pharmaceutical with other students attending these clases, and it shows that our students. are not inferior to others.

There have been six evening meetings during the past year, the attendance being quite up to the average, and on several occasions exceptionally good; but it is to be regretted that members generally do not avail themselves of the advantages which are presented by such meetings.

The papers read during the session have been of a highly interesting and instructive nature, and your Council desire to record their appreciation thereof and their indebtedness to those pharmacists who have made the communications. They also wish to express their warmest thanks to Dr. Matthew Hay and Mr. Patrick Geddes for the able and interesting lectures which they delivered under the auspices of the Council.

The Board of Examiners for Scotland have had four meetings for examination (in all on nine days) during the past year. Minor candidates have numbered 99, of whom 53 passed. These numbers show an increase of 26 candidates over the previous year, and failures to the extent of 46·5 per cent. For the Major examination there have been 9 candidates, of whom 4 passed, and 1 Modified candidate, who passed. Your Council have pleasure in noting a great improvement in Scottish Preliminary candidates since the last report: 204 candidates have presented themselves at the various centres in Scotland, and of these 118 have passed, showing 42 per cent. of failures as compared with 60 per cent. in the preceding year.

The most important event in the proceedings of the Society during the past year has been the adoption by the London Council of the suggestion of Mr. Schacht's Committee, that in future candidates for examination be required to produce evidence of having undergone a curriculum of education in botany, chemistry (both theoretical and practical), and materia medica, and that the examinations be divided into two parts, the first *written* and the second *oral*, with an interval of at least twelve months. Without entering into the debatable aspects of this measure your Council feel satisfied that its adoption, which it is proposed to effect in 1887, will greatly modify the distressing results of the examinations as they exist at present.

At the February meeting of the Council of the Society a draft Pharmacy Acts Amendment Bill was unanimously adopted. This Bill had been prepared on the suggestion of the Privy Council, chiefly with the view of placing some restriction on the sale of poisons under the guise of patent medicines, and of regulating the sale of poisonous articles, which there was a difficulty in embracing within the Poisons Schedule of the 1868 Act. Besides provision for these purposes the Bill contains various clauses for obviating difficulties and hardships which have been experienced in the operations of the last Act, and appears to have been drawn with great skill and with a practical adaptation to the purposes to be effected.

Your Council had a meeting to discuss the Bill and, although there were one or two dissentients, the great majority of members were in favour of supporting the London Council in promoting the measure almost in its entirety; and this resolution is simply an echo of an almost unanimous expression of opinion throughout the pharmaceutical body.

The Council have to record with feelings of regret—which they feel assured will be shared by all who knew him—the death of Mr. George Blanshard, for many years a member of this Council. Mr. Blanshard was a constant attendant at the meetings of this Branch, whether for business or scientific purposes, and his genial and gentlemanly bearing, as well as the zeal and diligence he always displayed in the interests of the Society, will cause his name to be long held in honour and esteem.

In laying on the table the result of the voting for the new Council, tabulated as formerly, your Council take the opportunity of referring to the alteration in the number of members, which was intimated in the nomination papers. This alteration was suggested by a committee appointed by the Council to inquire into the rules and precedents which have hitherto regulated the election and proceedings of the Council. The suggestion was adopted. The number, twenty-one, being believed to be that which would best ensure provincial representation, while the retirement of only two-thirds annually will provide for the continuous carrying on of the work.

Mr. Laird, in moving the adoption of the report, said that he was glad to know that the affairs of the Branch were in so satisfactory a condition. Much of this, he was sure, was due to the office-bearers, and he had pleasure in moving that the report be adopted.

Mr. Rait (Partick) seconded the motion, and it was unanimously adopted.

The President of the Branch then made some remarks regarding the work of the Branch, and a discussion thereon ensued, but no resolution was come to in the matter.

The Secretary to the Branch then submitted the results of the voting for the new Council as follows:—

Voting papers issued	247
Voting papers returned	134
Voting papers informal	4

Leaving 130 voting papers to be recorded.

These having been scrutinized it was found that the following gentlemen had a majority of votes, and were accordingly elected as the

Council for 1883–84.

Ainslie, William, 58, George Street, Edinburgh.
Baildon, H. Bellyse, 73, Princes Street, Edinburgh.
Borland, John, Kilmarnock.
Clark, William Inglis, 26, South Canongate, Edinburgh.
Frazer, Daniel, 131, Buchanan Street, Glasgow.
Gilmour, William, 11, Elm Row, Edinburgh.
Kermath, Wm. Ramsay, 18, Market Street, St. Andrews.
Kinninmont, Alexander, 69, South Portland Street, Glasgow.
Laird, George Hardie, 40, Queensferry Street, Edinburgh.
Mackay, George Duncan, Canning Street, Edinburgh.
Mackenzie, James, 45, Forrest Road, Edinburgh.
MacRitchie, David, 30, High Street, Inverness.
Napier, Alexander, 69, South Clerk Street, Edinburgh.
Nesbit, John, 162, High Street, Portobello.
Pinkerton, William, 17, Greenside Place, Edinburgh.
Stephenson, John B., 48, Frederick Street, Edinburgh.
Storie, Robert, 94, High Street, Dalkeith.
Storrar, David, 228, High Street, Kirkcaldy.
Strachan, Alexander, 148, Richmond Street, Aberdeen.
Watt, James (Senior), Haddington.
Young, James R., 17, North Bridge, Edinburgh.

Mr. Gilmour, in proposing a vote of thanks to Mr. Napier, said that as a President of the Branch that gentleman had been anxious to conduct his duties faithfully, and in doing so had been quite alive to the interests of the Branch and the Society. He very heartily proposed the thanks of the meeting for his conduct in the chair at that time and during the year he had held office.

Mr. Young seconded the motion, remarking that Mr. Napier had been assiduous in his attention to the duties of his office, and had shown great ability in conducting the affairs.

Mr. Napier returned thanks, and moved a similar vote to Mr. Nesbit, Vice-President, which was cordially agreed to.

Mr. Watt (Haddington) then moved a vote of thanks to the Honorary Treasurer (Mr. Stephenson). In doing so he said that a remarkable amount of enthusiasm had been thrown into any work which Mr. Stephenson had undertaken. This, coupled with his knowledge of affairs, had tended greatly to carry on the work which had fallen to the share of the late Mr. Mackay.

Mr. Mackenzie seconded and Mr. Nesbit supported the motion.

Mr. Stephenson having replied, the meeting adjourned.

The new Council met after the Annual Meeting for the election of office-bearers for the ensuing year, with the following result:—

President of the Branch, Mr. John Nesbit; Vice-President, Mr. H. Bellyse Baildon; Auditors, Messrs. Mackenzie and Young.

EXAMINATIONS IN EDINBURGH.

April 18, 19 *and* 20, 1883.

Present on each day—Messrs. Ainslie, Baildon, Clark, Gibson, Gilmour, Kinninmont, Nesbit and Stephenson.

Professor Maclagan was also present, on behalf of the Privy Council.

MAJOR EXAMINATION.

18*th.—Four* candidates were examined. *Three* failed. The undermentioned passed, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Holmes, James Henry............Kendal.

MINOR EXAMINATION.

18*th.—Ten* candidates were examined. *Seven* failed. The undermentioned *three* passed, and were declared qualified to be registered as Chemists and Druggists:—

Anderson, George Watson ......Forres.
Barlow, George Robert ....Congleton.
Campion, Martin Hand ....Louth.

19*th.—Twelve* candidates were examined. *Five* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cooper, Albert ....Huntingdon.
Donald, Andrew ....Perth.
Douglas, William ....Woodside.
Dunbar, George ....Dumfries.
Duncan, Adam.......................Edinburgh.
Edwards, Rees William ....Brecon.
Hendry, Robert Love ....Edinburgh.

20*th.—Twelve* candidates were examined. *Eight* failed. The undermentioned *four* passed, and were declared qualified to be registered as Chemists and Druggists:—

Scott, Charles ....Fraserburgh.
Simpson, Charles ....Aberdeen.
Slater, James Morrieson ....Loftus in Cleveland.
Thresh, Arthur.......................Buxton.

PRELIMINARY EXAMINATION.

At a meeting of the Board of Examiners for England and Wales, held on Wednesday, April 25, 1883, the report of the College of Preceptors on the examination held on April 3rd was received.

Three hundred and sixty-six candidates had presented themselves for examination, of whom *one hundred and ninety-five* had failed. The following *one hundred and seventy-one* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

Adamson, John Robert ....Bishop Auckland.
Affleck, John.........................Fort William.
Affleck Theodore Sykes ....Swindon.
Aitken, Thomas ....Kilmarnock.
Alexander, William Maxwell...Dundee.
Allanson, James ....Wishaw.
Allez, Peter Arnold ....Guernsey.
Anderson, George H. ....Edinburgh.
Andrews, Edward Arther ......London.
Angel, Alfred ....Guernsey.
Arnold, John Julius................Brighton.
Aslin, William ....Sunderland.
Aspland, Wm. Harold G. ......Newark.
Bagshaw, George William ......Kenilworth.
Baker, William James............Bradford.
Bard, Cecil Harry ....Exeter.
Barker, Joseph ....Doncaster.
Bates, John ....Bicester.
Beynon Benjamin ....Swansea.
Botterill, Frederick William ...Otley.
Bradbury, Charles..................New Fletton.
Brassington, Herbert William...Rugeley.
Breese, Charles ....London.
Brent, Arthur Redding ....Ashford.
Briggs, Thomas.....................Halifax.
Broadley, John Wilfred ....Louth.
Bromwich, Thomas ....Dudley.
Bunting, Edmund Robert ......Hoylake.
Butterworth, Frederick ....Rochdale.
Carter, Thomas.......................Hereford.
Chaplin, Albert Edward ....Taunton.
Church, Edward Harry ....Cambridge.
Clark, Alexander John ....Grantown-on-Spey.
Cole, Harold ....Congleton.
Colenutt, Frederick Moreton ...Shanklin.
Cook, Thomas Marsden ....Hindley.
Cooper, Edwin ....Lincoln.
Cripps, George Thornton.........Devizes.
Cussons, John William ....Ossett.
Davies, Charles Gardiner ......London.
Davies, James Lloyd ....Talgarreg.
Davis, George David ....Malvern Link.
Davis, William Orton ....Malvern Link.
Dawson, William Thorndick ...Norwich.
Dickie, Thomas......................Glasgow.
Dixon, Richard.......................Newport, I. W.
Downing, Samuel...................Braintree.
Drayton, Ernest ....Tunbridge Wells.
Drysdale, Robert ....Dalmeny.
Edmondston, Francis E..........Edinburgh.
Evans, Alexander Rae............Ely.
Evans, Dewi Louis ....St. Clears.
Evans, John ....Neyland.
Feather, Arad ....Pontefract.
Field, Reeve Holyoake ....Birmingham.
Fitton, Robert ....Huddersfield.
Fisher, George William ....Holt.
Fletcher, Richard Bewley ......Sunderland.
Flint, Charles ....Stratford-on-Avon.
Flynn, William.......................Lockerbie.
Forrester, William ....Lochee.
Fowler, Harry ....Shrewsbury.
Fraser, Robert ....Macduff.
Galt, Thomas James ....Thornley.
Gardner, John ....Bolton le Sands.
Gass, George Muncaster ....Whitehaven.
Gee, Ernest ....Bath.
Golland, James Henry ....Sheffield.
Goodman, Frederick William...Newport Pagnell.
Grammer, Frank ....Newark.
Green, Walter ....Hendon.
Green, William Henry ....Gargrave.
Greenhill, James Donaldson ...Glasgow.
Grimes, Henry ....Chesterfield.
Harrison, William Arthur ......Louth.
Hayton, Thomas R.................Plymouth.
Herington, Horace Edward ...Leighton Buzzard.
Hobson, Edmund...................Cheadle.
Hollely, Thomas Lowe ....Ollerton.
Hopley, David ....Goole.
Hughes, Philip Henry Alban...Liverpool.
Jackson, Thomas ....Altrincham.
Jones, John ....Rhyl.
Joy, Thomas George ....Cardiff.
Keddell, Charles Frederick ...Epsom.
Keene, Bernard ....London.
Kingston, George Thomas ......Bath.
Kirk, James ....Edinburgh.
Lee, George ....Barnstaple.
Letheren, Samuel Kemp.........London.
Lock, James ....Edinburgh.
Lockyer, Cuthbert Hy. Jones...Bruton.
Loeffler, George Berthold ......London.
Long, Frederick C. ....Norwich.
Lonnen, Walter ....Sheerness.

Macaulay, Donald .... Inverness.
McGregor, James .... Aberdeen.
Macintosh, P. F. .... Dunfermline.
Mackridge, William............... Barnsley.
Makepeace, Alfred Joseph ...... Nuneaton.
Martin, Stanley .... Derby.
Masterman, Francis John ...... Driffield.
Matheson, Joseph Milne......... Andover.
Mennie, Robert............... Aberdeen.
Menzies, James Acworth ...... Inverkeithing.
Miles, William Henry............ Portishead.
Millard, Edgar James........... Derby.
Millard, Percy .... London.
Mitchell, Walter Stuart .... Gloucester.
Moffat, John Archibald .... Whitehaven.
Mollard, James Kingston ...... Penzance.
Morris, William John .... Pontypridd.
Mousley, William Joyce .... Redditch.
Munro, James Innes .... Perth.
Murdoch, Henry William ...... Macduff.
Murray, Allan Grierson .... Annan.
Muskett, Frederic James ...... Newport Pagnell.
Newton, Arthur .... Northwich.
Nicholson, Gilbert .... Tunbridge Wells.
Ogdon, William .... Derby.
Pate, Charles .... Lincoln.
Paternoster, George Sidney ... Cirencester.
Peach, Charles William .... London.
Pegg, Joseph Edmund Jones ... Birmingham.
Phillips, Henry Allan .... Tavistock.
Pilkington, George Ratcliffe ... Haslingden.
Plevin, John .... Birkenhead.
Pottage, Frank Ernest .... Edinburgh.
Price, Joseph .... Wrexham.
Robertson, Robert .... Leith.
Robinson, Richard Hardy ...... Wainfleet.
Roe, Edwin John .... Nottingham.
Rowlands, William Handcock... Cardigan.
Ryall, Frederick John............ Devonport.
Sanderson, John William ...... Leeds.
Sewell, William John .... Barton-on-Humber.
Shand, Alexander............... Dunfermline.
Skinner, Donald McDougall ... Oban.
Slinn, Frederick Harry .... Rhyl.
Standing, William .... Darwen.
Staniland, Edwin Marshall...... Tadcaster.
Stark, George Miller .... Gatehouse.
Stephen, David J............... Kilmarnock.
Stewart, Robert McAll .... Penryn.
Stirling, David Alexander ...... Dunoon.
Stone, Leopold Hawkin .... Holsworthy.
Thomas, David............... Brynaman.
Thomas, Isaac Jenkin .... Aberavon.
Thomson, John............... Dalbeattie.
Thomson, Marshall .... Banchory Ternan.
Thorne, Henry Courtenay ...... Taunton.
Thorpe, Arthur Winton .... Northampton.
Thursfield, Bevington .... Kettering.
Tilsley, James Henry .... Berriew.
Timmis, John .... Silverdale.
Turnbull, Henry John............ Darlington.
Turner, George Reuben .... Peterborough.
Vassalli, Bartholomew Joseph .. Leeds.
Wadsley, William............... Wisbeach.
Waitt, Walter .... Cheltenham.
Wall, Henry Watson .... Coleshill.
Walters, James Lewis............ Burry Port.
Watkins, William H. .... Pontypridd.
Weekes, Ambrose............... Rochester.
White, Thomas Henry............ Whitby.
Wilkinson, Sidney .... Birkenhead.
Wilkinson, William .... Bradford.
Williams, Arthur John Berry... Wolverhampton.
Willington, Joseph Arthur...... Sheffield.
Wilson, John Codner .... London.
Wood, Albert Edward............ Highbridge.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	8	5	3	Lancaster	9	1	8
Birmingham	18	10	8	Leeds	20	10	10
Brighton	5	2	3	Lincoln	9	7	2
Bristol	11	6	5	Liverpool	18	6	12
Cambridge	5	1	4	London	49	19	30
Canterbury	2	1	1	Manchester	22	8	14
Cardiff	7	5	2	Newcastle-on-T.	6	3	3
Carlisle	8	2	6	Northampton	7	4	3
Carmarthen	10	5	5	Norwich	9	3	6
Carnarvon	6	2	4	Nottingham	8	4	4
Cheltenham	6	4	2	Oxford	1	1	0
Darlington	5	3	2	Peterborough	3	3	0
Dundee	4	3	1	Sheffield	10	5	5
Edinburgh	28	13	15	Shrewsbury	6	3	3
Exeter	12	8	4	Southampton	5	2	3
Glasgow	17	9	8	Truro	4	2	2
Guernsey	3	2	1	Worcester	7	3	4
Hull	9	3	6	York	7	2	5
Inverness	2	1	1				

The questions set for examination were as follows:—

Time allowed: Three Hours for the three subjects.

I. LATIN.

1. Translate into English:—

(i.) Ipse de quarta vigilia eodem itinere *quo* hostes ierant ad eos contendit, equitatumque omnem ante se mittit. (ii.) *Diutius* quum sustinere nostrorum impetus non *possent*, alteri se ut coeperant in montem receperunt, alteri ad impedimenta et carros suos se contulerunt. (iii.) *Id* ea maxime ratione fecit, quod noluit eum *locum* unde Helvetii *discesserant* vacare, ne propter bonitatem agrorum Germani e suis finibus in Helvetiorum fines *transirent* et finitimi Galliæ provinciæ Allobrogibusque essent. (iv.) His *rebus cognitis* Cæsar Gallorum animos *verbis* confirmavit, pollicitusque est sibi eam rem curæ futuram; magnam se habere spem et beneficio suo et auctoritate adductum Ariovistum finem injuriis facturum.

2. Parse the words in italics in the above extracts.

3. Decline together *hoc verbum* and *ea res*; and give the principal parts of the verbs *mitto*, *facio*, *duco* and *venio*.

4. Translate into Latin:—

(i.) All the cavalry will be sent by the same route. (ii.) We will betake ourselves to the mountains. (iii.) The general sees that the soldiers cannot sustain the attacks of the enemy. (iv.) The horsemen having been sent accross the river, the Gauls suddenly attack the camp.

II. ARITHMETIC.

[The working of these examples, as well as the answers, must be written out in full.]

1. How many yards of carpet, $\frac{3}{4}$ of a yard wide, will cover a room 16 feet wide and $27\frac{1}{2}$ feet long?

2. If 20 men can reap a field of 105 acres in 6 days of 12 hours each, how long will it take 16 men to reap 126 acres, working 16 hours a day?

3. Multiply the sum of $2\frac{1}{3}$ and $3\frac{1}{4}$ by the difference between $4\frac{3}{7}$ and $2\frac{1}{5}$.

4. Reduce $\frac{47}{32}$ and $\frac{7}{1250}$ to decimals; and reduce $\cdot 5\dot{7}\dot{3}$ to a vulgar fraction.

Multiply 1·525 by 80·08, and divide 31·5 by 126.

5. Give the ratio of a yard to a metre, and of a pint to a litre. Express 7 miles 7 furlongs in metres to four places of decimals.

III. ENGLISH.

1. Define *transitive verbs* and *intransitive verbs*, illustrating your definitions by examples. What difference is indicated by the terms *strong verbs* and *weak verbs*? Give the present tense of the verbs of which *sped, lit, cloven, shorn, gotten, flown* are respectively the past participles.

2. Show, by example, that *after, before*, and *since* may ae used—(i.) as adverbs, (ii.) as prepositions, (iii.) as conjunctions.

3. Parse each word in the following sentence:—"How wretched is that poor man that hangs on princes' favours!"

4. Correct the following sentences, giving your reason in each case:—(i.) Haste as well as waste are to be avoided. (ii.) Anybody may have this, I care not whom. (iii.) Paley's 'Evidences' are a well known book. (iv.) In memory of John Smith, born March 1, 1854, died July 2, 1876.

5. Write a short composition on one of the following subjects:—(i.) The Suez Canal; (ii.) Examinations; (iii.) Ventilation; or (iv.) give an account of some distinguished writer.

BOTANICAL PRIZE FOR 1884.

A Silver Council Medal is offered for the best Herbarium, collected in any part of the United Kingdom, between the first day of May, 1883, and the first day of June, 1884; and should there be more than one collection possessing such an amount of merit as to entitle the cellector to reward, a second prize, consisting of a Bronze Medal, and also Certificates of Merit, will be given at the discretion of the Council. In the event of none of the collections possessing sufficient merit to justify the Council in awarding medals or certificates, none will be given.

Competitors must be Associates or Apprentices or Students of the Society, and under twenty-one years of age.

The collection must consist of phanerogamous plants and ferns, arranged according to the natural system of De Candolle, or any other natural method in common use, and be accompanied by lists, arranged according to the same method, with the species numbered.

The collector must follow some work on British botany (such as that of Babington or Hooker), and state the work he adopts. The name of each plant, its habitat, and the date of collection must be stated on the paper on which it is preserved.

Each collection must be accompanied by a note, containing a declaration signed by the collector, and certified by his employer, or a pharmaceutical chemist to whom the collector is known, to the following effect:—The plants which accompany this note were collected by myself, between the first day of May, 1883, and the first day of June, 1884, and were named and arranged without any other assistance than that derived from books.

In estimating the merits of the collections, not only will the number of specimens be taken into account, but also their rarity or otherwise, and the manner in which they are preserved, and should a specimen be wrongly named, this will be erased from the list.

The collection must be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of July, 1884, indorsed "Herbarium for Competition for the Botanical Prize." After the Prize Distribution in October, collections will be retained one month, under the care of the Curator of the Museum, for the inspection of persons connected with the Society, and then returned to the collector, if required.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

A special meeting of the Council was held at the College of Physicians, Kildare Street, Dublin, on Monday, April 16, at three o'clock, p.m.

Present—Professor Tichborne, President; Dr. Collins, Messrs. Allen, Bennett, Brunker, Draper, Hayes, Simpson and Wells.

The meeting had been called with a view to consider the subject of the compilation of the Pharmacopœia and the advisability of attempting to secure the introduction into the new Medical Acts Amendment Bill (House of Lords) of a clause to provide for the formation of a standing committee of medical men and pharmacists for the purpose of compiling the Pharmacopœia.

After the subject had been discussed at some length with reference to what course should be adopted by the Council in the matter, it was proposed by Mr. Brunker, seconded by Mr. Draper, and resolved—

"That a memorial be drawn up and forwarded to Lord Carlingford, the member of the Government in charge of the Medical Bill in the House of Lords, praying that the pharmaceutical bodies in these Kingdoms shall be represented on the body to whom shall be committed the revision of the British Pharmacopœia."

Proposed by Mr. Brunker, seconded by Mr. Allen, and resolved—

"That a petition be drawn up to the House of Lords, conveying the same prayer, and that it be sent to the President of the Pharmaceutical Society of Great Britain, to be entrusted by him for presentation to such member of the House as he may think best."

The following memorial was then drawn up and agreed to:—

"To the Right Honourable Lord Carlingford,
"Lord President of the Council.

"The Memorial of the President and Council of the Pharmaceutical Society of Ireland—

"Humbly showeth, that this Council has had its attention called to the Medical Bill now before the House of Lords, and the clauses of same refering to the periodic revision of the British Pharmacopœia, and the absence of any provision by which the pharmaceutical bodies of these Kingdoms shall have a voice in such revision.

"They therefore pray that in any body appointed for this purpose due representation shall be accorded to pharmacists, as having special qualifications for aiding in an undertaking of such importance to the country.

"And your memorialists will ever pray.

"Signed on behalf of the Pharmaceutical Society of Ireland,

"Charles R. Tichborne, LL.D., Ph.D., *President.*
"Hugh James Fennell, *Registrar.*"

The Registrar was instructed to forward the memorial to Lord Carlingford, and to have the petition to the House of Lords engrossed on parchment, and forwarded as directed by the above resolution.

The Council then rose.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, April 19, Dr. W. H. Perkin, F.R.S., President, in the chair.

The following certificates were read for the first time:—

C. Beringer, H. E. Harrison, C. Hulke, E. H. B. Stephenson, A. Smith.

During the evening a ballot was held and the following gentlemen were declared by the scrutators, Messrs.

Spiller and Groves, to be duly elected Fellows:—T. L. Briggs, J. A. Basker, J. B. Coleman, W. H. Cannon, E. C. Conrad, C. Gillett, E. C. Hemming, N. K. Humphreys, L. Levy, A. Ness, V. J. Schopoff, A. E. Wilson.

The President called on Dr. Percy Frankland to read a paper on—

The Gases Evolved during the Conversion of Grass into Hay. By P. F. Frankland and F. Jordan.—About 5 grams of finely cut grass were imprisoned in a small retort adapter, which was then filled with mercury, the small end of the adapter corked up, the cork protected by a mercury cup, and the whole allowed to remain over mercury during the observation. In atmospheric air at 15° C. 3 c.c. of gas were evolved in three days and 4 c.c. more in thirty days. The gas in the first case was composed of CO_2, 46·35 per cent., O, ·07 per cent., N, 53·58 per cent.; in the second case CO_2, 85·33, O, 0·00 per cent., N, 14·67 per cent. Other experiments were made in which the grass was surrounded by atmospheres of carbonic anhydride, of hydrogen and of oxygen, with almost similar results; the authors conclude that the atmosphere with which the grass is surrounded has but little influence either upon the volume or the composition of the gas evolved; the grass in every case undergoes a rapid process of oxidation in which it speedily removes all the oxygen from the atmosphere with which it is surrounded, and in the absence of any oxygen in the free state, with which to combine, much carbonic acid is produced at the expense of the combined oxygen present in the grass. When, however, free oxygen is present in the atmosphere surrounding the grass, the gas evolved contains a considerable proportion of nitrogen. At a temperature of 36° C. more gas is evolved than at 15°. In all cases, carbonic anhydride is the chief product of decomposition, whilst hydrogen and hydrocarbons appear in only very small quantities. The authors have made similar experiments as to the gases evolved by grass when kept under water. Large volumes of gas are evolved (about five times as much as in the previous experiments), which are characterized by the presence of a notable proportion of hydrogen, which is doubtless due to the lactic fermentation induced by bacteria; acetic, lactic and probably propionic acids with bacteria being found in the water. If the water contain phenol or mercuric chloride or if the grass be steamed, no gas is evolved.

Dr. Voelcker said the paper was peculiarly interesting, not only from a scientific point of view, but from its direct bearing on the making of hay in wet weather and on the preservation of grass as "ensilage." The changes observed when the grass was immersed in water were those which take place in the "silo." He had examined some "ensilage" from Boston and had found considerable quantities of propionic and acetic acids. These acids are the best preservers of green food; the grass is in fact pickled. Well-made ensilage can be exposed without becoming mouldy; it contains no sugar. It would be interesting to know to what extent, as indicated by loss of weight, the changes observed by the authors had taken place. He had made some observations at Rothamsted, on a stack of hay made in dry weather under the most favourable conditions, and the loss was only 5 per cent.; on the other hand a stack made in wet weather at Cirencester had become so hot that it had to be taken down, and the quantities of carbonic anhydride, aldehyd and acetic acid completely overpowered the men employed. In the lower part of this stack the grass was completely calcined and 5 or 6 pounds of ash were collected. Now it would be extremely interesting to determine quantitatively the loss which grass undergoes when improperly stacked and to study the effect of temperature on these changes.

The President asked if any experiments had been made as to the composition of the combustible gases evolved, whether any marsh gas was present.

Dr. Percy Frankland said he had not been able to weigh the grass after the experiments; and that most of the combustible gas was absorbed by strong sulphuric acid.

Dr. L. T. Thorne then read a—

Note on an Apparatus for Fractional Distillation under Reduced Pressure.—By means of this apparatus, which was exhibited by the author, the various fractions can be removed from time to time without impairing the vacuum and the distillation can therefore be continued from beginning to end without interruption. If the substance under distillation is affected by exposure to the air any inert gas can be introduced instead of air without disturbing the apparatus.

The President said that the apparatus had been in use in his laboratory for some time, it seemed to be very convenient and answered extremely well.

Mr. W. H. Deering then read a paper entitled—

Notes on the Condition in which Carbon exists in Steel. By Sir F. A. Abel, C.B., and W. H. Deering.—Two series of experiments were made; in the first series discs of steel 2·5 in. in diameter and 0·01 in. thick were employed; they were all cut from the same strip of metal, but some were "cold-rolled," some "annealed" and some "hardened." The total carbon was found to be —"cold-rolled," 1·108 per cent., hardened, 1·128 per cent., and annealed, 0·924 per cent. and 0·860 per cent. Some of the discs were submitted to the action of an oxidizing solution consisting of a cold saturated solution of potassium bichromate with 5 per cent. by volume of pure concentrated sulphuric acid. In all cases a blackish magnetic residue was left undissolved. These residues, calculated upon 100 parts of the discs employed had the following compositions:—"cold-rolled" carbon, 1·039 per cent., iron, 5·87 per cent., annealed, C, 0·83 per cent., Fe, 4·74 per cent., hardened, C, 0·178 per cent., F, 0·70 per cent.; so that by treatment with chromic acid in the cold, nearly the whole of the carbon remains undissolved with the cold-rolled and annealed discs, but only about one-sixth of the total carbon is left undissolved in the case of the hardened disc. The authors then give a *résumé* of previous work on the subject. In the second part they have investigated the action of bichromate solutions of various strengths on thin sheet steel about 0·008 in. thick, which was cold-rolled, and contained carbon, 1·144 per cent.; silica, 0·166 per cent.; manganese, 0·104 per cent. Four solutions were used; the first contained about 10 per cent. of bichromate and 9 per cent. of H_2SO_4 by weight, the second was eight-tenths as strong, the third about half as strong, the fourth about one and a half times as strong. In all cases the amount of solution employed was considerably in excess of the amount required to dissolve the steel used. A residue was obtained as before. With solution 1 the residue contained C, 1·021; solution 2, C, 0·969; solution 3, C, 1·049 (the atomic ratio of iron to carbon was $Fe_{2\cdot694}C_1$, $Fe_{2\cdot65}C_1$, $Fe_{2\cdot867}C_1$); solution 4, C, 0·266 per 100 of steel. The authors conclude that the carbon in cold-rolled steel exists, not simply diffused mechanically through the mass of steel, but in the form of an iron carbide, Fe_3C, a definite product capable of resisting the action of an oxidizing solution (if the latter is not too strong), which exerts a rapid solvent action upon the iron through which the carbide is distributed.

Mr. Spiller said that there was, perhaps, a possibility of decomposing the carbide of iron, if all the iron present were deposited, and suggested that it would be preferable to leave a little iron undissolved to prevent this risk.

Mr. Deering said that it seemed to him the only natural stopping point was to dissolve as much as possible with a given solution and examine the residue.

On the Spectrum of Beryllium, with Observations relative to the Position of that Metal among the Elements. By W. N. Hartley.—Owing principally to the difficulty of obtaining beryllium pure, it is still questionable whether beryllium is a triad with atomic weight 13·8 and oxide Be_2O_3, or a dyad with atomic weight 9·2 and oxide BeO. The author has photographed the spark spectrum from a saturated solution of the chloride, prepared from pure oxide presented to him by Dr. Emerson Reynolds, and concludes that beryllium is the first member of a dyad series of elements of which, in all probability, calcium, strontium and barium are homologues.

The Society then adjourned to May 3.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of this Association held on Wednesday, April 11, a paper was read by W. Ralph Dodd, entitled "A Few Hints on Germs in Disease." He stated if there was one subject more than another about which there was so many conflicting opinions, it was the question of germs. He pointed out that bacteria were known as early as 1675, but were looked upon as mere microscopic and scientific curiosities, and that it is only of recent date that their life history has been made out, and they have been relegated to their proper position in the organic world. He stated that they belonged to the order Schizomycetes, the simplest organism of the vegetable world, thriving best in liquids that contain decomposing or decomposable organic matter. They were all semi-cellular and as yet are seen only to reproduce themselves by cell division. Diagrams were shown illustrating the various species of the order: *Bacterium Termo*, associated with ordinary putrefactive change, *B. Limola*, the germ which produces the lactic fermentation of milk, and also other species, with their functions, were described. The incredulity that existed with reference to spontaneous germination was alluded to, and it was mentioned that at one time creatures as high up in the scale as frogs were supposed to be without parental origin, and that caterpillars were thought to be evolved from the leaves upon which they fed. The important part which these organisms play in putrefaction was pointed out, and that in their absence the process was a very slow one indeed. Some experiments of Pasteur, Koch and others on sheep, cattle, silkworms, etc., were cited as showing what relation these organisms bear to the various diseases in the human species, and it was pointed out that no less than thirty zymotic diseases were attributed to the so-called germs. On the other hand some were of opinion that they are not the actual cause of the disease, but rather that they are associated with it, since they do undoubtedly coexist with the disease. Various processes of staining were detailed for the detection of these germs in the tissues of the body for their isolation and cultivation outside of the animal body.

Some interesting microscopic specimens were shown of *Bacillus tuberculosis*, *B. Anthrax*, in lung and liver, from cases of splenic fever, and others, putrefactive bacteria, woolsorter's diseases, etc., etc.

Parliamentary and Law Proceedings.

Poisoning by a Narcotic.

An inquest was held by the Birmingham Borough Coroner (Mr. H. Hawkes), on Saturday, April 21, on the body of Edward Kiernan, 22, manufacturer's clerk, who had been found lying in bed dead. There was a small medicine bottle on the side table empty, and under a book on the table was found a letter addressed to the coroner, in which deceased expressed his intention to commit suicide.

Joseph Lucas, chemist, Colmore Row, stated that on Monday evening deceased called on him, and asked for a mixture of chloral so that he might get some sleep. Witness strongly advised deceased to try and do without narcotics, but deceased said if he did not get something to make him sleep he should have to take a dose of another kind. Finding deceased was determined to have sleeping draughts, witness let him have the bottle produced containing 2 drachms of chloral and 2 drachms of bromide of potassium, 2 drachms of spirit chloroform, and 2 drachms of syrup. This was made up to an ounce and a half, and the direction was that a twelfth of the whole was a dose. If deceased had taken the whole at once it was sufficient to poison him.

A verdict of "Suicide whilst in a state of temporary insanity" was returned.

Obituary.

CHARLES HERBERT HUTCHINSON.

The death is announced, at the early age of 24, of Mr. Charles Herbert Hutchinson. Mr. Hutchinson was a student from 1874 to 1877 in the laboratories of the Pharmaceutical Society, and afterwards studied at Wiesbaden with Professor Fresenius. Upon his return to England he occupied the position of Assistant-Curator of the Pharmaceutical Society's Museum, and then became Assistant to Professor Armstrong, at the London Institution and at the City and Guilds of London Institute in Cowper Street. In 1879 he was elected a Fellow of the Chemical Society, and in the year following began to interest himself in brewing. With this object he studied at Burton-on-Trent, and also at Strassburg, finally becoming proprietor of a brewery in Essex. Mr. Hutchinson was a prominent member of the School of Pharmacy Students' Association. In 1877 and again in 1878 he was elected Vice-President, and for four years fulfilled the duties of Reporter upon Inorganic Chemistry. Many of his Reports have been published in this Journal, and are noteworthy for the concise way in which papers containing the details of scientific work have been brought together and condensed so as to form summaries containing the essential points of long and intricate yet interesting and important researches. The following are the most important of Mr. Hutchinson's contributions:—"The Chemical Constituents of Ivy Berries" (with Mr. R. H. Davies), *Pharm. Journ.*, [3], vii., 275; "Myrtus Chekan," *Pharm. Journ.*, [3], ix., 653; "The Formulæ of some Inorganic Substances," [3], x., 841, and xi., 141; "Berthelot and Ditte's Researches upon the Hydrochlorides of the Metallic Chlorides," [3], xi., 1053; "Soxhlet's Researches upon the Quantitative Estimation of the Sugars," [3], xi., 720, 757; "Quantitative Electrolytic Analysis," [3], xii., 715.

Those who knew Mr. Hutchinson, and there are not a few in pharmacy, will regret the loss of one who stood high in the estimation of all as an able and conscientious worker of great promise, while his familiar friends will sadly miss the exhilarating effect of his amiable fellowship.

Notice has also been received of the death of the following:—

On the 21st of March, Mr. John Watkins, Chemist and Druggist, High Street, Abergavenny. Aged 53 years.

On the 24th of March, Mr. John Anderton, Chemist and Druggist, Northgate, Halifax. Aged 60 years.

On the 2nd of April, Mr. John Reay, Chemist and Druggist, St. Bees, Cumberland. Aged 54 years.

On the 6th of April, Mr. John Allan Paige, Chemist and Druggist, South Street, South Molton. Aged 79 years.

On the 7th of April, Mr. George Walter Brock, Chemist and Druggist, Chelmondiston, Suffolk. Aged 43 years.

On the 7th of April, Mr.

and Druggist, Charles Street, St. John's Wood, London. Aged 55 years.

On the 8th of April, Mr. George Wilson, Chemist and Druggist, Cathcart Street, Greenock. Aged 53 years.

On the 8th of April, Mr. William Howell, Chemist and Druggist, King's Lynn. Aged 29 years.

On the 10th of April, Mr. Frederick Robertson Martin, Pharmaceutical Chemist, Clevedon. Aged 40 years.

On the 12th of April, Mr. George Samuel Drury, Chemist and Druggist, Parrock Street, Milton. Aged 50 years. Mr. Drury had been a Member of the Pharmaceutical Society since 1875.

On the 13th of April, Mr. John Becket Hurst, Pharmaceutical Chemist, Market Place, Louth. Aged 36 years. Mr. Hurst had been a Member of the Pharmaceutical Society since 1870.

On the 21st of April, Mr. Thomas Baker, Chemist and Druggist, Islip Street, Kentish Town, London. Aged 41 years.

Notes and Queries.

[746]. Horse Hair.—Can any of the readers of the *Pharmaceutical Journal* inform me of a process for destroying the yellow pigment in horse hair? That at the root is quite white, becoming yellow or auburn towards the tip. Under 50 diameters the pigment appears crystalline. Of course this must be got rid of without destroying the hair. "Norsk."

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Pharmacy Acts Amendment Bill.

Sir,—The expression of opinion respecting clause 2, which was appended to the resolution carried at the recent meeting in Manchester, might, with advantage, have been more clearly worded, but it was not based upon any misconception or erroneous assumption, as conjectured by you in your leader of last week.

The feeling of the meeting was one of regret that the Council had relinquished the claim, so recently made by them, to include, in the interests of the public, these same "poisonous" articles in the list of scheduled "poisons." In other words, that it had been thought necessary to admit the principle of allowing unregistered persons to sell poisonous articles, *i.e.*, poisons, when the main object of the poison clauses of the Pharmacy Act of 1868 was to limit, as well as regulate, the sale of them. We can hardly be blamed for supporting a view so clearly expressed in the earlier clauses of that Act, and so often and so ably enlarged upon by you on former occasions.

If Parliament will not accept the suggestion that these be added to the list of scheduled poisons, is it necessary to make such a compromising proposition as the one objected to by us?

If it be desirable in the interests of the public to limit, as well as regulate, the sale of poisons, surely it is inconsistent to approve the unrestricted sale of these so-called "poisonous" articles, no whit less deadly than those included in the Poisons Schedule of the 1868 Act. The fact that they have not yet been included is no argument that they ought not to be; the former action of the Council points, indeed, in quite the opposite direction. It was both logical and consistent for us, therefore, to object to the introduction of a clause approving of the sale of these articles by unregistered persons.

I fail to see that there is anything erroneous in our assumption that the particular articles referred to are not less a "part of the materia medica which appertain exclusively to the practice of the arts of pharmacy and medicine," than oxalic acid, corrosive sublimate, cyanide of potassium, vermin killers, etc., which were, with one accord, included in the poisons schedule.

F. Baden Benger,
Hon. Sec. Manchester Chemists and Druggists' Association

Sir,—As you have devoted two columns to our meeting at Manchester, I may venture to ask room for an explanation of the paragraph in the resolution which relates to clause 2. It is perhaps rather unfortunately worded and does not exactly express what was intended by the meeting, but not expecting a whole page of criticism and half a column of editorial lecturing we did not choose our words so carefully as we otherwise might have done. The real intention of the resolution was to express regret that "a legal sanction for the sale of poisonous articles by unregistered persons had been proposed for the first time in a Bill promoted by the Pharmaceutical Society," not that they were to be allowed to sell them. We are not quite so ignorant as not to know that unregistered persons are, and always have been, entitled to sell the articles in question, and, therefore, need no permission for continuing to do so, nor did we wish to interfere with established usage in that respect; but the opinion was very strongly expressed that the great objection to the clause is this,—that legislative sanction having once been given to the sale of poisonous articles by unregistered persons, there was no certainty that it would not, and no reason why it should not, be given to the sale of other poisons, *e.g.*, oxalic acid and some others, and so gradually extended to the whole Poisons Schedule.*

We are quite aware of the real purport of the second clause of the Bill and think we do not need much information about the real purport of any of the others, but did not think it either necessary or desirable to publish our opinions to all the world.

I should have thought that we, in this part of the country, who are accustomed to see them by hundreds of gallons, would hardly be supposed to labour under the "erroneous assumption that the particular articles to which the clause would apply are part of the materia medica which appertain exclusively to the arts of pharmacy and medicine." We do know a little more about them than to entertain such an idea, and though the business carried on by some of us is, unfortunately, of a mixed nature (very mixed), and we should probably be plucked for the Minor, or even the Modified, we do know that oil of vitriol, spirit of salt, aqua fortis and carbolic acid are not used exclusively in the practice of medicine and pharmacy, but are at least sometimes used in manufacturing processes.

I quite agree that it would have been desirable that an expression of opinion from this district "should have been supported by a greater number of those interested in the proposed legislation;" but people have to be thankful for small mercies sometimes, and it is just possible that a larger attendance might not have arrived at the same conclusion, for I have good reason to believe that many of those who stayed away are not merely "indifferent," but a good deal like the old apothecary spoken of by Mr. Giles, and have the same feeling towards the Pharmaceutical Society and all its acts as he had towards the College of Physicians; and, perhaps, do not quite see how a Bill, of which it is said, "that regard for the public safety is the only consideration upon which it can be submitted to the Legislature," should be considered necessary in the interests of pharmacy.

Manchester. W. Wilkinson.

[*** Our correspondent is over modest in being surprised that we should call attention to the proceedings of the Manchester Association, and he is uncharitable in forgetting that, editorially, we also have often to be thankful for small mercies. As regards the point upon which we appear to have incurred the displeasure of our Manchester friends, we do not, however, perceive any reason for altering our opinion as to their misconception, but of course we do not mean to insinuate that it is intentional.—Ed. Ph. Journ.]

* Mr. Frazer's remarks on this subject at page 868 deserve the very serious attention of every one interested in pharmacy.

Parrish's Syrup and Potassium Chlorate.

Sir,—Concerning Mr. Prosser's letter regarding the decolorizing effect of potassium chlorate on compound syrup of phosphate of iron, I beg to state that having made the experiment suggested in his paper I can only agree with his remarks to a certain extent.

I find if Squire's syrup be used no visible alteration takes place during a lapse of six hours, beyond the destruction of the characteristic bright appearance; if, however, the mixture be boiled for twenty minutes it assumes a dark flesh colour. Apparently this is due to the chloric acid, liberated by the free acid present, oxidizing the colouring matter of the cochineal, it behaving in a similar manner towards indigo and other pigments.

7, Poultry, E.C. William Thomas Deeks.

Sir,—The letter of Mr. T. H. Prosser, in the current number of the Journal, is an interesting comment upon the prevailing practice of preparing Parrish's syrup with hydrochloric acid. The fact that the *syrupus phosphatum compositus* being extremely liable, when manufactured on a large scale, to deposit considerably, has furnished the pretext, recommended originally, I believe, by Professor Parrish himself, for the production of a more elegant elixir by substituting for a portion of the free phosphoric acid, a more or less large proportion of HCl.

It is to the presence of this latter body that the decomposition, ascribed by Mr. Prosser to phosphoric acid, is due. Potassic chlorate and hydrochloric acid, dissolved in a large quantity of water, constitutes the well-known *mistura chlorinii acida,* which, besides its medicinal qualities, possesses in an eminent degree the powerful bleaching properties of chlorine.

On the other hand, dilute H_3PO_4 exercises no such undesirable action upon the chlorate; and if, in the case he has described, Mr. Prosser had employed a syrup prepared with this acid, and without the addition of HCl, he would have been spared the unpleasant *rencontre* with the prescriber to which he was subjected. Such a syrup, containing no hydrochloric acid and upon which $KClO_3$ exercises no inconvenient decolorizing powers, was fully described by Mr. S. Daniel, in a paper read at the London meeting of the British Pharmaceutical Conference, and which may be found in the published transactions of that body ('Year-Book of Pharmacy,' 1874, p. 596; and *Pharm. Journal* [3], v., 213).

I would like, ere concluding, to add that I heartily agree with the sentiment expressed in the last paragraph of Mr. Prosser's letter. I have, personally, always assumed that the reason Mr. Baldock's views had finally prevailed, and the 'Dispensing Memoranda' ceased to exist, was that recipes of a sufficiently difficult character had not been forwarded by correspondents to your office for elucidation.

Rock Ferry, Cheshire. J. E. Saul.

Assistants in India.

By the courtesy of Mr. Turner, of Great Russell Street, we are enabled to publish the following extracts from a private letter recently received, which throw further light upon the position of chemists' assistants in India:—

"With regard to myself I have no reason to regret coming out here; I am doing fairly well, with prospects of doing better, and am enjoying my usual good health.

"I had a liberal increase in my salary before I had been out six months.

"I have now got accustomed to the life in Bombay, and made a few friends, so that I am never at a loss to know how to spend an evening.

"When I came out I was put in charge of the laboratory and soda water factory, the former has been transferred to the opposite side of the "compound" to more convenient premises, and I have now got it nearly finished with all the latest improvements for carrying on laboratory work. The soda water factory also is a great item in the business. We have received lately one of Hayward and Tyler's largest and most improved soda water machines which works splendidly. I have over thirty men and boys to look after in my two departments.

"We have just finished another large warehouse specially built for drugs, druggists' sundries and patent medicines, and there is every probability of another one being erected, for the business goes on increasing wonderfully, so much so that five men have been brought out from home during the last twelve months.

"The assistants here are all on a very different footing to those at home; here you are practically your own master in your own department, and of course held responsible as such.

"I should not care to return to the life of an assistant at home again.

"We commence business at 8 o'clock; breakfast at 9 o'clock, and read the daily papers with all the latest intelligence; tiffin at 1 o'clock, to which we take one hour; at 4 o'clock we have a cup of tea and some toast; at 6 o'clock business is finished for the day. On Saturdays we close at 4, dinner at 8 o'clock.

"I joined the volunteers soon after I came out and find the Saturday afternoon parades great fun."

G. A. Paterson.—The subject of concentrated infusions was fully discussed in the earlier volumes of this Journal: see especially vol. xiv. of the first series. The varying results you speak of would appear to have been due to some irregularity in the mode of operating.

"*Herbalist.*"—(a) *Pedicularis sylvatica.* (b) *Chrysosplenium oppositifolium.* (c) *Caltha palustris.* (d) *Arum maculatum.* (e) *Stellaria Holostea.* (f) *Potentilla anserina.*

S. Griffith.—*Equisetum arvense.*

C. T.—*Ornithogalum nutans.*

Cerium.—No apparent decomposition takes place in this mixture; neither does it on standing show any tendency towards the disengagement of gas. Cold water should be used in dispensing mixtures with pulv. tragac. co.; the probable use of the starch is to separate the particles of gum and so facilitate the formation of the mucilage.

J. W. Aplin.—There should be no cloudiness or precipitation when liq. bismuthi is mixed with liq. magnesiæ, if both preparations used are according to the B.P.

Gulielmus.—When liquor bismuthi is ordered in a prescription the liquor bismuthi B.P., should be used. As the difficulty referred to does not occur with the B.P. preparation it needs no further remark. It is sometimes very difficult to determine the nature of the decomposition which takes place when a private preparation is used.

An Assistant (Leeds).—The prescriber has in this instance ordered for one pill the amount of ol. carui usually ordered for a dozen, and the dispenser must act accordingly.

U. A. Coates.—When tinct. quin. ammon. is mixed with plain or medicated water a separation of quinine takes place. If a little mucilage be previously added to the water the quinine will remain suspended in a finely divided condition, and there will be no aggregation of particles as a flocculent separation or as a precipitate.

P. H. and Novice.—A very suitable excipient for these pills is glycerine of tragacanth, made by mixing 1 part of powdered tragacanth with 6 parts of glycerine, allowing the mixture to gelatinize before it is used.

A. J. Rayson.—The disrespectful tone that pervades your letter throughout would render it unsuitable for publication, even if your complaints had a better foundation than they appear to have.

Pyrotechnist.—A recipe for making "Cheltier's Copper" will be found in vol. viii. of the present series of this Journal, p. 619.

F. C. S.—We are not acquainted with any such list.

H. Lambie.—Several communications on the preparation of koumiss have appeared in this Journal. See i., 865; iii., 544; iv., 692; v., 323. A recipe for making an imitation koumiss from cow's milk will be found in vol. ix., 1022.

Botanist.—The announcement for the Botanical Prize for 1884 will be found on p. 892 of this number of the Journal.

Blind.—It has not been published yet, but we hope to insert it in an early number.

Communications, Letters, etc., have been received from Messrs. Moon, Howie, Forrest, Saul, Colonial.

RESULTS OF THE ANALYSIS OF SAMPLES OF CINCHONA BARK GROWN IN JAMAICA.

BY DR. B. H. PAUL.

It having been considered desirable that analyses should be made of the samples of Jamaica cinchona bark, presented to the Museum of the Pharmaceutical Society by the Colonial Office, portions of these samples were placed in my hands for that purpose, and the following table gives the results arrived at.

It will be seen that there is some considerable difference between these results and those referred to by Mr. D. Morris in his notes,* as having been obtained by Mr. John Eliot Howard, and to some extent this is to be accounted for by the fact that the samples analysed by Mr. Howard two years ago were specially selected samples of the richest part of the lower trunk, while those recently presented to the Museum are a fairer average representation of the bark product for sale in Jamaica. This is especially the case as regards the sample of "officinalis," as I have had opportunity of ascertaining by a comparison of my results with those obtained by the analyses of a parcel lately sent over from Jamaica.

	Variety of Plant.	Kind of Bark	Quinine.	Quinidine.	Cinchonidine	Cinchonine.	Amorphous.	Total.
1	*Cinchona officinalis*	Trunk	3·74	0·04	1·77	0·23	0·30	6·08
		Twig	1·08	trace	·37	·60	·20	2·25
		Root	2·90	1·01	·67	4·60	·58	9·76
2	*Cinchona succirubra*	Trunk	2·04	·13	2·58	2·45	·50	7·70
		Twig	·78	—	·47	·23	·29	1·77
		Root	1·76	·34	1·39	4·40	·90	8·79
3	Hybrid?	Trunk	2·47	—	2·24	·90	·52	6·13
		Twig	1·00	—	·87	·40	·36	2·63
		Root	2·45	·57	2·02	3·54	·56	9·14
4	*Cinchona Calisaya*	Trunk	·34	·23	·82	·82	1·80	4·01
		Twig	—	—	—	—	—	1·30
		Root	trace	4·07	·45	1·80	·65	6·97
6	*Cinchona micrantha*	Trunk	1·13	·30	·67	3·24	·68	6·02
		Twig	·43	—	·28	·60	·50	1·81

The data in the foregoing table are also interesting in some other respects: thus, for instance, the large proportion of quinidine in the root bark of the "calisaya" sample is quite exceptional, and taken together with the small amount of quinine may perhaps be evidence of unhealthy growth or of the influence of unfavourable conditions of soil or climate. This small amount of quinine may, however, be due to the circumstance, referred to by Mr. John Eliot Howard at the Linnean Society last Thursday evening, that the plants sent to Jamaica as "calisaya" were really plants of *C. micrantha*, var. *Calisayoides*, instead of the true *Ledgeriana*, characterized by the large amount of quinine contained in the bark. Again, the amount of quinine in the "succirubra" sample shows that there is a very good type of this cinchona being cultivated in Jamaica.

While referring to these analyses it may perhaps be useful to publish some analyses made by me in 1878 of some of the first samples brought from Jamaica by Mr. R. Thomson. These samples were all very thin and green, probably having been taken from very young trees. The results furnished by the dried bark are as follow.

A comparison of these results with those furnished by the samples of bark presented to the Society's Museum shows such differences as may be taken to justify the inference that with further growth there has been in most instances an improvement in the quality of the bark. In the "succirubra" samples there is on the average more than twice the amount of quinine, and in the "officinalis" samples there is a considerable increase. In the case of the samples represented as "calisaya," however, the reverse is the case and this may be due to the bark having been derived from different varieties of that species.

	Quinine alkaloid. Per cent.	Cinchonine alkaloid. Per cent.	Cinchonidine alkaloid. Per cent.	Moisture. Per cent. in bark as received.
1 *Species uncertain*	0·95	0·20	1·39	34·7
2 *Succirubra*— From bridge at old foundation	0·98	1·30	2·92	10·0
3 *Succirubra*— From Latimore River	1·23	4·24	1·88	10·25
4 *Calisaya*— Facing William "Puv" (*sic*)	2·52	Traces.	4·04	11·25
5 *Officinalis*— Latimore River	2·27	0·20	5·46	8·50
6 *Officinalis*— From Monkey Hill	2·77	Traces.	0·58	13·0

* *Ante* p. 802.

EXPLOSIVES AND MATERIALS FOR EXPLOSIVES.

A copy of the following Circular, addressed to local authorities under the Explosives Act, has been forwarded from the Home Office, by direction of Sir William Harcourt, Secretary of State for that department, with a request that it might be published in the *Pharmaceutical Journal*:—

"Home Office,
"18*th April*, 1883.

"Sir,—I am directed by the Secretary of State to inform you that it appears to him desirable that the attention of the local authorities and of the police should be directed to the importance of exercising special and vigilant observation with a view to preventing the acquisition by persons for unlawful objects not only of explosives adapted for such purposes, but of the materials with which, if possessed of a little technical knowledge, they would be able to manufacture explosives.

"With a view to assisting you in exercising such observation, I beg to enclose a memorandum which has been drawn up by H.M. Chief Inspector of Explosives, and which enumerates the more important of the materials which are capable of being more or less readily applied to the production of explosive.

"It would be desirable that you should take immediate steps to bring this circular under the notice of all pharmaceutical chemists, chemists and druggists, drysalters, oil and colourmen, and manufacturers of or dealers in chemicals within your jurisdiction, and otherwise obtain for it such publicity as may be practicable in order that any suspicious cases of purchase or possession may be promptly brought under the notice of the police.

"I am at the same time to call your attention to certain provisions of the Explosives Act, 1875, *e.g.*, section 69, which directs that 'It shall be the duty of every local authority to carry into effect the powers vested in them under this Act,' and to the powers of appointing officers (sections 69 and 75), and the considerable powers of search and seizure conferred by sections 73, 74, and 75. You will not fail to observe that section 73 gives a power to search for ingredients of an explosive as well as for the explosive itself, while the Explosive Substances Act, 1883, which incorporates the same powers, extends them to the search for and seizure of any apparatus for firing explosives.

"Section 23 of the Explosives Act, 1875, imposes upon the occupiers of factories, magazines, stores, and registered premises the obligation of taking all due precautions for preventing unauthorized persons having access to the factory, magazine, or store, or to the explosive therein or in the registered premises, and attention should be at once called to any case in which it may appear to the local authority that this obligation is imperfectly discharged. The local authorities should also require their officers to direct the particular attention of the occupiers of all stores and registered premises within their jurisdiction to this obligation.

"I am also to insist upon the importance of the local authority availing themselves of the powers which the Explosives Act of 1875 confers upon them of appointing competent officers to carry out the Act within their jurisdiction; and these officers should be enjoined to direct their particular attention to the prevention by every means in their power of the illegal manufacture and possession of explosive.

"I am to add that a reward of £100 will be given to any person (other than a person belonging to a police force in the United Kingdom) who furnishes information which may lead to the discovery and conviction of any person who may be engaged in the illegal manufacture of explosive, in any case in which it is shown to the satisfaction of the Secretary of State that such illegal manufacture constituted a serious infraction of the law, and was being carried on for a criminal purpose.

"I am, Sir,
"Your obedient servant,
"A. O. F. Liddell."

"*Memo.*

"Independently of the purchase of explosives (such as dynamite, blasting gelatine, guncotton, tonite, potentite, and detonators) specially adapted for blasting, and therefore generally available for destructive purposes, by persons who may not be reasonably supposed to require the same for industrial objects, suspicion should attach to the acquisition in notable quantities of all or any of the materials adapted for the making of explosives when the person seeking to purchase the same is unknown to the seller, or is not known to require such materials for trade purposes or other legitimate use.

"Among the substances which fall within this category may be specially enumerated the following:—

Nitric acid } especially in their more concen-
Sulphuric acid } trated forms.
Glycerine.
Saltpetre.
Chili saltpetre (nitrate of sodium).
Chlorates (especially chlorate of potash).
Picrates.
Picric acid.
Phosphorus.
Iodine }
Metallic mercury } Even in comparatively small quantities.
Nitrate of mercury }
Orpiment.

"V. D. Majendie, *Colonel*,
"*H.M. Chief Inspector of Explosives.*"

DEODORIZED COD LIVER OIL WITH IRON.*

BY W. A. HENRY.

Take of—

Cod liver oil	1 pint.
Sulphate of iron, dried	64 grains.
Castile soap, powdered	128 grains.
Charcoal, powdered	1 ounce.
Coffee, ground	½ „
Or,	
Chocolate, powdered	¼ „
Hot water	q.s.

Dissolve the sulphate of iron and Castile soap, each separately in a sufficient quantity of hot water, mix the two solutions, and after washing the resulting precipitate (oleate of iron) with water, triturate the oleate in a mortar with the cod liver oil (previously heated in a water-bath) gradually added; then the remaining ingredients, subject the whole to a water-bath for an hour, and filter, while hot, through paper or flannel.

The oleate of iron, which each tablespoonful of this preparation contains, is equivalent to nearly 1 grain of the sulphate of iron. To increase the quantity of iron in the above formula, twice the amount of the sulphate and soap may be used; the preparation would then contain oleate of iron equivalent to nearly 8 grains of sulphate of iron to the fluid ounce, or 1 grain to a teaspoonful, the latter modification being adapted to the administration of small doses of the oil.

The preparation has a dark brown, almost transparent appearance, the oleate of iron combining readily with the warm oil. It retains only a faint odour of cod liver oil, the charcoal assisting as a deodorizing agent, and the chocolate or coffee adding flavour to the same. It has the advantage of being acceptable to persons who would reject the oil in its unmodified form.

* From *New Remedies*.

The Pharmaceutical Journal.

SATURDAY, MAY 5, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE MEDICAL COUNCIL AND PHARMACOPŒIA REVISION.

WE learn from the medical journals that the British Pharmacopœia is again to be placed upon the stocks, for repair of such dilapidations as in the lapse of time naturally result from the progress of knowledge rather than any other cause. The sixteen years that have passed since the work was last in hand have been so fertile in additions to our chemical science, to our materia medica, and in applications of science for the purposes of medicine and surgery, that it is full time the standard authority in accordance with which pharmacists are bound to regulate the execution of their duties should be brought to the level of the time.

The responsibility of carrying out this work from time to time is by law entrusted to the General Medical Council, and although that body as at present constituted has probably but a brief existence to look forward to, it has been deemed expedient in the face of that prospect to provide for the preparation of a new edition of the Pharmacopœia. The Committee appointed last July for this purpose consisted of Drs. QUAIN, AQUILLA SMITH, PITMAN and HALDANE, and Messrs. COLLINS, BRADFORD and MACNAMARA. At its first meeting a Sub-Committee was empowered to take such steps as were thought necessary towards preparing the new edition and to report thereon. At the late meeting of the Medical Council the Pharmacopœia Committee presented a report, showing that the Sub-Committee had communicated with Professors REDWOOD, BENTLEY and ATTFIELD, as to undertaking the duty of preparing a new edition of the Pharmacopœia under the direction of the Committee; that these gentlemen had submitted a report which, subject to certain modifications recommended by the Sub-Committee, had been approved of, and that an arrangement had been made to pay them a sum of £800 as their remuneration for the work of carrying out any experiments required, correcting the press, and preparing an index to the satisfaction of the Committee.

From the report of the Professors it appears that the negotiations relating to this arrangement have been in progress since last November, and that some time prior to the date of the report, the Pharmacopœia Committee had given instructions for the work of revision to be proceeded with. The Professors then go on to explain such changes as they think requisite, and assuming the general arrangement of the matter in the Pharmacopœia to be satisfactory they direct attention mainly to chemical nomenclature and notation, and to the mode of representing quantities of ingredients in preparing medicine. The recommendations in regard to the former subject embody the views propounded some years ago by Professor ATTFIELD and subsequently adopted in the United States. It is also proposed to discontinue the use of symbolic notation according to the old system, and to indicate that chemical formulæ have a somewhat qualified meaning in regard to the commercial forms of such articles as cream of tartar. This will, perhaps, be of benefit to public analysts afflicted with a mania for impossible purity, and it may be useful in preventing them from troubling without reason.

In regard to the subject of proportional weights reference is made to the comments upon it in the preface to the Pharmacopœia, and the reasons there given for not adopting the metric system as being in their general bearing applicable now with almost as much force as when they were written; but with the view of facilitating and promoting the more general use of metric weights and measures it is suggested that proportional parts should be substituted for specific weights and measures wherever it be applicable in the description of processes. It is not recommended that this change should be carried so far as to adopt parts by weight for liquids as well as solids, as has long been the case in Germany and is now in the United States, but it is thought that, with few exceptions, parts might be substituted for specified weights and measures with advantage, the term "parts" being used to represent parts by weight, and the term "fluid parts" to indicate the volume of the specified number of parts of the same value of water. This method of representation will be adopted side by side with the present method in the new edition of the Pharmacopœia, and it will thus be seen that in describing or interpreting a process by the new method, all the proportional numbers applied to the process must refer to one and the same denomination of weight or measure. It is pointed out that in the great majority of cases the quantitative relation of ingredients in the processes is simple, and the application of the new method would be obvious and easy; but some processes would require to be reconstructed and, in a few instances, it will be necessary to make a slight alteration in the proportions of the ingredients. The only cases in which the method is inapplicable are those of the enemas and inhalations, and the formulæ of these will be left as exceptions to the general practice.

The advantages anticipated from the adoption of this method are—that the use of proportional numbers will tend to the simplification of proportions in compounded medicines; that the proportions given being equally applicable to either of the two systems of weights and measures, a way will be opened to the more general use of the metric system; that the processes of the B.P. will be more intelligible to medical men and pharmacists abroad who are accustomed to use the metric system exclusively; and that thus provision will be made for the assimilation of medicines bearing the same names in different Pharmacopœias.

So far as relates to the introduction of new drugs or preparations, and the elimination of any that have proved to be unnecessary, the report of the professors witholds any opinion as to specific articles until opportunity has been offered for investigation and consultation with the Pharmacopœia Committee and with such medical and pharmaceutical authorities as it may think should be consulted. A more decided view is expressed on the alteration of processes, as well as of descriptions and definitions of substances, and it is justly stated that in this direction there is room for improvement involving much experimental work. The same will also be needed in connection with the chemical processes generally, and for extending and rendering more complete the application of chemical tests.

The satisfaction with which pharmacists might be expected to regard the prospect of a speedy revision of the British Pharmacopœia may, however, be very considerably modified, if the reports given in the medical journals as to the arrangements that have been made for the execution of the work convey a complete account of those arrangements. It is true that the Committee makes mention of an intended application to the Pharmaceutical and Chemical Societies, as well as to the several medical authorities and such persons as may be likely to furnish useful information for making the Pharmacopœia as complete as possible; but this is a proceeding that would not travel beyond the necessities of the case so far as the Committee is concerned, and it does not seem, so far as we can gather from the published reports, to comprise any consideration for the views respecting the representation of pharmacy that have of late years been put forward and supported by forcible arguments derived from the nature of the work to be done as well from the usage of other civilized countries.

Whether the want of information on this point is due to deficiency in the reports or not, it is certainly matter for surprise that the revision of the Pharmacopœia should now appear to have been for many months under consideration by the Medical Council without any communication on the subject having been made to the Council of the Pharmaceutical Society. Is it to be inferred that some malign influence hostile to the Society dominates the proceedings of the Pharmacopæia Committee, or is that body unmindful of the necessity for recourse to practical pharmacists for assistance in the preparation of a Pharmacopœia? It would, we think, have been easy on the part of the Pharmacopœia Committee of the Medical Council to place this matter in a position satisfactory to pharmacists and calculated to ensure the attainment of the objects which that Committee has in view, by communicating to the Council of the Pharmaceutical Society the plan contemplated for the revision of the Pharmacopœia and asking the advice and support of the Society in carrying it out. Certainly, the absence of any such communication with the body which represents pharmacy bears the appearance of a slight, whether it be intentional or not, and we cannot refrain from expressing our great surprise that without such a step the arrangements for the revision of the Pharmacopœia should have been carried so far as they appear to have been. Nor is our surprise lessened by the circumstances that the Pharmacopœia Committee has entered into arrangements for engaging experts to carry out the work of revision in regard to chemistry, materia medica and practical pharmacy, and that the experts requested and willing to undertake the duty of preparing a new edition of the Pharmacopœia, without any official recognition of the Pharmaceutical body, are the Society's Professors.

NOMINATION OF LOCAL SECRETARIES.

Probably before the publication of another number of this Journal the Members and Associates in Business of the Pharmaceutical Society will be in receipt of the voting papers for the forthcoming election of Members of Council and Local Secretaries. This will, therefore, be a timely opportunity for calling attention to a form of abstention from voting which it is especially important shall not obtain to any extent this year: we refer to the omission of a large number of provincial voters to fill in the papers relating to the office of Local Secretary. The extent of this default may be estimated from the statement made last year by the Secretary, that whilst the number of towns entitled to appoint a Local Secretary was three hundred and three, nominations for the office had been received from only one hundred and ninety-two. Such a condition of affairs, if existing at certain conjunctures, might deprive the Society of one-third of its political strength. It will be seen, for instance, from the report of the proceedings of the Council on Wednesday, that it may become desirable at an early date to support the action of the Council in respect to Pharmacopœia revision by the presentation of petitions from every district, and in other ways to bring local influence to bear upon members of Parliament; but it must be evident that it will be difficult to do this effectually in places where the pharmacists have neglected to provide the most elementary means for securing prompt intercommunication and co-operation. Nor is this the only subject upon which it may become necessary for the trade to make its influence felt during the present or the next session of Parliament, and it is, therefore, to be hoped that each voter will make a point of nominating as Local Secretary the man whom he may deem most competent to serve the Society in this direction.

At the meeting of the Linnean Society last Thursday, a paper was read by Mr. John Eliot Howard bearing on some important questions in reference to the cultivation of cinchonas as a source of quinine-yielding bark. Want of space prevents our referring more at length to this paper in the present number, but we hope to have an early opportunity of giving a *résumé* of Mr. Howard's views.

* * *

On Friday, the 27th ult., the Medical Acts Amendment Bill was read a third time in the House of Lords and passed, and on Wednesday it was read a first time in the House of Commons, Mr. Mundella's name being on the back of the Bill. As a last finishing touch, before parting with the Bill, their Lordships eliminated the Apothecaries' Society of London from the list of bodies that would be entitled under its provisions to send representatives to the "Medical Board" entrusted with the carrying out of the "final examinations in England for the admission of candidates to registration as medical practitioners." The Society does not seem to have mustered a single defender, and even the Lord President admitted that its claims to representation were of the slightest. So that, as the Earl of Camperdown put it, the Society of Apothecaries will, if the Bill passes in this form, lose its power of granting licences to medical candidates, and it may, therefore be expected that its degree and diploma will not be sought after with so much avidity in the future. The Bill is set down for second reading on Thursday next.

* * *

An attempt made by the chemists and druggists' assistants of Walsall to obtain from their employers the boon involved in closing their establishments on Monday and the three following evenings in each week at eight o'clock has been fairly successful, ten out of thirteen employers having promised to conform to the rule.

* * *

We regret to have to record that on Thursday, April 26, another annuitant, Mr. William J. Froom, passed away at the age of eighty-one, the immediate cause of death being cerebral hæmorrhage. Mr. Froom was formerly in business at Exeter, and was one of the Founders of the Pharmaceutical Society. He was elected at the second election of Annuitants, in the year 1866.

* * *

Some little amusement has been caused by a paragraph that has gone the round of the press to the effect that an experiment consisting in the explosion of a thimbleful of dynamite under water, made by Mr. Allen, of Sheffield, to illustrate a lecture he was delivering in Firth College on the "Chemistry of Explosives," resulted in the destruction of the containing bucket and the scattering of the water over a portion of his audience. In an explanatory letter that appeared subsequently Mr. Allen deprecates exaggeration, and states that the explosion occurred exactly as arranged, and that the scattering of the water and the tearing open of the bucket were effects fully anticipated. It is not surprising, however, that some of the audience who did not share Mr. Allen's expectations should have come to a different conclusion and made a hasty retreat from his demonstrations.

* * *

In a paper published in the *Chemical News* (April 13, p. 169) Professor Bloxam states that removal of the nitro radicle from nitro-glycerine can be safely effected by treatment with potassium or ammonium sulphide, or the solution produced by boiling flowers of sulphur and slaked lime together in water. This last, though somewhat more slow in its action and requiring most agitation, would furnish the cheapest method of decomposing nitro-glycerine, unless it were found that the "calcium sulphide" from the tank waste of alkali works could be substituted for it. The nitro-glycerine is poured into the sulphide liquor, and after a few minutes' stirring the reduction appears to be complete, free sulphur being deposited.

* * *

The *Pharmaceutical Record* tells a strange narrative of a recent occurrence in the Insane Asylum at Staunton, Va., in which institution it is the custom to dispense the medicines for the patients in single doses in mugs. It is supposed that whilst three trays full of these mugs containing medicines were waiting for the nurses to take them into the respective wards some person tampered with the contents, for immediately after the administration of the medicines, which were supposed to be limited to iron and quinine tonics and an anodyne mixture containing fluid extract of hyoscyamus, some of the patients complained of the effects, and within ten minutes several had died, whilst two others died after two hours, and another after two days. *Post mortem* examinations disclosed the presence of aconitine, as much as four-fifths of a grain being recovered from one stomach, some of it in a crystalline condition. That the results were attributable to tincture or fluid extract of aconite is thought impossible, and, moreover, the dispensary stock of these two preparations was found undisturbed. To add to the mystery, no aconitine was known to be in the asylum, and it was not kept in stock by any chemists in the town.

* * *

It is reported to be the intention of the French Government to lay before the Legislative Assembly a Bill having for its object to increase the annual pension to M. Pasteur, voted some time since, from 12,000 to 25,000 francs, with reversion to his wife and children.

* * *

It has been decided to adopt for the new Codex, in respect to degrees Baumé, the experimental results of Messrs. Coulier, Berthelot and d'Almeida, as embodied in a report which was printed in this Journal in the year 1873 (vol. iv., p. 470).

* * *

According to the *Pharmaceutical Record* the police authorities of Washington, D.C., have issued warrants for the arrest of fourteen druggists for violation of the local Pharmacy Act, in the employment of "clerks" that were not registered pharmacists or assistants.

* * *

At a meeting of the School of Pharmacy Students' Association to be held on Thursday next, May 10, at 8 p.m., a paper on "Acetic Acid and its Derivatives" will be read by Mr. H. S. Elworthy, and a Report on Pharmacy will be made by Mr. R. A. Cripps, consisting of "Notes on the United States Pharmacopœias."

* * *

A meeting of the London Section of the Society of Chemical Industry will be held on Tuesday next, the 8th inst, when a paper on "Secondary Batteries," by Mr. C. T. Kingzett, will be read.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, May 2, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, Hills, Radley, Richardson, Robbins, Savage, Schacht, Symes, Williams, Woolley and Young.

The minutes of the previous meeting were read and confirmed.

The following, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Austin, Alfred.
Holmes, James Henry.
Levett, Herbert.
Marsh, Edward.
Pidgeon, Joshua David.
Ransom, Francis.
Smith, William Thomas.
Spencer, George.
Stephenson, Stephen.
Townsend, Henry Holden.
Tyson, Thomas Balmforth.
Worsley, Albert George.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Burton, Walter......Geneva.
Deeks, William Thomas......London.
Fisher, Harry......Bristol.
Fletcher, James Edward......London.
Foggitt, John Blackett......Thirsk.
Holmes, James Henry......Kendal.
Levett, Herbert......Bodiam.
Marsh, Edward......Luton.
Parker, William Henry......London.
Ransom, Francis......London.
Shephard, William Arthur......Gt. Malvern.
Smith, William Thomas......Bridgnorth.
Spencer, George......Hitchin.
Stephenson, Stephen......Llyn y mawn.
Townsend, Henry Holden......Bristol.
Tyson, Thomas Balmforth......London.
Worsley, Albert George......Folkestone.
Wright, Robert......Buxton.
Yeatman, Frederick James......London.

Chemist and Druggist.

The following registered chemist and druggist, who was in business on his own account before August 1, 1868, having tendered his subscription for the current year, was elected a "Member" of the Society:—

Pullan, John Richard......Harrogate.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Anderson, James......Dundee.
Bates, Frederic William......Manchester.
Baxter, William Smith......Bradford.
Beacock, Joseph Henry......Leeds.
Birkbeck, John Thomas......Lincoln.
Boon, Nathaniel......Kirton Lindsey.
Burroughs, George Henry......Oxton.
Bush, Robert......Norwich.
Chambers, Herbert......Brighton.
Chapman, Walter......London.
Clare, John......Scarborough.
Coslett, Thomas Watts......Brierley Hill.
Dickinson, John George......Lancaster.
Duncalf, Thomas Henry......Macclesfield.
Elliott, Henry......Kimberley.
Fraser, Alexander......Liverpool.
Harwood, George Rosamond......Forest Hill.
Jackson, Henry Lawson......London.
Jenkins, Evan......New Southgate.
Jones, Charles William......Ashby-de-la-Zouch.
Jones, Thomas Glynne......South Stockton.
Lloyd, Walter......Carmarthen.
McGregor, Donald......Leith.
Michie, Charles Coutts......London.
Morgan, William John......Great Bridge.
Need, John......Gt. Malvern.
Newton, George Harry......Ashton-under-Lyne.
Phethean, James......Bolton.
Russell, John William......Dundee.
Saunders, Thomas Samuel......London.
Skinner, Robert......London.
Taylor, Henry......Marple.
Thomas, Thomas Rees......Burry Port.
Thorpe, Thomas Frederick......Northampton.
Treharne, Frederick Gwilym......London.
Walker, Charles Joseph......Ramsgate.
Walton, Frederick George......Darlington.
Wastie, Francis......London.
Weddle, William......Grangetown.
Winpenny, Frank Walker......London.
Woollings, Frank......London.

Modified.

Cleaver, Edward Orlando......Croydon.
Davies, Charles Edward......Hersham.
Speight, Robert......London.
Streater, James Hobbs......London.
Thomas, Joseph Josiah......Porthcawl.
Troake, Charles Francis......Southampton.
Wrighton, Alfred......Ilfracombe.

ASSOCIATES.

The following, having passed their respective examinations and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Badcock, Harry Digby......Ottery St. Mary.
Banbury, Richard......Camelford.
Barnes, James Burdon......Knightsbridge.
Bayley, Cornelius......Boston.
Baily, Edward......Ramsgate.
Beckett, Harry Rumbold......London.
Bishop, Cecil......Brading.
Boyden, John Augustus Chas......Wisbeach.
Chattaway, William......Leicester.
Corder, Walter Shewell......Sunderland.
Crow, William Edward......Louth.
Cubey, Robert......South Shields.
Cunningham, Oscar William......Norwich.
Dulley, David......Wellingborough.
Dymond, Thomas Southall......Bristol.
Elstob, John......Richmond
Ensor, John Thomas......Birmingham.
Foster, Henry Simpson......Rotherham.
George, Isaac......Gt. Yarmouth.
Gill, William......Nottingham.
Gradidge, James Henry......Truro.
Granger, Harold......Nottingham.
Harrison, James Hughes......Sheffield.
Harvey, Frederick......Margate.
Haynes, Joseph Alfred......Fairford.
Healy, Joseph......Leicester.
Hill, John......Alford.

Holwell, Alfred ....Loughborough.
Hopkins, William Richard.......Aberystwith.
Jamieson, Simpson ....St. Andrews.
Jary, Joseph James...............South Shields.
Jeans, Alfred.........................Mansfield.
Jones, John Wesley...............Llanelly.
King, Arthur ....Norwich.
McNeilage, Alexander............Greenock.
May, Samuel Augustus ....Jersey.
Midgley, Walter ....Keighley.
Painter, Frederick Hubert......London.
Parker, Chas. Henry Mitchell...South Molton.
Phillips, Sidney ....Wolverhampton.
Presbury, Herbert Henry ......London.
Rednall, William Rush ....Northampton.
Roberts, Arthur Harry ....Barrow-in-Furness.
Rye, Frank ....Northampton.
Skyrme, Henry Edward ....Cardiff.
Slater, James Morrieson ....Loftus-in-Cleveland.
Stevens, Chas. Wm. Davis ......Upper Norwood.
Talbot, William Widdowson ...Bulwell.
Taylor, Ernest Sanderson ......Grantham.
Toplis, John Walter...............St. John's Wood.
Walker, George John ....Revesby.
Williams, William Lloyd ......Buckley.
Willoughby, Arthur John ......St. Leonards.
Wilson, Richard ....Kidderminster.

Modified.

Crosby, John.........................Lincoln.
Jones, William Shepherd ......Southport.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Alexander, William Maxwell...Dundee.
Allez, Peter Arnold...............Guernsey.
Angel, Alfred ....Guernsey.
Bagshaw, George William ......Kenilworth.
Baker, William Herbert.........Cosham.
Baker, Willliam James ....Bradford.
Beaton, Hugh ....Woodside.
Bellamy, Francis Alan ....Streatham.
Brassington, Herbert William..Rugeley.
Breese, Charles......................London.
Bromwich, Thomas ....Dudley.
Carter, Joseph Montague ......Manchester.
Charge, Arthur William..........Chichester.
Clayton, William Hatch..........Newcastle-on-Tyne.
Coulter, Charles ....Walthamstow.
Davis, George David ....Malvern Link.
Downing, Samuel...................Braintree.
Drysdale, Robert ....Dalmeny.
Ellingworth, Alfred Thomas ...Bromsgrove.
England, Reginald Arthur ....London.
Field, Reeve Holyoake ....Birmingham.
Fitton, Robert ....Huddersfield.
Flint, Charles ....Stratford-on-Avon.
Foss, Walter Edwin ....Broadway.
Galt, Thomas James ....Thornley.
Gass, George Muncaster ....Whitehaven.
Gibbons, Alfred John ....London.
Green, Walter ....Hendon.
Hopley, David ....Goole.
Jackson, Thomas ....Altrincham.
Jones, John Lewis ....St. Asaph.
Kay, Charles William ....Leeds.
Keene, Bernard ....London.
Lane, Henry Charles George ...Salisbury.
Lewis, Thomas Wright ....Bloxwich.
McDonald, Alexander Minto...Edinburgh.
Makepeace, Alfred Joseph ......Nuneaton.
Millbanke, William Byron......Sunderland.
Moffat, John Archibald ....Whitehaven.
Neish, William.......................Aberdeen.
Norman, Arthur Henry ....Newmarket.
Openshaw, John Wm. Walker..Lower Darwen.
Palmer, Frank Thomas ....Cheltenham.
Poole, Weston ....Newcastle, Staffs.
Tilsley, James Henry ....Berriew.
Watson, Arthur John ....Great Bridge.
Watson, David Sydney ....London.
Wells, Arthur John................Leamington.
Wilson, John Codner ....London.
Wood, Charles Granville.........Oldham.
Yates, Charles George............Brighton.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

RESTORATIONS TO THE REGISTER.

The following persons having severally made the required declarations and paid a fine of one guinea, their names were restored to the Register of Chemists and Druggists:—

Edwin John Frith, 50, Westminster Bridge Road, London, S.E.

Nathan Moore Green, 34, Fox Street, Liverpool.

George Francis Hart, 53, Albert Row, Southwick, Sunderland.

REPORTS OF COMMITTEES.

FINANCE.

The report of this Committee was read and adopted, and various accounts ordered to be paid. The Committee also recommended that £3000 on the General Fund be placed on deposit at the London and Westminster Bank.

The Council went into committee to consider the question of re-investment in ground rents. After considerable discussion, the Council resumed, and it was resolved that Mr. Butt's name be added to the Committee entrusted with this matter.

The Council again went into committee and discussed for some time the regulation under which fines are imposed on members who have left the Society and desired to return.

It was decided to refer the whole subject to the consideration of the Library, Laboratory and Museum Committee, to report at the next meeting of the Council.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£20 to the widow and the daughter of an associate and member from 1841 to 1877, to assist the applicants in emigrating, providing a certain additional sum be raised by their friends.

£10 to a former associate and member, aged 65, who has had two previous grants.

£10 to assist in the education of two orphan children of a late associate.

£10 to a registered chemist and druggist, aged 76.

The report and recommendations of the Committee were received and adopted.

LIBRARY, MUSEUM, LABORATORY, AND HOUSE.

Librarian's Report.

This report stated that the report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
March	Day	687	37	11	28
	Evening	189	17	3	10

Circulation of books.	No. of Entries. Town.	Country.	Total.
March	176	123	299

Carriage paid, £2 6*s.* 2*d.*

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Berichte d. deutschen chemischen Gesellschaft, 188?.
Journal of the Chemical Society, 1882.
From Mr. WALTER HILLS.
Foster (M.), Text-book of physiology, 4th ed., 1883.
From the AUTHOR.
Hoffmann (F.) and F. B. Power, Manual of Chemical Analysis, as applied to the examination of medicinal chemicals, 3rd ed., 1883. From the AUTHORS.

The Committee recommended the purchase of the undermentioned works for the Library:—

Ogilvie (J.), Imperial Dictionary of the English Language, new ed., by C. Annandale.
Sprague (J. T.), Electricity, 1875.

The Committee also recommended the purchase of the undermentioned works and periodicals for the Society's Library in Edinburgh:—

Dorvault's L'Officine.
Stillé and Maisch's National Dispensatory.
United States Pharmacopœia.
British Homœopathic Pharmacopœia.
Hager's Handbuch der pharmaceutischen Praxis.
Ringer's Handbook of Therapeutics.
Quain's Dictionary of Medicine.
Sachs' Text-book of Botany.
Lindley and Moore's Treasury of Botany.
Payen's Industrial Chemistry.
Roscoe and Schorlemmer's Treatise on Chemistry.
British Medical Journal.
Lancet.
Edinburgh Medical Journal.
Nature.
Chemical News.
New Remedies.
Journal of the Chemical Society of London.
Proceedings of the Royal Society of London.

Curator's Report.

The Curator had reported that the attendance in the Museum had been:—

	Total.	Highest.	Lowest.	Average.
Morning .	483	33	11	20
Evening .	105	11	0	5

The following donations to the Museum had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

A complete and valuable collection of the barks, and of Herbarium specimens of the Cinchona trees cultivated in Madras. Forwarded through HER MAJESTY'S SECRETARY OF STATE FOR INDIA.
Specimens of pure Aldehyde and Metaldehyde.
From Messrs. HOPKIN AND WILLIAMS.
Specimens of the leaves of Sethia acuminata, of Mollugo cerviana, of the resin of Semecarpus Gardneri and of the Fruits of Randia dumetorum.
From Dr. ONDAATJE, Ceylon.
Specimens of crude and refined Ozokerit; and of elastic Bitumen, from Castleton, in Derbyshire.
From Mr. L. FIELD.
Specimen of Wild Belladonna root.
From Mr. H. B. JOHNS, Southampton.
A basket of Elemi from Manilla, being an unusual form of package for the drug.
From Messrs. EVANS, LESCHER AND WEBB.
Fine pod of Bourbon Vanilla (*V. Pompona*).
From Mr. EMIL SELBERG.
Specimens of Madras and Bombay and Cochin Nux Vomica seed. From Mr. T. WHIFFEN.
Specimens of Cinchona barks not now met with in pharmacy. From Mr. E. N. BUTT.
A case of chemical specimens prepared some years ago in the Laboratory of the Society by Mr. FORD.

Professors Redwood and Bentley had attended and reported satisfactorily of their respective classes.

The President had reported the steps taken with respect to the laying down of wood pavement in Great Russell Street, he having taken the responsibility of guaranteeing that the amount required by the Board of Works in order to carry out this improvement should be forthcoming. The Committee recommended that the President's guarantee be confirmed.

The Committee had considered the alterations necessary in the regulations for written examinations consequent upon the extension of time to be introduced into the Preliminary examination, and recommended that on and after December 31, 1883, the resolution of January 7, 1874 (*Pharm. Journ.*, January 10, 1874, p. 563), be rescinded, and that the following regulations be adopted instead thereof:—

"*Regulations for Written Examinations.*

"That persons be especially appointed by the Council to superintend the written examinations; that they be called superintendents of examinations, and be paid fees for each examination; such superintendents not being necessarily members of the Board of Examiners.

"A deputy-superintendent shall be also appointed by the Council in each centre.

"A fee of one guinea for the first part and half-a-guinea for the second part of the examination shall be paid to the superintendent or deputy-superintendent on the occasion of each examination.

"The Local Secretary shall be, in the first instance, offered the appointment of superintendent.

"The Preliminary examinations shall be held in the months of January, April, July and October, on the second Tuesday of the month, from 11 a.m. to 4 p.m., with an interval of one hour from 2 to 3 p.m.

"No examinations shall take place in the house of the superintendent or deputy-superintendent. He shall be authorized to engage some apartment suitable for the purpose, and charge a sum not exceeding 15*s*. to the Society on account thereof.

"The examination for the Jacob Bell Memorial Scholarships shall be held annually on the second Tuesday in July, concurrently with the Preliminary examination.

"Notice shall be given in the *Pharmaceutical Journal* two months prior to the day of holding each Preliminary examination, that such examination will take place, and giving a list of the centres at which it will be held.

"Candidates for the Preliminary examination must pay the fee and give notice to the Registrar (on a printed form of application, to be obtained from him) of their intention to present themselves for examination, and shall also state the centre at which they desire to be examined. Such notice and the fee must in each case be in the hands of the Registrar not less than fourteen days prior to the day on which the examination is to be held.

"The examination papers shall be forwarded by the Registrar under seal, to the superintendents or deputy-superintendents, so as to be received by them not later than the morning of the day fixed for the examination. Special sheets for the candidates to write upon will also be sent by the Registrar.

"Writing materials for each candidate must be provided, and all arrangements for the accommodation of the candidates completed before the hour fixed for opening the packets of questions from the Registrar.

"The instructions to superintendents and deputy-superintendents of examinations shall be as follows:—

"*Instructions to Superintendents and Deputy-Superintendents of Examinations. To be read aloud to the Candidates before commencing their writing.*

"Candidates must be in their places at the time appointed, and after this time no candidate will be admitted.

"Candidates must be placed at a sufficient distance from each other to prevent copying, and they are not permitted to take either books, scribbling papers, or memoranda into the examination room.

"The examination papers must be opened by the superintendent or deputy-superintendent at the appointed time, in the presence of the candidates, and immediately distributed by him.

"He must see that each candidate signs his papers in the place indicated.

"The answers to the questions are to be written on one side of the paper only, the other side being intended for scribbling and calculations. No other scribbling paper is allowed to be used.

"No examination paper shall be taken from the room until the examination is complete.

"The superintendent or deputy-superintendent must carefully watch the whole examination, to see that the candidates do not use unfair means, either by assisting each other, or using books or notes. No person except the superintendent or deputy-superintendent, or a member of the Council, or of the Boards of Examiners, is permitted to be present, and on no consideration shall candidates be allowed to speak to each other after the papers are distributed.

"A candidate wishing to ask any questions must hold up his hand; the superintendent or deputy-superintendent will come to him, and satisfy any legitimate inquiry, but no explanation will be given on the subject-matter of the questions.

"At 11 a.m. the questions on Latin shall be handed to the candidates, who must deliver their written papers on that subject, with all memoranda and scribblings thereon, to the superintendent or deputy-superintendent at 12.30 p.m.

"At 12.30 p.m. the questions on Arithmetic shall be handed to the candidates, who must deliver their written papers on that subject, with all memoranda and scribblings thereon, to the superintendent or deputy-superintendent at 2 p.m.

"The superintendent or deputy-superintendent must then forthwith enclose all the written papers on Latin and Arithmetic in an envelope sent for that purpose by the Registrar, seal it with his seal, and forward it by first post thereafter to the Registrar, enclosing the accompanying declaration duly filled in and signed.

"At 3 p.m. the questions on English shall be handed to the candidates, who must deliver their written papers on that subject, with all memoranda and scribblings thereon, to the superintendent or deputy-superintendent at 4.30 p.m.

"The superintendent or deputy-superintendent must then forthwith enclose all the written papers on English in an envelope sent for that purpose by the Registrar, seal it with his seal, and forward it by first post thereafter to the Registrar, enclosing the accompanying declaration duly filled in and signed."

The resolution of the Council at its last meeting with reference to the Medical Acts Amendment Bill and Pharmacopœia revision had been considered, and it had been deemed desirable for the President to have an interview with the promoter of the Bill (the Lord President of the Council) previous to drafting any proposed amendment.

The regulations for the admission of visitors to the Museum had been considered, and it was recommended that the regulation on this subject, published in the Calendar, should be worded as follows:—"Persons not connected with the Society who are desirous of obtaining admission to the Museum, should make application to the Secretary."

An estimate had been obtained for further accommodation for specimens in the Museum, and it was recommended that an additional case be fixed in the examination room, for the reception of reference specimens, at a cost of £45.

At a second meeting of the Committee the President had reported that he had sent the following letter to the Clerk to the Privy Council. He had since had an interview with the Lord President of the Council, who was not disposed to agree to the principle of the proposed alteration of the Medical Bill.

"Pharmaceutical Society of Great Britain,
"17 Bloomsbury Square, London, W.C.
"*12th April*, 1883.

"C. Lennox Peel, Esq., C.B.

"Dear Sir,—I am requested by the Council of this Society to call the attention of the Lord President of the Council to the provisions of the 'Medical Acts Amendment Bill' in so far as they relate to the preparation and revision of the British Pharmacopœia.

"This volume is to be produced under the direction of the Medical Council, but there is no instruction as to what class of persons is to constitute the Committee which must necessarily be appointed for compiling and revising the Pharmacopœia *previous* to its publication.

"In this country, hitherto, that Committee has consisted solely of members of the medical profession, whereas in all other European countries the constitution of that Committee is fixed by law, and it includes, in every case, a considerable number of pharmaceutical chemists, and in the United States of America, pharmacists form a majority of the Committee of Revision.

"The decision as to what drugs or medicines shall be introduced into or expunged from the Pharmacopœia rests with the medical members of the Committee and the working out of the chemistry and pharmacy of the preparations and the manner in which they should be made rests with the pharmaceutical members.

"The Council of this Society considers that this or some such method should be followed in this country and laid down in the Bill now in the House of Lords. It is supported in this view by many members of the medical profession and by articles which have appeared from time to time in the medical press. Moreover, inasmuch as by the Pharmacy Act, 1868, and the Sale of Food and Drugs Acts, the Pharmacopœia is taken as the standard of purity and strength of such drugs and medicines as are contained therein, it seems desirable that the practical experience of pharmaceutical chemists should be made available on the Committee.

"I am desired by the Council to solicit the favour of a personal interview with the Lord President before the Bill is considered in Committee, to enable me to explain more fully its views and point out other considerations bearing on the subject.

"I am, dear Sir,
"Yours faithfully,
(Signed) "M. Carteighe.
"*President.*"

The Committee had resolved that the President be instructed to arrange for an interview between a deputation from the Committee and those members of the House of Commons who have charge of the Bill when it arrives in that House.

The draft Annual Report had been submitted, approved and ordered to be sent to each member of the Council.

Mr. Woolley asked if in future the admission of visitors to the Library and Museum would be in the discretion of the Secretary.

The President said the Secretary would be the person responsible.

Mr. Symes thought it would be very satisfactory to everyone to know that any person, within reasonable limits, might gain information from the Museum and Library. He hoped the discretionary power now placed in the hands of the Secretary would be exercised in a broad and liberal spirit.

Mr. Greenish feared that difficulties would constantly crop up in connection with this question. If it were possible—he did not know that it was—he should like to see some arrangement carried out in the Museum whereby those drawers which were really used by students qualifying for an examination should be removed to some room upstairs, all those specimens which were objects of scientific interest being left in the Museum. If this were done those visitors who came for scientific purposes would not be so liable to interfere with those who came for educational purposes.

The President thought the tendency of the Committee's work was in the direction indicated, and probably the difficulty would solve itself in a year or two.

Pharmacopœia Revision.

Mr. Greenish wished to direct the attention of the Council to a very important subject which arose in connection with the Report of the General Council of Medical Education and Registration, as published in the last number of the *British Medical Journal.* It included a report from the Pharmacopœia Committee of the Medical Council which had been ordered to be received and entered on the minutes. It was in the following words:—"The Pharmacopœia Committee, at their first meeting on July 8, 1882, appointed a Sub-Committee, with power to take such steps as they thought necessary towards preparing a new edition of the Pharmacopœia and to submit a report to a future meeting of the General Committee. The Sub-Committee have reported that they have held two meetings since their appointment, and that they have communicated with Professors Redwood, Bentley and Attfield as to undertaking the duty of preparing a new edition of the Pharmacopœia under the direction of the Committee. These gentlemen have submitted to the Pharmacopœia Committee a report, which with certain modifications recommended by the Sub-Committee has been approved of and, as so amended, is appended hereto." In their report the Professors said, "Having received your instructions to proceed with the revision of the British Pharmacopœia, we now, in accordance with the suggestions made in our joint letter of November 7, enter into a more detailed explanation than we previously gave of the changes that seem to be required." He must confess it was with a feeling of great humiliation that he saw there was to be a new edition of the Pharmacopœia brought out without any official reference to the Pharmaceutical Society at all; and it was to his great astonishment that he found the three Professors of the Society had been engaged more or less in this work since November 7, six months ago. Those gentlemen held chairs endowed by the Society, and it seemed to him that they were scarcely loyal to the Society, knowing as they did that this subject had been constantly under discussion, in not giving some official intimation that they were engaged on this work. It had been said that the darkest hour of the night was nearest the dawn, and he thought one inference at any rate might be drawn, viz., that the Medical Council, by employing these gentlemen, acknowledged that it was itself incapable of undertaking the revision of the Pharmacopœia. At the same time it was humiliating to find that the Society, which had been established upwards of forty years, and had done so much for pharmaceutical education and the general advancement of pharmacy, was not directly recognized. He had no doubt that other members would feel as he did on the matter, and he hoped that the fact that their existence had been ignored on the present occasion, and that this work had been going on for six months unknown to the Council, would not prevent the Council from pressing the claim of the Society in the first place on the promoters of the Medical Acts Amendment Bill, in the shape of such an amendment as had been shadowed forth in the President's letter, and if that were not effectual, he hoped that the House of Commons would be flooded with petitions asserting the just claims of pharmacists to direct influence in the preparation of any future edition of the national Pharmacopœia.

Mr. Hampson said he must express the same sense of surprise which had been stated by Mr. Greenish. But though he was much grieved at the action of the Society's own professors, considering the relation which had existed between them and the Council for so many years, it must not be forgotten that there was a practical purpose to be kept in view, viz.:—to press forward the claim of pharmacists with regard to the Pharmacopœia. It might possibly be that in consequence of this appointment their cause was damaged; he was disposed to think it might be; and it was a sad thing to think that it might be damaged by the Society's own professors. Those gentlemen seemed to be interested in keeping things as they were. If they had had the interest of the Society at heart, they would no doubt have conferred with the Council on the subject, and he was sure the Council would not have desired to stand in the way of their obtaining any emolument which was offered them. He did fear that the position of the Society in respect to this question had been jeopardized from this unfortunate circumstance. Still he would rather pass over this matter and return to the more important question before the Council, how to obtain official recognition with regard to the national Pharmacopœia. He hoped the Council would strengthen the hands of the Committee and urge the necessity of leaving nothing undone, and that all legitimate and constitutional means should be employed to obtain that recognition.

Mr. Williams suggested that it would be well if the President were now to give any information he was in a position to do, as to what passed with the Lord President of the Council.

Mr. Young asked if it was known to any member of the Council at the last meeting that the professors had been in communication with the Pharmacopœia Committee of the Medical Council.

Mr. Butt thought it would facilitate matters if the President stated the results of his interview with the Lord President.

The President said he was quite ready to do so, but nothing was said on the occasion with regard to the appointment of the professors.

Mr. Symes supported the view put forward by Mr. Greenish, and was very much surprised and grieved to hear of the position of affairs. Much as they all wanted a new Pharmacopœia, he was sorry to hear that a new one was being prepared under the conditions which had been explained. The assistance wanted in preparing a new Pharmacopœia was that of practical pharmacists, rather than professors of pharmacy, botany, materia medica and chemistry. Some of the greatest difficulties which occurred in pharmacopœias arose from the men who prepared them being men of theory and not of practice; a great deal might be correct in theory, which failed in practice. He was very pleased to observe in the *British Medical Journal* that all medical men did not ignore the position of pharmacists, for he noticed that Dr. George Johnson in speaking of a test for diabetic urine said he "hoped and believed that our friends and fellow workers, the pharmaceutical chemists, will prepare the standard solutions." He should support Mr. Greenish in proposing to go any reasonable length in opposing the Medical Acts Amendment Bill, unless it contained a clause which would provide for pharmacists assisting in what was their legitimate work.

Mr. Schacht thought it desirable that the Council should, before going further, hear anything the President had to communicate, if necessary, in committee.

The President said he thought there was no necessity for going into committee. The Lord President had, of course his letter before him, and also a memorial from the Council of the Pharmaceutical Society of Ireland, which had met specially to consider the subject. The Lord President listened patiently to all he had to say on the subject, and asked him two or three questions, and then he said, the broad question was whether the Pharmacopœia as a public document was a bad book. Of course his reply was that the Society did not bring a charge against the Pharmacopœia of being a bad book, but that it might at any time become a bad book if it were not properly compiled. As a result the Lord President said he did not feel inclined to move in the question on public grounds, especially as the Bill did not make any change in this respect in the existing law. He did not wish to be weighted with too many amendments, and he did not think a sufficiently strong case had been made out to induce him to move in the question. He also asked if the editor of the Pharmacopœia was not a pharmaceutical chemist; to which, of course, he replied that though a pharmaceutical chemist he was also a professor of chemistry and pharmacy. The Lord President gave it as his opinion that in some cases the best results were obtained by employing competent men to prepare works for the body having charge of a subject. He gathered from Lord Carlingford that he rather looked upon it as a question to be dealt with between the Society and the Medical Council.

The VICE-PRESIDENT said this question had now assumed great complexity, and something more must necessarily arise from it. He understood the President did not gather that the Lord President was at all conscious of the employment of professors on the Pharmacopœia at the present time.

The PRESIDENT said he did not think the Lord President knew anything about it. He simply referred to the existing volume, and raised the question whether, if you had good special officials who submitted a report to the public body you did not get a result which was sufficiently good for the purpose. Of course he, the President, dissented from that.

Mr. YOUNG did not think the Government could be blamed for the action it had taken. The painful thing to his mind was the position in which the Society's professors stood, and he could not understand how it was the professors should have been in communication with the Pharmacopœia Committee of the Medical Council for such a long period and the Council had heard nothing about it. It appeared to him that however well fitted they were to do everything necessary in the revision of a new Pharmacopœia, they would have been very much assisted by having two or three practical pharmacists associated with them, and it would have been perfectly easy on their part to make that suggestion to those with whom they were in communication. It was a very painful thing to find that gentlemen who had been long connected with the Society should have placed themselves in such a very invidious position. At the last meeting of the Council he expressed the opinion that it was an oversight on the part of the Government that the Society had not been consulted, but he had no doubt now that the Government had been of opinion all along that the Society had been consulted, as this conference was going on with the professors. He quite agreed with Mr. Hampson that the Council should do everything to help forward this new revision and to make its influence felt.

The PRESIDENT said he had no doubt that Professor Redwood's idea was that he was a servant of the Pharmacopœia Committee. Some time ago, in a report he made to the Committee of the Medical Council, he did refer to the importance of having a committee of pharmacists. The opinion of the Council had always been that the Committee should contain practical men who were capable of knowing that any professional men appointed were competent to do their work, added to which there was a question of representation. This book became the pharmacist's law, and it seemed an anomaly in a country where representation was looked upon as a *sine quâ non* for legislation that practically those who had to obey the law were not represented on the body which made it.

The VICE-PRESIDENT suggested the Council should leave the personal question and come to the important one of what was to be done. What was wanted was direct recognition and direct representation.

Mr. GREENISH apprehended the next step would be to bring under the notice of those who might have charge of the Bill in the House of Commons, the amendment which had been suggested, and if this were not accepted, there was only one course left, namely, to do, as had been done before very efficiently, to send up petitions on the subject.

Mr. SCHACHT took the same view. He said he felt so extremely angry about the personal matter that he would rather not say anything about it. It was only within the last hour or two that he had heard of it, and he felt so much annoyed that he refrained from saying a word about the position which the Medical Council had chosen to take in the matter and the behaviour of the professors. The result showed the utter futility of attempting to employ diplomacy against professed diplomatists. The only chance of doing any good for the Society and the public was to go straight for what was thought right before the whole world, not try to creep up any back stairs, or hang on by any man's coat tails. He hoped in future the policy adopted would be a bold straighforward appeal to the authorities in a public way, letting the whole world know what they thought right, and what they wanted, and their motives for aiming at it. Then, at any rate, if they were beaten they could go again on a future occasion on the lines they had been driven from.

The PRESIDENT said there had been no attempt at diplomacy. It was the usual course to go first to the promoters of a Bill before trying to amend it. He was requested by the Committee to ask a question of the promoter of the Bill, and this he had done.

Mr. HILLS asked if anything had been done which merited the terms Mr. Schacht had used.

The PRESIDENT said he understood Mr. Schacht was speaking generally.

Mr. SCHACHT said it was desirable now to go before the House of Commons and endeavour by some such petition as the Committee would be able to draw to influence that House. The letter which the President had addressed to the Clerk of the Privy Council appeared to him to be a masterpiece of letter writing, and if a memorial to those who had charge of the measure in the House of Commons were framed on the same lines it would, in his view, be perfectly satisfactory.

Mr. HAMPSON remarked that the Committee already had full power to take all necessary steps, excepting that it had not the power, nor had the President, without the sanction of the Council, to affix the seal of the Society to any petition. He would move a resolution, therefore, conferring that power upon the President. He believed if the Council was in earnest it would succeed. The case was plain and consistent, and by no means novel, for there were precedents all over the civilized world.

The PRESIDENT then read the following resolutions, which had been passed by the Council of the Pharmaceutical Society of Ireland and forwarded to him:—

"Resolved—

"That a Memorial* be drawn up and forwarded to Lord Carlingford, the Member of the Government in charge of the Medical Bill in the House of Lords, praying that the pharmaceutical bodies in these Kingdoms shall be represented on the body to whom shall be committed the revision of the British Pharmacopœia."

"Resolved—

"That a petition be drawn up to the House of Lords, conveying the same prayer, and that it be sent to the President of the Pharmaceutical Society of Great Britain, to be entrusted by him for presentation to such member of the House as he may think best."

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* The Memorial drawn up in accordance with this resolution was printed on p. 892.

Mr. ANDREWS said he had only heard the news, which had just been communicated, on Monday last, and he had never heard anything in connection with the Society which he felt more acutely. It was very painful to think that the labours of the Society for more than forty years had been entirely set aside, but it was still more painful to think that the Society's professors should have acted as they had done. He trusted, however, there would be some answer to this part of the case. If there were not he should consider their conduct most ungrateful. On that point he would say no more, but he should like to hear any explanation which the professors had to offer. The practical issue was how the Council was to go on at present, and that had been pointed out by several speakers. It must go to the promoters of the Bill, and if it could do nothing with them it must get pharmacists throughout the country to petition for their just claims.

Mr. GOSTLING suggested that it would be only proper if the Council were to ask the professors for a copy of the letter addressed to them by the Medical Council in November last.

The PRESIDENT did not think it would be dignified for the Council to raise any question with the professors on the subject. He assumed most fully, that in their communications to the Committee of the Medical Council, at some time or another, they had expressed their sense of the importance of being associated with practical pharmacists.

The report and recommendations of the Committee were then received and adopted.

It was also resolved on the motion of Mr. GREENISH—

"That the Library, Museum, Laboratory and House Committee be empowered, at its discretion, to draw up and address to the House of Commons, in the name of the Council, a petition in reference to the question of Pharmacopœia revision, and that the seal of the Society be affixed thereto."

The Council then went into committee, and considered one or two clauses of the Medical Acts Amendment Bill.

The Annual Report.

The Annual Report, as drafted by the Library, Museum, Laboratory and House Committee, was also considered by the Council in committee.

On resuming, the Report was adopted and ordered to be issued with the voting papers for the Annual Meeting.

GENERAL PURPOSES.

The report of this Committee, which was read in committee, included the usual letter from the Solicitor, stating the progress of cases which had been placed in his hands.

Two cases of alleged infringement of the Pharmacy Act had been brought before the Committee, and after consideration, it was recommended that proceedings be taken against the offenders.

The report and recommendations of the Committee were unanimously adopted.

On the motion of the PRESIDENT, seconded by the VICE-PRESIDENT, it was resolved—

"That in pursuance of a resolution of Council at its last meeting, the name of John Keith, 28, Kirkgate, Leeds, be removed from the register of members of this Society."

REPORTS OF THE GOVERNMENT VISITORS ON THE EXAMINATIONS.

The following reports from Dr. Greenhow and Dr. Maclagan, having been forwarded from the Privy Council Office for the information of the Council, were ordered to be printed in the Society's Journal:—

REPORT BY DR. GREENHOW.

[*Copy.*]

"*Report on the Examinations held by the London Board of Examiners of the Pharmaceutical Society during the year* 1882.

"During the year 1882 the London Board of Examiners of the Pharmaceutical Society held twenty-six meetings for the examination of candidates for registration under the Pharmacy Act, 1868, at twelve of which I was present on behalf of the Privy Council. This is exclusive of the first or Preliminary examination in English, Latin and Arithmetic, which is held four times in the year, and continues to be conducted by the College of Preceptors, as it has been since 1875.

"*Preliminary Examination.*—During last year 1269 candidates presented themselves for this examination, of whom 629 passed, and 640, or 50·4 per cent. failed.

"This is a smaller portion of rejections than in the previous year, when 56·6 per cent. of the candidates were rejected; but it must not therefore be too hastily assumed that there has been any material improvement in the elementary education of the candidates. Indeed, no such sudden change can be looked for, though eventually the regulation requiring this examination to be passed previous to the commencement of apprenticeship or pupilage may, perhaps, diminish the proportion of rejections, by compelling the candidates to come up for the examination immediately after leaving school.

"Whether this should prove to be the case or not the regulation cannot fail to be most beneficial to the candidates in two respects: first, when young men, on presenting themselves at the age of 16 or 17 years for this examination, find themselves unable to pass it, by reason of defective education, they will still be able, without serious loss of time, to turn themselves to some other occupation; whereas, at present when a youth fails he commonly goes on studying under very disadvantageous circumstances, during his apprenticeship, with a view to presenting himself again at a future time in the hope of eventually getting through. The second advantage I have referred to is, that having already passed this educational test before the commencement of his apprenticeship the student will be able to devote his time and thoughts exclusively to learning the strictly technical part of his business.

"The proportion of rejections to passes last year was about the average of the preceding five years, including 1881, when, as I have just said, it was very large, namely 50·9 per cent.; but the variations from year to year have been considerable, having, exclusive of the exceptional year, 1881, ranged from 42·4 per cent. in 1876, to 52·4 in 1878.

"Two changes have been made in the mode of conducting this examination, which will, I understand, come into operation this year. The examination is a written one and hitherto one hour has been allowed for each of the three subjects. Henceforward this period is to be increased to one hour and a half with an interval of one hour between the second and third subjects; and, further, the candidates are to have the option of translating a passage from the first book of Virgil's 'Aeneid,' instead of being, as heretofore, limited to one from the first book of Cæsar's 'De Bello Gallico;' these changes are favourable to the candidates and will add to the efficiency of the examination without increasing its stringency.

"Of the rejected candidates, 15 who had obtained the minimum passing number of marks allotted to each subject failed because they had not gained half the aggregate number of marks required for passing the entire examination; 80 failed in all the subjects; 303 in arithmetic; 173 in two of the three subjects; 49 in English; and 20 in Latin.

"This latter number, however, by no means represents the actual number of failures in Latin, for if those who failed in all the subjects, or in two of them, whereof Latin was one, and those also who failed in the aggregate, be added together the rejections for Latin amount to 181: and, even of those candidates who pass the Preliminary examination, a considerable number, amounting last year to 60, fail at the Minor examination in translating prescriptions written in Latin.

"*Major Examination.*—During last year 94 candidates were examined for the Major examination, entitling such as pass it to be registered as pharmaceutical chemists, 36 of whom passed, and 58 or 61·7 per cent. failed. This is the largest proportion of failures that has ever occurred; the next largest having been in 1880 when 54·3 per cent. were found incompetent. The large number of rejections last year cannot be ascribed either to any change in the regulations for conducting the examination or to increased strictness on the part of the examiners.

"The examination must be regarded as an examination for honours, since candidates must previously to presenting themselves for it have passed the Minor examination, which confers all the business privileges necessary for keeping an open shop for retailing, dispensing or compounding of poisons. Looked at from this aspect I do not consider the examination as set at too high a standard. It is a good practical examination and candidates who cannot pass it are certainly not entitled to hold the higher grade of pharmaceutical chemist. Of the 58 rejected candidates 19 failed upon the examination as a whole; 29 in chemistry and practical work; and 18 in botany or botany and materia medica.

"*Minor Examination.*—During last year 572 candidates offered themselves for this examination, of whom 242 passed and 330 or 57·7 per cent. failed. This again is a very large proportion of rejections, the largest excepting in 1874, when the rejections amounted to 69·3 per cent. Since that year the proportion of rejections, exclusive of 1882, has varied from year to year, and has ranged from 48·1 to 54·6 per cent. in different years.

"Of the 330 rejected candidates last year, 75 failed in the examination as a whole, that is to say, although they had gained the minimum passing number of marks in each of the several subjects, they did not obtain half the aggregate number of marks upon the whole examination. A candidate may be so weak in one subject as only to obtain the passing number of marks in it, and this may be compensated for by greater excellence in the other subjects; but, when he is so weak in all the subjects as not to gain half the aggregate number of marks on the whole examination, even though he may have attained the lowest passing number in each subject, he is clearly not fit to pass and undertake the responsibility of keeping an open shop for dispensing and compounding prescriptions. As a rule, I have observed that candidates are seldom very weak in one subject only, but, on the contrary, that when a man is weak in one branch of the examination he fails more or less completely in the other subjects.

"I may here state that the examination for each subject is conducted by a different examiner, so that a candidate who fails in the aggregate must have been found incompetent by six different examiners who are rarely aware how he has acquitted himself in the other subjects. Of the remainder 81 failed in chemistry; 39 in reading Latin prescriptions; 30 in materia medica; 24 in practical dispensing; 19 in pharmacy; 16 in botany; and 46 in two of these subjects.

"As I said in my report for 1881 the large number of rejections at this examination has occupied the serious attention of the Board of Examiners and the Council of the Pharmaceutical Society. It has also been the subject of much discussion in the pages of the *Pharmaceutical Journal.*

"Some of the speakers and writers seem to have thought that the examinations are imperfect and unsatisfactory because so many candidates are rejected, whereas on the contrary, this circumstance ought rather to indicate that the examinations are carefully conducted. It might indeed be asserted on the other hand, that the requirements from candidates are too high; but, of this no one who has not carefully observed the examinations in progress can be competent to form an opinion.

"I have now for fourteen years very closely and impartially done so, and whilst I have never hesitated to suggest improvements, or to point out deficiencies in the regulations, or in the mode of conducting the examinations, whenever I have considered it necessary, I have yet been able invariably to express a favourable opinion of the efficiency of the examinations and of the tact and good sense with which they are conducted by the Board of Examiners. I should here perhaps add that the several recommendations which I have made from time to time, more especially during the earlier years after the Pharmacy Act was passed, have been courteously received, and I believe, after due consideration, always adopted.

"Unquestionably the several changes which have been introduced in the regulations, and the mode of conducting the examinations, more especially the practical part, have raised the standard; but this was inevitable and necessary if the intention expressed in the preamble of the Pharmacy Act was to be fulfilled.

"In commencing a system of compulsory examination it would have been manifestly inequitable to have passed at once from the laxity which, previous to the enactment of the Pharmacy Act, permitted persons to carry on the trade of a chemist and druggist without any recognized qualification, and to have exercised a degree of strictness which, however desirable in itself, would have made the examinations press hardly upon a large number of candidates whose education had commenced before the Act came into operation.

"At a later period it was quite proper to make the examinations more thorough and practical and to introduce such changes as experience might have shown to be desirable.

"It is indeed much to be regretted that so many candidates should be rejected, but I am quite sure that the present examination is a sufficient test of competency in those who pass. It may, indeed, possibly happen that a rather weak candidate occasionally passes, though I cannot recollect such an instance to have fallen under my observation; but, on the other hand, I believe that no really competent candidate is ever rejected. I am als satisfied that all those who pass are qualified to carry on the business of a chemist and druggist with safety to the public, which must be regarded as the essential purpose and requirement of the Pharmacy Act.

"In my last report I mentioned that the Pharmaceutical Society had adopted a scheme of education and examination prepared by a Committee and approved by the Council of the Society, and I said that I entirely agreed with two of the recommendations: viz., first, that the Preliminary examination should be passed prior to the commencement of the period of apprenticeship or pupilage; and second, that the candidates should be required to produce evidence of apprenticeship or pupilage of not less than three years with some duly registered chemist and druggist.

"It has always appeared to me that the absence of a clause rendering an apprenticeship compulsory was an oversight in the Pharmacy Act, and my experience of the examinations from year to year has but strengthened this opinion. Pharmacy is a skilled occupation, requiring those who exercise it to possess such a practical acquaintance with drugs and manipulative skill in compounding them as can only be acquired by long and constant practice, and this skill and knowledge can in no other mode be so advantageously acquired as during an apprenticeship in a chemist's shop. Yet it was not until several years had elapsed after the enactment of the Pharmacy Act, that a regulation was adopted requiring a candidate for the Minor examination to produce a certified declaration that he had been for three years registered and employed as an apprentice or student, or that he had been otherwise for three years practically engaged in the translation and dispensing of prescriptions. This regulation has not been found to afford a sufficient guarantee that the candidates actually have had the practical training that was intended, and the new regulation is intended to obviate this defect. An apprenticeship or pupilage, such as is now intended, should imply a certain share of responsibility on the part of the master for the pupil's progress, as well as on that of the student, and it may be hoped that henceforward the apprentice will receive a better training and have better opportunities for learning his business than seems to have hitherto been the case. I regret that, if the Society have the legal power, the period of apprenticeship has not been extended to five years. Under the new regulation a candidate who has had a fair education ought to be quite able to pass the Preliminary examination at the age of sixteen years, and the subsequent five years of his life could not be more advantageously spent than in qualifying himself by practical training in a druggist's shop for his future calling.

"When the apprenticeship is served in a small country pharmacy it might be arranged, with the concurrence of the master, that the two last years of the apprenticeship should be passed in a pharmacy in some large town, where better opportunities for learning might be found; or, the last year might, at the option of the apprentice, be occupied in attending a certain specified course of instruction in practical chemistry at a recognized school of pharmacy.

"To the fourth of the proposed regulations I can only express a qualified approval. It provides that the Minor or qualifying examination shall 'be divided into two parts, with an interval of not less than six months between the first and second portions.'

"'That the first portion be a written examination to be conducted in London, Edinburgh, and certain provincial centres, and shall consist of the translation of prescriptions from Latin into English and English into Latin, pharmacy and theoretical chemistry and botany.'

"In a further report drawn up by the same Committee and presented to the Council in March, 1883, it is proposed to omit botany from the written examination, and to extend the period between the date of passing the first portion of the examination and the second to not less than one year.

"To the proposal to divide the examination I see no objection, but I think it undesirable to hold it anywhere except in London and Edinburgh; neither do I think it desirable to insist upon an interval of not less than a year between passing the first and second portions. The candidate might, perhaps, have the choice of presenting himself for the first portion of the examination one year or six months before coming up for the second or final portion; but if in order to avoid the expense and trouble of attending twice in London or Edinburgh, he preferred passing both parts of the examination at the same time, the interval between them should not necessarily exceed a few days.

"The recommendation that the examination should be a written one is also, I think, objectionable as regards prescriptions, pharmacy and botany. The present examination in each of these subjects is thoroughly good and practical. In prescriptions the candidate is required to translate several, of different kinds, which have actually been dispensed in chemists' shops, in the presence of the examiner, who further tests the knowledge of the candidate by *vivâ voce* questions upon the doses and strength of the medicines prescribed. Next he is sent to a table by himself with a simple prescription written in English, and required to translate it into Latin, ample time being allowed him for this purpose. I consider this examination quite satisfactory as now conducted. The examiners are thoroughly competent, and whilst they do not pass incompetent candidates they allow a weak or nervous one every chance of passing if he be fit to do so. The importance of continuing this *vivâ voce* examination in translating Latin prescriptions is further shown by the fact that, notwithstanding they had all previously passed the Preliminary examination, which comprises a written examination in Latin, more than one-sixth of the candidates who were rejected at the Minor examination last year failed in reading Latin prescriptions.

"Pharmacy, as now conducted, is also a practical examination. The candidate is required to recognize the various pharmaceutical preparations of the British Pharmacopœia, submitted to him by the examiner without labels, and to describe the processes by which they are made; to explain the reasons of those processes, and to state the strength and ordinary doses of each preparation. Notwithstanding that botany is no longer recommended to be included in the written portion of the examination, I may observe that, as now conducted, the examination in it is thoroughly good and practical. It is conducted in a most efficient manner; the table in front of the examiner is covered with fresh specimens of plants upon which the candidate is required to show the various parts of the flower and the character of the leaves, stem, root, etc., the examiner putting such *vivâ voce* questions as may appear necessary in order to test the candidate's knowledge. At seasons when recent specimens of the indigenous medical plants cannot be procured, the examination is supplemented by submitting well-mounted, characteristic dried specimens to the candidate for recognition.

"I am of opinion that the proposed written examination would be an inadequate and unsatisfactory substitute for the present more practical one in each of the subjects I have mentioned; but, the case is otherwise as regards theoretical chemistry and a written examination in that subject might very beneficially be added to the present practical one, *provided* it was not allowed to stand in any respect as a substitute for it. It might be held on the same day as the examination in prescriptions, pharmacy and botany, a certain fixed time being allowed for writing the answers.

"There still remains one recommendation of the Committee to which it seems necessary that I should briefly refer. It is, that the candidate be required to produce evidence that he has, since passing the Preliminary examination, attended a course of lectures on materia medica, a course of lectures on chemistry, a course of lectures on botany, and a course of instruction in practical chemistry. This recommendation has been approved by the Council of the Pharmaceutical Society, but is not intended to come into operation until after December 31, 1887. I have already, in former reports, expressed my opinion that such a curriculum is not required for the purpose of the Pharmacy Act, and I see no reason for changing that opinion. As a matter of fact, a certain number of the candidates do not attend such lectures; and as I have already said a portion of the apprenticeship might, at the candidate's option, be passed in following such a curriculum. But whilst I would not discourage the candidates from attending the proposed course of instruction, if they pleased, I do not think it necessary to enforce such attendance. The preamble of the Pharmacy Act, 1868, states, 'that it is expedient for the safety of the public that persons keeping open shop for the retailing, dispensing, or compounding of poisons, and persons known as chemists and druggists should possess a competent practical knowledge of their business, and to that end . . . all persons not already engaged in such business, should, before commencing such business, be duly examined as to their practical knowledge.' I infer from this that no restriction beyond what is necessary for the safety of the public was intended to be imposed upon pharmacists, and I have been able, from year to year, to express my satisfaction with the results of the examination, and my opinion that, as at present conducted, it affords a sufficient guarantee for such safety; and further, that the candidates who pass it are fit persons to be registered under the Pharmacy Act as qualified to keep open shop as chemists and druggists. I think that, so long as this is the case, no additional burden of expense or examination should be imposed upon the candidate for the Minor or qualifying examination. I conclude that the Council of the Pharmaceutical Society have been advised that they have the legal power to enforce the regulation respecting a curriculum, but I cannot help expressing a hope that, having adopted the very sound and practical regulations as to the time of passing the Preliminary examination and the stricter apprenticeship, they will defer making any further change in their regulations for candidates until these have been fairly tried and found wanting in efficiency.

"As regards the Major and voluntary examination, I have more than once said that the standard might very properly be raised, from time to time, and I think that candidates for it might be required to attend such a curriculum, as has now been proposed for the Minor examination, after passing the latter before presenting themselves for this higher qualification.

(Signed) "E. HEADLAM GREENHOW."

[*Copy.*]

"REPORT BY DR. MACLAGAN ON PHARMACEUTICAL EXAMINATIONS IN EDINBURGH.

"My last report embraced a period of three years; the present report does the same, extending from February, 1880, to January, 1883, inclusive.

"The results of the examinations conducted during this period will appear from the following statement:—

	Candidates.	Passed.	Failed.	Percentage of failures.
Majors . . .	29	15	14	48·2
Minors . . .	292	166	126	43·15
Modified . .	6	2	4	66·6
	327			

"The total number is smaller than in the previous triennium, when it amounted to 368; but the number of candidates, and the length of the period by which these numbers are furnished, are sufficient to enable me to remark that the proportion of failures, instead of diminishing, is actually increasing. This will appear from a perusal of the percentage of failures during these two triennia:—

	1877-80.	1880-83.
Majors	37·5	48·2
Minors	37·8	43·15
Modified	50	67

"I am, by these figures, compelled to repeat the remark made by me in my last report, that there is a great, and I may add, deplorable ignorance on the part of candidates for admission to the profession of pharmacy, as to what is required of them in the way of preparation for their examinations. It may be supposed that as some changes have taken place during these three years in the *personnel* of the examining Board in Edinburgh, this may be due to greater strictness on the part of the new examiners. On this personal matter I have only to observe that whilst the new examiners leave nothing to be regretted in regard to the changes which have taken place, they do not discharge their duties with any more stringency than was done by their predecessors, and that to my mind the decisions given as to the appearances of candidates are now, as they have always been, well balanced between justice to the public interest and fairness to the candidates. I cannot, therefore, attribute the large proportion of failures to any other cause than the want of preparedness, and the ignorance of what constitutes preparedness, on the part of candidates.

"As regards the causes of failure, I have little to say on the subject of the Majors, except to explain that the reason why 11 out of the 14 failures are due to deficiency in practical chemistry is this, that the examination on this subject is always conducted on the day before that on which the full Board of Examiners meets, and that, therefore, those who fail in the practical work do not go on to the *vivâ voce* examination. We see from these numbers, however, how little idea candidates have of the necessity for extending, or even for keeping up, their chemical knowledge after they have passed the Minor examination.

"The Modified candidates give no room for any remarks. Their number is small and is diminishing, and in a short while this very undesirable class of candidates will become extinct. The failures were 67 per cent., chiefly due to general insufficiency.

"The Minors are those regarding whom I have to offer a few more detailed observations, and I can, I think, make these more intelligible by adverting to the appearance of candidates in respect to the several subjects of examination.

"It is to be borne in mind that this table does not tally with the number of rejected candidates, because sometimes two of the failures refer to the same individual, and many rejections were due to general insufficiency, *i.e.*, that though the candidates got the minimum number of marks entitling them to pass in each individual subject, they did not come up to the aggregate number of marks entitling them to get their certificate. The percentages, and what I may call "black marks," got in individual subjects, and exclusive of cases of general insufficiency during the three years from 1877 to 1880, and 1880 to 1883 respectively, are as follows:—

	1877-80.	1880-83.
Botany	32·12	20·80
Chemistry	23·08	17·44
Materia Medica . . .	6·41	·671
Prescription Reading . .	1·92	5·36
Dispensing	15·38	12·08
Pharmacy	23·08	12·08

"On these various causes of failure I beg to offer a few remarks, though they must, in great measure, be repetitions of those made on former occasions.

"*Botany.*—This still stands highest among the sources of failure, and although there is considerable improvement in the average appearances, it is quite clear that the greater number of the candidates have not studied the subject in any proper sense. Most of them can name herbarium specimens of medicinal plants fairly, but they are often deficient in vegetable organography, and still more so in vegetable physiology. This last may appear to be too purely a scientific matter to be of great importance; still it is of practical value if it were only to secure that the candidate has an intelligent appreciation of the reasons why medicinal plants should be gathered at one season more than another.

"*Chemistry.*—This, as usual, takes the second place in the subjects in which failures occur. I am bound to say that there is amelioration in the average appearances of candidates as regards chemistry, but there is still much room for improvement. I have actually seen one candidate present himself to whom the examiner very properly did not give a single mark for chemistry. He did not, for instance, know any way of distinguishing sulphate of zinc from sulphate of magnesia, except by the taste.

"With regard to these two subjects, botany and chemistry, I have to remark that the appearances of candidates, whether succeeding or failing, show how much they require a more methodical instruction than most of them have enjoyed. In my report of the previous three years I stated my opinion of the necessity for pharmaceutical students going through a regular curriculum of study. I am every year more and more impressed with the absolute necessity for this, but I do not need to insist upon this at length, because I think there is now a general consensus of opinion that a regular curriculum is necessary. Even in the case of candidates who get a sufficient number of marks to enable them to pass, the want of systematic instruction is observable. It is easy to observe, though impossible to define, the difference between a correct and an intelligent answer, between one which is the result of cram and one which is the outcome of a good instruction. But the difference can be seen better when the candidate has made a blunder. The intelligent and instructed man retrieves himself and shows that he knows more than at first sight appeared; the man who has crammed, in his struggles to correct his mistake only flounders more and more deeply into the mud. The remedy for this is true systematic instruction. It is not necessary that this should be given in London or Edinburgh, for in the case of one candidate in December, 1881, who made a most admirable appearance in chemistry, I asked the examiner after the examination was over to ascertain where this young man had been instructed, and I learned that he had had a course of chemistry by an excellent teacher in an English provincial town.

"*Materia Medica.*—The proportion of failures in this subject is comparatively small in the last three years as well as in the former three. The recognition of crude drugs is generally good, and shows that the candidates avail themselves of the museums and other collections for this purpose. Candidates are generally asked if the drugs presented to them are of good quality, but I would venture to observe that the samples shown to them are in general rather too good and typical, and that it would be well to show them also some bad samples and thus to ascertain that they can recognize those inferior or false drugs which, it is to be feared, are too common in commerce.

"*Prescription Reading.*—I was disappointed, in calculating out the averages, to find that there had been an increase of failure on this subject, because, probably accidentally, I had come upon several examples of young men whose translations of Latin prescriptions into English, and putting English prescriptions into Latin, were really very good. It is clear, however, from the average Latinity of candidates that there is room for improvement in the Preliminary examinations. It is, perhaps, not of much importance as regards practical use that a candidate should be well up in Latin quantities, provided he knows the grammar and can translate the words of a prescription, but it is desirable that some amendment should take place in this respect. It might be well if those who undertook the editing of a new Pharmacopœia would put the signs of quantity over the names of the drugs, and that we should not hear candidates who are reading prescriptions use such pronounciation as atrōpa, gentiana lutēa, conĭum, acĕtum, liquŏris. It must be said for candidates that they do not get much help in regard to Latinity from some of the things which they see in print. I have before me an advertisement from a well-known firm, in the advertising columns of the *British Medical Journal*, in which they give the designation of a special preparation, consisting of three words, two of which are hideous violations of two of the most elementary rules of Latin grammar.

"I wish here to make an observation on prescription reading in its relation to the examination in pharmacy. It is impossible in any system to avoid making one subject over-ride another to a certain extent, but this should as far as possible be avoided. In both the above-named subjects I have often observed that the very same questions as to the doses of drugs are put to the same candidate. It appears to me that these posological questions belong essentially to the examiner in pharmacy, and that in prescription reading all that need be ascertained is that the candidate shall not overlook the fact that the prescription, either through ignorance or inadvertence on the part of the prescriber, contains dangerous doses of potent drugs. It is obviously essential that the pharmacist should know the proper doses of the medicines which he dispenses. All I wish to point out is, that in examinations where the value of the candidate's replies are stated numerically, he should not, when he makes a blunder, have it counted against him twice, or that when his answers as to doses are correct he should have them twice put to his credit. It is to be distinctly understood that these remarks do not apply to the present examiner in prescription reading only, but apply equally to the examiners before his time.

"*Dispensing*: *Pharmacy.*—I take these two subjects together because the percentage of failures is the same in both, and because in the proportion of failures they come next to the two scientific subjects botany and chemistry. I have on former occasions pointed to these as showing that while there must be many creditable exceptions, there can be little doubt that, to a large extent, members of the pharmaceutical profession do not do their duty properly to their apprentices. If young men during their apprenticeship do not learn pharmacy and dispensing, it may come to be asked, and in a very practical form, what do they learn during the three years' apprenticeship the utility of which is so much insisted on? If the apprentice is merely to learn the routine duties which fall on any one standing behind a counter, six months would be enough and the three years' apprenticeship might be abolished with advantage. Pharmacists would have themselves to blame were this to come about, and would regret it if they found that instead of having apprentices to aid them in their business, they would need to secure the services of assistants, which cost money. I repeat what I have said before now, that it is an immoral thing in a pharmacist to take a young man as his apprentice and not to enable him to learn the very things which his master can teach him. Every discouragement should be given to the practice, I suspect too common, of purchasing galenical preparations, such as tinctures, from wholesale houses, instead of making the apprentice prepare them and seeing that he does so accurately. Perhaps some change in the terms of indentures, enforcing more decidedly the duty of the master to teach his apprentice practical dispensing and pharmacy, would be of use in saving time which is wasted behind the counter in retail dealing, and which might more profitably be used at a school of systematic instruction.

"As regards the final result of the examinations, I have to state my belief that the Minor examination affords ample security for the public safety at the hands of those who obtain their diplomas. I am equally bound, however, to say that the Major examination does not, to my mind, fulfil what ought to be its object,—the raising up of a class of scientific pharmacists in Britain. It is well known that it is proposed to abolish the distinction between these two examinations, and the difference between them is not so great as to lead me to make any objection to this proposal. I hope, however, that this will be done by raising the standard of the pass examination at least up to the level of the present Major, and that a strenuous attempt will be made by creating a higher class of members of the pharmaceutical profession to produce, more than at present exists, of a body of truly scientific British pharmacists.

(Signed) "DOUGLAS MACLAGAN."

THE INTERNATIONAL PHARMACEUTICAL EXHIBITION AT VIENNA.

The PRESIDENT said a communication had been received from the Imperial and Royal Austro-Hungarian Consul-General calling attention to the International Pharmaceutical Exhibition at Vienna, in August next, with a request that it should be brought under the notice of persons interested. It would be remembered that several notices respecting this exhibition had already appeared in the Journal, and he believed some members intended to contribute to it.

PHARMACY ACTS AMENDMENT BILL.

The PRESIDENT stated that communications had been received concerning the draft Bill from the Manchester Chemists and Druggists' Association, from King's Lynn, and from Mr. Vizer. These communications were referred to the Law and Parliamentary Committee.

The PRESIDENT also announced that the Secretary had received from Mr. Sandford the following notice of motion which he intended to bring forward at the Annual Meeting.

"That in the opinion of this meeting certain provisions set forth in the proposed Bill to regulate the sale of poisons and alter and amend the Pharmacy Acts require alteration, especially clauses 4 and 5, which render retail vendors of patent or proprietary medicines, who have not and cannot have any control over the required labelling of such medicines, liable to prosecution for insufficient labelling, for which offence the proprietors only should be and can be made responsible."

REPORT OF EXAMINATIONS.

April, 1883.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major (18th)	7	1	6
" (19th)	7	3	4
" (25th)	5	5	0
" (26th)	6	2	4
	— 25	—11	—14
Minor (18th)	23	9	14
" (19th)	22	10	12
" (20th)	26	12	14
" (25th)	23	10	13
" (26th)	24	8	16
" (27th)	26	11	15
	—144	—60	—84
Modified (18th) . . .	2	2	0
" (19th) . . .	2	1	1
	— 4	— 3	— 1
	173	74	99

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major (18th)	4	1	3
Minor (18th)	10	3	7
" (19th)	12	7	5
" (20th)	12	4	8
	—34	—14	—20
	38	15	23

PRELIMINARY EXAMINATION.

Candidates. Examined.	Passed.	Failed.
366	171	195

Sixteen certificates had been received in lieu of the Society's examination:—

5 College of Preceptors.
2 Society of Apothecaries.
5 University of Cambridge.
1 " London.
3 " Oxford.

EXAMINATIONS IN LONDON.

April 18, 19, 20, 25, 26 *and* 27, 1883.

Present on each day—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Fletcher, Gale, Greenish, Linford, Plowman, Tanner, Taylor and Thresh.

Dr. Greenhow was present on the 26th, on behalf of the Privy Council.

MAJOR EXAMINATION.

18*th.*—*Seven* candidates were examined. *Six* failed. The undermentioned passed, and was declared to be duly qualified to be registered as a Pharmaceutical Chemist:—

Austin, Alfred ....Birmingham.

19*th.*—*Seven* candidates were examined. *Four* failed. The undermentioned *three* passed, and were declared to be duly qualified to be registered as Pharmaceutical Chemists:—

Levett, Herbert ....Maidstone.
Marsh, Edward.................. ...Luton.
Ransom, Francis ....Hitchin.

25*th.*—*Five* candidates were examined. All passed, and were declared to be duly qualified to be registered as Pharmaceutical Chemists:—

Pidgeon, Joshua David ....Brighton.
Smith, William Thomas ....Bath.
Spencer, George ....Hitchin.
Stephenson, Stephen ... .Congleton.
Townsend, Henry Holden ......London.

26*th.*—*Six* candidates were examined. *Four* failed. The undermentioned *two* passed, and were declared to be duly qualified to be registered as Pharmaceutical Chemists:—

Tyson, Thomas Balmforth ......London.
Worsley, Albert George ....Folkestone.

MINOR EXAMINATION.

18*th.*—*Twenty-three* candidates were examined. *Fourteen* failed. The undermentioned *nine* passed, and were declared to be duly qualified to be registered as Chemists and Druggists:—

Arnott, Daniel ....Pontypridd.
Badcock, Harry Digby ....Ottery St. Mary.
Baily, Edward ....Ramsgate.
Banbury, Richard..................Camelford.
Barnes, James Bunden ....Knightsbridge.
Beckett, Harry Rumbold ......London.
Bishop, Cecil... ....Brading.
Carter, William ....Penzance.
Roberts, Arthur Harry ....Barrow-in-Furness.

19*th.*—*Twenty-two* candidates were examined. *Twelve* failed. The undermentioned *ten* passed, and were declared to be duly qualified to be registered as Chemists and Druggists:—

Bayley, Cornelius..................Boston.
Chattaway, William...............Leicester.
Codling, Arthur John ....Norwich.
Corder, Walter Shewell ....Sunderland.
Cubey, Robert ....South Shields.
Cullwick, Geo. Hamar Jones ...Birmingham.
Cunningham, Oscar William ...Norwich.
Curnow, William Albert.........Swansea.
Dulley, David ....Wellingborough.
Dymond, Thomas Southall......Bristol.

20*th.*—*Twenty-six* candidates were examined. *Fourteen* failed. The undermentioned *twelve* passed, and were declared to be duly qualified to be registered as Chemists and Druggists:—

Crow, William Edward ....Louth.
Elstob, John ....Richmond.
George, Isaac ....Great Yarmouth.
Gill, William........................Nottingham.
Gradidge, James Henry ....Truro.

STATEMENT OF ATTENDANCE OF MEMBERS OF COUNCIL ON COMMITTEES FOR THE YEAR 1882-83.

	Committees held once a Month or Oftener.		Committees held Occasionally.		Special Committees.	Total Number of Attendances.
	Finance.	Library, Museum, Laboratory, and House.	Benevolent Fund.	General Purposes.		
Number of Committee Meetings held.	12	10	12	10		
Andrews (*London*)	4	8	*	8	*	20
Atkins (*Salisbury*)	5	7	9	10	20	51
Borland (*Kilmarnock*)	*	*	*	9	*	9
Bottle (*Dover*)	*	8	8	7	11	34
Butt (*London*)	3	10	12	8	7	40
Carteighe (*London*)	2	10	11	10	28	61
Churchill (*Birmingham*)	*	*	1	4	*	5
Gostling (*Diss*)	11	6	*	9	*	26
Greenish (*London*)	*	9	6	9	13	37
Hampson (*London*)	*	6	*	8	9	23
Hills (*London*)	11	9	*	9	12	41
Radley (*Southport*)	*	*	11	10	*	21
Richardson (*Leicester*)	*	7	8	5	2	22
Robbins (*London*)	*	9	11	9	7	36
Savage (*Brighton*)	9	*	*	7	*	16
Schacht (*Clifton*)	9	0	*	10	8	27
Squire (*London*)	6	4	*	7	5	22
Symes (*Liverpool*)	4	*	*	5	8	17
Williams (*London*)	*	7	9	9	8	33
Woolley (*Manchester*)	*	*	5	5	4	14
Young (*Edinburgh*)	*	*	10	9	2	21

* Not appointed on this Committee.

NUMBER OF ATTENDANCES OF MEMBERS OF COUNCIL AT COUNCIL MEETINGS FOR THE YEAR 1882-83.

Andrews, Frederick	10	Gostling, Thomas Preston	11	Savage, William Dawson	11
Atkins, Samuel Ralph	11	Greenish, Thomas	10	Schacht, George Frederick	11
Borland, John	10	Hampson, Robert	11	Squire, Peter Wyatt	8
Bottle, Alexander	11	Hills, Walter	11	Symes, Charles	11
Butt, Edward Northway	11	Radley, William Valentine	11	Williams, John	11
Carteighe, Michael	11	Richardson, John George Fredk.	10	Woolley, George Stephen	9
Churchill, Walter John	10	Robbins, John	10	Young, James Robertson	10

Number of Meetings during the year, 11.

Granger, Harold ....Nottingham.
Guest, George Robert ....Brentwood.
Harrison, James Hughes.........Sheffield.
Haynes, Joseph Alfred ....Fairford.
Hepple, Thomas ....North Shields.
Hill, John ....Alford.
Horne, Charles ....Stourbridge.

25*th.*—*Twenty-three* candidates were examined. *Thirteen* failed. The undermentioned *ten* passed, and were declared to be duly qualified to be registered as Chemists and Druggists:—

Jeans, Alfred ....Mansfield.
Johnson, Leonard ....Aiskew.
King, Arthur...........................Norwich.
Mallett, Thomas John.............Luton.
May, Samuel Augustus ....Jersey.
Micklem, Edwin ....London.
Midgley, Walter ....Keighley.
Nickolls, John Bate ....Bromsgrove.
Taylor, Ernest Sanderson ......Grantham.
Thomas, Llewelyn Lloyd ......Bala.

26*th.*—*Twenty-four* candidates were examined. *Sixteen* failed. The undermentioned *eight* passed, and were declared to be duly qualified to be registered as Chemists and Druggists:—

Low, David ....Hexham.
Painter, Frederick Hubert ....London.
Pearson, William Jackson ......Little Gowerby.
Phillips, Sidney......................Wolverhampton.
Presbury, Herbert Henry ......London.
Rawling, William John ....Devonport.
Thomas, Arthur William WynneBala.
Wood, Edward James............Brentford.

27*th.*—*Twenty-six* candidates were examined. *Fifteen* failed. The undermentioned *eleven* passed, and were declared to be duly qualified to be registered as Chemists and Druggists:—

Shepherd, Robert James.........Wisbech.
Stevens, Chas. Willm. Davis...Upper Norwood.
Talbot, William Widdowson ...Bulwell.
Thwaites, Frederick................Bishop Auckland.
Toplis, John Walter................St. John's Wood.
Walker, George John ....Revesby.
Wallis, Edwin ....Streatham.
Williams, William Lloyd.........Buckley.
Willis, William........................Chudlington.
Willoughby, Arthur John ....St. Leonards.
Wilson, Richard ....Kidderminster.

MODIFIED EXAMINATION.

18*th.*—*Two* candidates were examined. *Both* passed, and were declared to be duly qualified to be registered as Chemists and Druggists:—

Crosby, John ....Lincoln.
Jones, William Shepherd ....Southport.

19*th.*—*Two* candidates were examined. *One* failed. The undermentioned passed, and was declared to be duly qualified to be registered as a Chemist and Druggist:—

Troake, Charles Francis ....Newbury.

PRELIMINARY EXAMINATION.

27*th.*—The undermentioned certificates were received in lieu of the Society's Examination:—

Certificates of the College of Preceptors.

Bircham, Jesse ....Reepham.
Blomfield, Thomas Nevill ......London.
Heath, Walter George............Norwich.
Milbanke, William B. ....Sunderland.
Yates, Charles George............Brighton.

Certificates of the Society of Apothecaries.

Scott, Sack Noy ....St. Austell.
Stocker, George ....Exeter.

Certificates of the University of Cambridge.

Dawson, Theophilus Ernest ...Gateshead.
Gibbons, Alfred John ....London.
Hobbs, William Harry ....Uxbridge.
Islip, Charles Cater ....St. Leonards.
Poole, Weston ....Newcastle, Staffs.

Certificate of the University of London.

Stacey, Wilson ....London.

Certificates of the University of Oxford.

Carter, Benjamin...................Falmouth.
Fowle, Sydney ....London.
Seaton, Richard ....Stamford.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The thirteenth general meeting of the above Association was held at the Royal Institution, on Thursday, April 12, 1883, Mr. A. H. Mason, F.C.S., Vice-President, in the chair.

The minutes of the last general meeting were read and confirmed, and the following donations announced:—The *Pharmaceutical Journal*, from the Society; the 'Annual Report and Journal of the Liverpool Polytechnic Society' for 1882, from the Society.

Mr. James Crawford Bredin was elected a member, and Mr. V. T. Cole an associate.

Dr. C. Symes, alluded to one of the new tests for albumen in urine, viz., picric acid, and pointed out that strongly acid urine might give no reaction with this reagent unless a considerable excess were used.

A few remarks were made upon this subject by Messrs. R. M. Sumner, E. Davies and Conroy.

The Chairman, Mr. A. H. Mason, read and commented upon an article in the *Times*, referring to an explosion stated to have occurred on the occasion of the destruction of the dynamite prepared from the nitro-glycerine recently seized in London.

Several gentlemen, including Messrs. Conroy, Symes, Davies, A. C. Abraham and A. H. Mason, discussed the question, Mr. E. Davies explaining it by supposing that a portion of the train might have become heated, not to a sufficient extent to cause combustion at the time, but sufficient to produce such a critical molecular condition as to explode when again lighted. In proof of the probability of this explanation, Mr. Davies cited an instance in which some ½ ounce of nitro-glycerine, when being dried in his laboratory, exploded with great violence. The assistant had, in fact, in the absence of instructions, been drying the preparation on a water-bath, and having neglected it until the water had all evaporated was about to add fresh water when the air-bath, into which it had been converted, caused the explosion. Mr. Davies did not think that the temperature could have exceeded 200° to 300° C.

Mr. Mason thought that Mr. Davies' explanation did not agree with the results of Professor Abel's experiments and his opinions founded upon them.

Mr. A. C. Abraham thought that Mr. Davies' explanation would not be found to be opposed to the results arrived at by Professor Abel. He pointed out that the only difference between explosion and ordinary combustion was in the rapidity with which decomposition took place, and thought that the experiments which had been carried out by the authorities conclusively showed that the nearer the temperature of dissociation of an explosive was approached the more rapid would the combustion be, and, therefore, the more would it approach in violence to an explosion caused by a detonator.

The Honorary Treasurer then took the chair and called upon Mr. A. H. Mason, F.C.S., to read a paper on "Odours, Perfumes, and Flavours," of which the following is an abstract:—The necessity of educating the sense of smell in our ordinary avocation was first referred to, and the action of the olfactory apparatus explained. The influence of the sense of smell, the classification of odours, the impregnation of odours, the origin and introduction of perfumery into this country, and the sources and uses of the materials derived from the animal and vegetable kingdom used in the manufacture, were fully entered into, the materials referred to being divided into ten series—animal, floral, herbal, citrine, spicey, ligneous, radical, seminal, balmy, and fruity. The various products of these materials taking the form of essential oils, ottos, pomades, essences, scented oils, alcoholic tinctures and waters. The processes actually employed for the extraction of the odorous principles from these substances were detailed—(1) by distillation with water; (2) by impregnation with fatty bodies; (3) by pressure and expression.

Mr. Mason next explained the method of procedure in the various attempts which have been made to extract these principles by more scientific and economical ways, but said these were not found of utility in actual practice. The production of artificial odorous principles by chemical artifice, such as cumarin, vanillin, and heliotropine was next explained, also the manufacture of artificial fruit essences or flavourings.

The paper was illustrated by diagrams and specimens of the various articles alluded to.

A vote of thanks was proposed by Dr. Symes, and seconded by Mr. Michael Conroy, who recommended no one to attempt to prepare artificial fruit essences from the published formulæ, as they would not thereby obtain a satisfactory product.

The discussion was continued by Messrs. E. Davies, Samuel, and the chairman, after which the vote of thanks was carried, and Mr. Mason having replied, the proceedings terminated.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The usual monthly meeting of the Association was held at the Masonic Hall, on Wednesday evening, April 25, the President in the chair. There was a good attendance of members and associates.

The minutes of the last meeting having been read and confirmed, the President briefly introduced Mr. H. Major, B.A., who delivered a very interesting lecture on "Beverages." He stated that a beverage, or water in some form or other, was a necessity to the human body; in fact, the body itself contained 87 per cent. of water, muscle containing 75 per cent., which was the same as blood. The functions of the body could not be carried on without water to sustain life, its greatest use being the reduction of heat in the system. There was no definite standard as to the purity of water in the ordinary sense of the word. The lecturer next dealt with milk as a beverage; this was the next in importance, and in fact contained all the elements necessary to the sustenation of the life and work of the body, and he remarked that less milk was drunk in England than in any other country of Europe, the average being only ¼ pint per head per day. After speaking of the adulteration of milk, he directed the attention of his hearers to tea and coffee as beverages, stating that the former was more preferable for general use, it having the properties of exciting vital action and perspiration, and acting directly upon the cerebral portion of the brain; coffee did not induce perspiration, but rather suppressed it, and in this respect was less valuable than tea. In conclusion, the lecturer made some remarks upon alcohol, stating that whisky was the oldest form in which it was used as a beverage, but it was with great difficulty that either it or brandy or gin was obtained pure, the latter especially being "doctored" to a very large extent. Rum was the purest form of spirit obtainable in England. He then treated upon alcohol as a food and deprecated its use, remarking that it was a narcotic, and certainly could not be proved to be of any use in the human economy.

The lecture was listened to with great interest, and at its close a vote of thanks, proposed by Mr. Beverley, and seconded by Mr. Warriner, was accorded to Mr. Major. Mr. Major having responded, the meeting terminated.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Thursday, April 26, at 4 p.m. Present—Professor Attfield, F.R.S., etc., President, in the chair; Messrs. Brady, Carteighe, Ekin, Squire, Taylor; and Messrs. Benger and Plowman (Hon. Secretaries).

The minutes of the previous meeting were read and confirmed.

Letters of thanks for copies of the 'Year-Book of Pharmacy' were read from various societies.

A letter was read from Mr. O. R. Dawson, Secretary to the Local Committee of the last Conference meeting, expressing thanks, on behalf of the chemists of Southampton for the Bell and Hills gift of books.

In reference to a resolution passed at a previous meeting, that a circular inviting to membership be sent to all registered chemists in Great Britain and Ireland, not already connected with the Conference, it was resolved "That the mode of canvassing be adopted as on previous occasions, and that the Secretaries be instructed to carry out the details."

The question of the desirability of appointing Colonial Secretaries was discussed, and the Secretaries were instructed to obtain the names of suitable gentlemen in the colonies and India willing to undertake the duties, and submit them to a future meeting for further consideration.

The Honorary Secretaries reported that the arrangements for the Southport meeting were making satisfactory progress.

The names of a number of members whose subscriptions were in arrears were ordered to be removed from the list.

The following gentlemen were elected to membership:—Messrs. T. P. Garrett, Newport, Mon.; C. J. Holmes, London; A. C. J. Horrell, Dartford; A. E. Martin, Oldham; C. Paterson, Pollokshields; J. Righton, Southport; F. E. Rookledge, Easingwold; G. Tocher, Helensburgh; A. W. Gabriel, Queanbeyan, N.S.W.; T. M. Wilkinson, Dunedin, New Zealand.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

H. C. Dodson.—The point has not been lost sight of, as all persons passing the qualifying examination would be registered as "pharmaceutical chemists."

R. Prust.—All sales of preparations—except "patent medicines"—containing scheduled poisons are subject to the provisions of the Pharmacy Act.

G. R. Guest.—No, they are not exempt.

"*Inquirer.*"—(1) *Lychnis dioica.* (2) *Geranium molle.* Send geraniums with fruit in future. (3) *Ribes sanguinea*: not a British plant. (4) *Peltigera polydactyla* and *P. canina.* (5) *Rumex Acetosella.* (6) *Conium maculatum.*

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Baldock, Reynolds, Salmon, Hill, Greenish, Alcock, Modlen, Millhouse, Junior, W. J. W.

THE ETHER TEST OF QUININE SULPHATE.

BY A. J. COWNLEY.

It has already been shown by Dr. B. H. Paul (*Pharm. Journ.*, [3], vii., 653) that the use of ether as a means of judging of the purity of quinine sulphate cannot be relied on to give accurate results as hitherto practised, and that the ether test requires several important modifications to make it of any value for the purpose of detecting the presence of cinchonidine. The sulphate of this alkaloid being the most frequent impurity of commercial quinine sulphate and the one which is most of all likely to be met with, it is of no little importance to bear in mind that when using an undue proportion of ether, such as is prescribed in the British Pharmacopœia, the ether test will admit of quinine sulphate being passed as pure which contains nearly 30 per cent. of cinchonidine sulphate.

In the French Codex the proportion of ether to quinine sulphate prescribed for the application of this test is little more than one-half as much as is directed in the British Pharmacopœia, but it is still far too large for the detection of the presence of cinchonidine.

M. H. Byasson (*Jour. de Pharm.*, [5], vii., 291) has lately suggested a modification of the ether test for the detection of cinchonidine, quinidine and cinchonine in quinine sulphate, which consists in agitating 0·5 gram of the sample with 6 c.c. of ether and 2 c.c. of ·950 ammonia solution. On account of the proportion of ether used being less than that required by the Codex, he claims the possibility of detecting, by the separation of insoluble alkaloid, the presence of from 3 to 4 per cent. of sulphate of cinchonine, 4 to 5 per cent. of sulphate of quinidine, and from 5 to 6 per cent. of sulphate of cinchonidine.

As regards the detection of cinchonidine, however, this statement is not borne out by experiment. Applying M. Byasson's test to a mixture of pure quinine sulphate with the maximum proportion of cinchonidine sulphate said to be indicated by this test, viz., 6 per cent., it was found that no evidence of the presence of cinchonidine was given, and that even after some days' standing there was no recognizable separation of crystals of cinchonidine. Operating in the same way, with mixtures containing larger proportions of cinchonidine salt, it was found impossible by this test to detect the presence of even 20 per cent. of the admixture.

There is, indeed, no reason for being surprised at this result, since we know from the experiments described in the paper above referred to that even when using the smallest quantity of ether short of allowing the gelatinization of the alkaloid it is quite possible to fail to obtain evidence of the presence of 10 per cent. of cinchonidine by means of the ether test.

M. Byasson's results are no doubt to be attributed to the fact that the sulphate of quinine operated upon was not absolutly pure, as it is not of uncommon occurrence to meet with commercial sulphate of quinine containing up to 10 per cent. of cinchonidine sulphate (*Pharm. Journ.*, [3], vii. 672), an amount which would be passed over by the ether test.

So far as quinidine or cinchonine is concerned, the presence of salts of these alkaloids in quinine sulphate may be more easily ascertained, and the probability of their being present is so much less than that of cinchonidine sulphate that they may to a great extent be left out of consideration.

THE UNITED STATES PHARMACOPŒIA PROCESS FOR THE ESTIMATION OF HYDROCYANIC ACID.*

BY R. A. CRIPPS,

Assistant in the Laboratories, Bloomsbury Square.

The directions given in the United States Pharmacopœia for the estimation of hydrocyanic acid are as follows:—"13·5 grams of diluted hydrocyanic acid, diluted with 30 c.c. of water, and mixed with enough aqueous suspension of magnesia to make the mixture quite opaque, and afterwards with a few drops of solution of chromate of potassium, should require 50 c.c. of the volumetric solution of nitrate of silver, before the red colour, caused by the latter ceases to disappear on stirring (corresponding to the presence of 2 per cent. of absolute hydrocyanic acid)." On reading this I was struck by the small amount of solution of nitrate of silver required, and on calculating the amount theoretically required to precipitate the whole of the hydrocyanic acid as cyanide of silver found it to be 100 c.c. instead of 50 c.c. *Assuming* the formation of a double salt of cyanide of silver and cyanide of magnesium of the formula $MgCy_2(AgCy)_2$, and *assuming* also that chromate of silver will be precipitated as soon as the double salt is completely formed, then the figures given in the U.S. Pharmacopœia would be correct.

The object of the experiments shortly detailed in this note was to prove, first, whether or no the U.S. Pharmacopœia is correct in assuming that chromate of potassium will indicate the complete formation of double cyanide of magnesium and silver (if such exist), in the estimation of hydrocyanic acid, or whether it will only indicate the precipitation of the whole of the cyanogen as cyanide of silver; and second, whether a double cyanide of magnesium and silver really does exist, and if so, what is its composition?

To determine the first point—(1). 2·8402 grams of a sample of dilute hydrocyanic acid was estimated by the B.P. process (Dr. Senier's modification), and required 4·7 c.c. of the vol. solution of nitrate of silver, indicating nearly ·9 per cent. of absolute HCy. (2). 2·4446 grams of the same sample were then estimated by the U.S.P. method, and required 8·25 c.c., indicating 1·82 per cent. admitting the assumption before mentioned, or ·91 per cent. if (as is evident from the figures) the whole of the cyanogen is precipitated as AgCy, before any silver chromate is permanently formed, agreeing to about ·01 per cent. with the B.P. process.

The same experiment was repeated with the same result, proving conclusively that chromate of potassium will not serve as an indicator on the basis of the figures mentioned in the U.S. Pharmacopœia.

2. To prove the existence of a double cyanide of silver and magnesium, no mention being made of a double cyanide of magnesium and silver, either in Gmelin's 'Chemistry,' Watt's 'Dictionary,' or the leading English and American chemical journals, I made a few rough experiments to determine the existence of such a compound. (1). Calcined magnesia was shaken with hydrocyanic acid until alkaline to test-paper, filtered, a little chromate of potassium added, and solution of nitrate of silver run in in small quantities at a time; the precipitate at first formed was redissolved, showing that either a

* Read before the School of Pharmacy Students' Association.

double cyanide was formed or that cyanide of silver is soluble in solution of nitrate of magnesium, which latter was disproved by the addition of more nitrate of silver, when white cyanide of silver was precipitated, until the whole of the cyanogen was converted into silver cyanide, when red chromate of silver was formed. (2). Having thus proved the existence of a double salt I attempted to determine its composition by repeating the above experiment quantitatively, noting the number of c.c. of nitrate of silver solution required to give a cloudiness from the precipitation of silver cyanide, and also the number required to completely precipitate the cyanogen (indicated by the formation of red chromate of silver).

Quantity of hydrocyanic acid used .	2·5688 grams.
Quantity of st. sol. of $AgNO_3$ required to give cloudiness, from precipitation of AgCy	5·64 c.c.
Quantity of st. sol. of $AgNO_3$ required to *completely* precipitate the AgCy.	11·24 c.c.
corresponding to:—	
Real hydrocyanic acid	·030348 of a gram.
HCy required to form AgCy in double salt	·015217 of a gram.
HCy left in combination with Mg in double salt	·015131 of a gram.
Silver required to form double salt .	·0607 of a gram.

thus agreeing within the limit of experimental error with the formula $MgCy_2(AgCy)_2$.

The salt was prepared in filamentous crystals by filling an ordinary vial with hydrocyanic acid, adding excess of calcined magnesia, securely corking and heating in a water-bath for about twenty minutes, filtering and dissolving in the filtrate cyanide of silver until saturated, again filtering and evaporating over sulphuric acid.

From these experiments the following conclusions have been drawn:—

1st. That the United States Pharmacopœia is at fault in the directions given for the estimation of hydrocyanic acid, arising from a false assumption, viz.:—that chromate of potassium will indicate the complete formation of double cyanide of silver and magnesium.

2nd. That in order to use this method for the practical estimation of hydrocyanic acid, the clause "should require 50 c.c. of the volumetric solution of nitrate of silver" in the U.S.P. must be read, "should require 100 c.c. of the volumetric solution of nitrate of silver."

3rd. That the method is not so satisfactory as that in vogue in this country; for if it be carried on till the formation of red chromate of silver, double the amount of silver solution will be required, and if it be filtered before estimation, the length of time required for complete union of MgO with the HCy, and for filtration and washing, would generally exclude the method from use.

4th. That a double cyanide of magnesium and silver does exist, having the formula $MgCy_2(AgCy)_2$, analogous to that of silver and sodium NaCy,AgCy.

Since writing the above I find that the U.S. Pharmacopœia in another place states that 1 c.c. of solution of nitrate of silver is equivalent to ·0054 of a gram of HCy, which is also incorrect, being also based upon the assumption that chromate of potassium will indicate the complete formation of a double salt. The correct statement would be, that 1 c.c. of decinormal solution of nitrate of silver is equivalent to ·0027 of a gram of real HCy as shown by the following equations.

$$HCN + AgNO_3 = AgCN + HNO_3;$$

or with the addition of magnesia:—

$$2HCy + MgO = MgCy_2 + OH_2$$
$$MgCy_2 + 2AgNO_3 = 2AgCy + Mg(NO_3)_2$$

That is to say, 2·7 grams of hydrocyanic acid are equivalent to 1000 c.c. of decinormal solution of nitrate of silver, and therefore ·0027 of a gram equals 1 c.c.

ESSENTIAL OILS AND DISTILLED WATERS.

BY PERCY WELLS.

Now that the season is approaching for the distillation of essential oils and perfumed and other waters, I desire to call attention to a very simple and inexpensive plan for improving the odour and quality of oils, and preventing the decomposition of distilled waters. I have given the process a fair trial and can, therefore, speak confidently of its efficacy. The article I use is permanganate of potash, and it should be added to water before it is put into the still only in quantity enough to make it a *faint* pink.

If any chemist has rose, elder flower or orange flower waters, which are partly spoiled, let him add to them just enough of the salt to give the permanganate tinge, and then distil them, and he will find the products to have recovered their odour and not again change.

I have some waters which I treated in this way nearly two years ago, and they are perfect. I have also redistilled oils, adding to the water permanganate in the proportion of ½ to 1 grain per ounce of oil, and the result has been most satisfactory.

THE CULTIVATION OF THE POPPY IN EUROPEAN TURKEY.

The following is a translation of instructions as to the cultivation of the poppy and the method of extracting and preparing opium, which have been drawn up under the authority of the Turkish Government, and distributed throughout the agricultural districts of Macedonia, with a view to promote the development of the opium industry in that province:—

"If we take into consideration the fact that poppy seed is capable of yielding 6 okes [22½ lbs.]* of opium and 10 kilos of seed to every dunum [100 sq. metres] of land sown; that an oke of opium realizes 400 pias [£3 12*s.*], and a kilogram of poppy seed 40 pias, and therefore that altogether a dunum of land sown with poppy seed may be worth as much as 2640 pias [£23 15*s.*]; if at the same time we bear in mind that a dunum of land sown with wheat seed yields at most 10 kilos of wheat and 2000 okes of straw, and that with wheat realizing 25 pias the kilogram, and with straw being only worth 30 pias per 200 okes, the total possible value of a dunum of land sown with wheat is 280 pias [£2 10*s.*], we see at once that in comparison with wheat and other similar products the cultivation or the opium poppy is a most lucrative industry.

"Seeing then how productive of wealth the cultivation of the opium poppy has been to the agricultural population of the sandjak of Broussa the following is a short treatise supplying information on this point.

"*The Various Species of Poppy Seed and the Proper Season for Sowing.*—Poppy seed is also sometimes styled

* The figures between brackets are inserted as approximately correct.—ED. PH. J.

'Khashkash' seed. It is very small and it is of two kinds. One is white and the other is of a darker hue, both being contained within shells or pods, which are sometimes termed cocoons. These cocoons are globular in shape, and of the size of a Jerusalem artichoke, having on the upper side a roundish mark which is termed the 'comb.'

"The darker-hued seed is of two species. The outer shells or cocoons of the first species are small, and may be distinguished by a row of small holes, through which if great attention be not paid, as soon as the outer shells are fully matured and ready to receive the produce of the seed the latter drops and is lost. The flowers of this first species are generally of a red or purple hue. So also are the flowers of the second species, but the outer shells of the latter are larger and of an oval shape, and they have no holes in their combs.

"The white poppy seed is also of two kinds, of which though one is white the other is yellow. In other respects there is very little difference between these two kinds, both having large oval-shaped, outer shells with no holes under their combs, the flower, like the seed, being white. The opium extracted from this species of poppy is more abundant and of a superior quality to that which is the produce of the first-named species.

"Although in some localities the 'Khashkash' or poppy seed is sown, as a rule it is only utilized by yielding an oil which is extracted from it. From 100 okes (275 lbs.) of seed may be obtained a yield of 30 or 40 okes (82½ or 110 lbs.) of oil, which is of two kinds, of which one is obtained by first pounding the seed, then heating it and extracting the juice, while the seed is still hot. This oil is used in Europe in the composition of water-colour paint and oil paint, and is also burnt in lamps. It is also used in the manufacture of glass shades.

"The other kind of oil is obtained without heating the crushed seed, and having a pleasant taste is used in the preparation of food.

"Arkara-Hissar Sahib ('Afion Kara Hissar').—The seed is first heated before the oil is extracted, which is then universally used by the inhabitants in the preparation of food.

"The oil extracted from the yellow poppy seed, like the opium so extracted, is of a superior quality to the others. In localities where there is no hoar frost in spring and autumn, poppy seed is sown from the month of September up to March; but in places where there is hoar frost the seed must without fail be sown in the month of September and in the spring after the chilly weather is passed. However, seeing that in most places there is hoar frost both in spring and autumn, and that in spring, even in the month of April, there is usually some hoar frost, and that after the month of April seed time is already passed, in this country the seed should be sown in September, or at latest in the beginning of October; if the seed be sown at the season mentioned the yield both of opium and of poppy seed is more plentiful than if that operation be performed when the weather is chilly.

"*Description of the Kind of Soil most suitable to the Poppy.*—The poppy seed must be sown in light, rich, and yielding soils. If it be sown in cold clayey soil or in damp localities the yield will be small and the opium of an inferior quality.

"Ground which is to be sown with poppy seed, of whatever kind it be (*i.e.*, the seed), should be well manured, sheep's dung being of course preferable. Experience has proved that if a field which has just yielded a crop of opium be immediately sown with wheat, the crop resulting from this last sowing will be remarkably good.

"*The Method to be adopted in Sowing and the necessary subsequent Treatment.*—The soil of a field which is to be sown with poppy seed should be ploughed two or three times and well turned up. The seed should then be scattered about with the hand, just as flax seed is. After this the soil must be thoroughly stirred up and mixed by a rake or a row of bushes bound on to the back of a harrow.

"If 100 drachms (*i.e.*, Turkish drachms) of poppy seed be sown on every dunum of land, or on such an extent of land as will take a kilogram of wheat seed, it is sufficient. As soon as ever the young poppy plants begin to appear above the surface of the soil and to bear three or four leaves, in those places where they are too close together they must be taken up and planted again in such a manner as to leave a space of a span between each plant. In order to remove any weeds that may make their appearance in these spaces the soil must be hoed once or twice. This use of the hoe must never be omitted, for if there be many weeds in the field they stunt the proper and healthy growth of the plants, and cause a considerable diminution in the amount of the crop. Moreover, if the seeds of such weeds remain in the soil it becomes subsequently impossible to rid the field altogether of them.

The Course of Treatment to be observed at Harvest Time.—Opium being a substance which is extracted from the pods or outer shells described above, as soon as these pods become green in colour and have reached their full growth the green hue changes to yellow. A few days before this change of colour takes place there forms over the pods a very thin watery film of a light green hue, though somewhat indistinct in appearance. This film is called 'cougak.' If it be wiped away with the finger its place remains quite visible. If at about this time the pod be squeezed between the thumb and forefinger, it becomes so far strengthened that it cannot be easily crushed. It is then that the juice which forms the opium must be gathered.

"In order to gather the juice or paste, the first step is to take a knife made especially for this purpose, being small and as sharp-pointed as the end of a penknife, and with it to cut a semi-circular line in the pod beginning from the middle and going round the edges, at the same time leaving a space of about a finger's breadth. Immediately this is done there appears a white milk-like fluid of a bitter taste, and there forms. This fluid little by little increases in consistency, and its colour becomes darker and darker, until in twenty-four hours it becomes coffee-coloured, and as thick as paste. This is opium. This must be scraped off with the edge of a somewhat large and blunt knife and put into a poppy leaf, and so on until as much as 20 or 30 drachms of opium have been collected on one leaf, the edges of which must be turned in so as to prevent it being spilled. If, while the opium is being collected, the film above described be mixed with it, it has a beneficial effect.

"At Karahissar the work of cutting lines in the pods of the poppies is generally begun early in the afternoon and continued until nightfall. As the opium must be collected twenty-four hours after the above operation has been concluded, the following day also, soon after twelve o'clock, they begin on the one hand to collect the opium from the pods which were cut the day before, and also to cut lines in other pods, which work occupies them until the evening. But should they come across pods which are not quite ripe, they leave them alone, and five or six days afterwards they again visit them, and after cutting lines in them collect their juice.

"In order that the exact season for collecting the juice may not be missed, the whole work must be gone through and finished in five or ten days. Moreover, the proper time for marking the pods must be accurately ascertained, for if the pods be cut say ten days before or after they are quite ripe, there is no yield of opium. As an instance of this it may be mentioned that in the plain of Broussa the experiment was made. Although the plants had reached their full growth, the pods were marked or cut both before and after the exact time when the operation should have been performed, and consequently there was no yield of opium. Sometimes it happens that a dry wind begins to blow at the very time when the poppy pods should be cut, and the atmosphere becomes chilly in consequence. During such weather the yield of opium is very small. The pods also should not be cut when it is raining, for the rain washes away and destroys the juice as fast as it exudes from the seams that have been cut for it.

"After the opium crop has been gathered in, the pods change their previous hue of either green or yellow to rose colour; when this change takes place the poppy plants should be taken up by the roots one by one and collected into small bundles. Each bundle should then be bound by a young green withe, and then so placed upright in the ground that the roots of the plants be covered, in which position they should remain for a few days until the seed contained within the pods shall have become thoroughly matured and dry. Then the pods should be threshed with a stick until they break open, when the seed may be collected.

"Another method is to sever the stem of the plant at the knot which is to be found close up to the pod, with the finger and thumb, and after collecting the ends so severed to spread them out to dry in some open place, and then to break them open by threshing, or else to pull them to pieces, and, after sifting the seed until it is quite free from extraneous matter, to collect it.

"At Karahissar they purposely burn most of the pods and reduce them to ashes, a fluid extracted from which they use to bleach cotton, on the ground that it is more effective than the water strained off from ordinary ashes.

"After extracting the oil from the poppy seed, there remains a sediment technically called 'kyusebe,' on which buffalo, cows, and black kine generally are fed, on the ground that such diet increases the amount of milk and so of 'caimak' (cream)."

THE ACTIVE CONSTITUENTS OF THE OLEANDER.*

BY O. SCHMIEDEBERG.

It is known, especially through the investigation of Pelikan, that the oleander (*Nerium Oleander*, L.) contains a cardiac poison with an action similar to that of digitalin, which the different authors who have been engaged in ascertaining its characters, — Landerer, Latour, Lacornski, Lukomski, Pelikan, Girard and Betelli,—have generally agreed in describing as a yellow resinoid body, whilst their opinions as to its chemical nature have shown a wide divergence. In the following investigation, which had for its object, among other things, to discover the chemical relations between the active constituents of the oleander and the purple foxglove, the principal materials used were oleander leaves, which were brought back in considerable quantity from Tunis, by the late Professor Gustav Williams. These were packed in bales whilst quite fresh, were scarcely withered when they arrived and were then first carefully dried.

Even with these materials the active constituents could only be isolated and their characters, but not their elementary composition, investigated. In order to establish with certainty their empirical formulæ a quantity would be required which would only be yielded in a manufacturing operation.

Oleander leaves contain two chemically different non-nitrogenous substances, both of which, however, produce the known cardiac action in a similar manner. One of these appears to be identical with digitalein, occurring in *Digitalis purpurea;* but since this identity is not yet established with the necessary certainty the substance may be provisionally called "neriin." The other active substance, which, except as to basic properties, agrees essentially with the oleandrin of Lukomski and Betelli, forms an amorphous mass very slightly soluble in water, and very easily soluble in alcohol, ether and chloroform, for which the name "oleandrin" may be adopted.

In perfectly fresh oleander leaves, gathered in German gardens in spring-time, only these two constituents could be detected. The African leaves, on the contrary, contained, besides, other substances in considerable quantity, which may have originated from the decomposition of neriin or oleandrin. One of these presented in respect to its properties a certain resemblance to digitalin, but was almost inactive. It might be named "neriantin," since upon treating it with sulphuric acid and bromine it gave very readily the beautiful colour which is peculiar to the red flowers of the oleander. Oleander leaves also contain the derivatives of neriin and oleandrin corresponding to digitaliretin.

The method adopted in the preparation of the substances mentioned was as follows. An extract was prepared with 50 per cent. alcohol from the dried and powdered leaves, and this was treated with subacetate of lead and ammonia. The precipitate first produced was lemon-yellow, and consisted of a lead compound with a substance belonging to the class of tannins, which was not further examined. Further treatment yielded a pure white precipitate which consisted of a lead compound of neriin. The neriin is not, however, completely precipitated from the liquid in this way; a portion remains in solution probably in the form of a lead compound.

Upon concentration of the yellowish filtrate from which the lead has not been removed, the neriantin separates as the alcohol evaporates in bright light flocks, which are removed by filtration of the liquid before all the alcohol has been removed, and before the separation of other dark coloured substances which would contaminate the neriantin and be afterwards difficult to remove. Subsequently, when all the alcohol has been driven off, besides fresh quantities of neriantin, oleandrin separates as a resinous mass. The filtered liquid still contains considerable quantities of oleandrin and neriin, besides the decomposition product of the latter already referred to.

1. *Neriin, or Oleander Digitalein.*

The precipitation of neriin can be effected either by means of lead subacetate in the presence of ammonia, or by tannic acid. In the presence of much free mineral acid it is also precipitated by various so-called alkaloidal precipitants, especially by solution of iodide of bismuth and potassium. This behaviour of non-nitrogenous glucosides was first utilized by Marmé in the isolation of helleborein. The most convenient method of liberating the neriin from the almost resinous tannic acid compound is to dissolve this in alcohol and then heat it to dryness on a water-bath with zinc oxide. The liberated neriin is then extracted by means of absolute alcohol, from which it is precipitated upon the addition of an excess of ether. The further purification of the crude neriin is effected by fractional precipitations of alcoholic solutions with anhydrous ether.

For the precipitation of neriin by means of an alkaloidal reagent a solution of iodide of bismuth and potassium is used most advantageously. In order to obtain a precipitate a quantity of acid—sulphuric acid is the best—must be added to the liquid. The precipitate, which quickly adheres together, is well washed upon a filter, or by decantation, with dilute sulphuric acid and decomposed in the ordinary manner with barium hydrate. The solution freed from excess of the latter by means of carbonic acid contains neriin together with barium iodide. This is removed by silver sulphate, the filtrate treated with barium hydrate to throw down excess of silver, and then after again filtering the baryta and the last traces of silver are removed by passing through the liquid first carbonic acid gas and then a few bubbles of sulphuretted hydrogen.

The colourless or faintly yellow coloured liquid contains, besides neriin, a considerable quantity of oleandrin, which upon evaporating the solution in a vacuum over

* *Archiv fur experimentelle Pathologie und Pharmakologie*, vol. xvi., p. 149.

sulphuric acid gradually separates tolerably well as a glass-clear resinous mass and is completely removed by filtration. The neriin can be then further purified in the way already mentioned by fractional precipitation. In this way perfectly colourless preparations were obtained from German oleander leaves.

Neriin, when purified as much as possible, possesses all the properties of digitalin [? digitalein]. After drying it has a faint yellowish colour, dissolves perfectly clear in water and alcohol in all proportions, is insoluble in chloroform, ether and benzin, upon boiling with concentrated hydrochloric acid communicates to the liquid a yellow, or when a less pure preparation is used, a yellowish-green colour, and gives with sulphuric acid and bromine the red colour reaction before mentioned. Its behaviour towards precipitants is the same as that of digitalein, since the latter is also precipitated by tannic acid, by subacetate of lead in the presence of ammonia and different alkaloid reagents. Slight differences in external character and in the behaviour of the two substances towards concentrated hydrochloric acid, as well as sulphuric acid and bromine, diminish with increasing purity. After complete drying over sulphuric acid it forms, when freshly prepared, a friable mass; but when preserved some time in well-closed bottles it loses this property, becomes viscous and gum-like, and no longer dissolves clear in water.

Upon carefully boiling neriin with dilute mineral acids it splits up, without any notable change of colour, into glucose and a resinous body which perfectly agrees in its reactions and external characters, as well as in respect to its physiological action, with the corresponding decomposition product from digitalein.

Although the identity of neriin with digitalein cannot be affirmed with certainty in the absence of analytical data, for which the available material was insufficient, the above facts prove beyond doubt that the two substances at least stand in very near relation to one another.

2. *Oleandrin.*

This body is obtained, as before stated, in the evaporation of the oleander extract and as a bye-product in the precipitation of neriin by alkaloidal reagents, either colourless, or more or less yellowish, or even brownish, according to the degree of purity or freedom from colour of the original solutions. For its purification oleandrin is treated with large quantities of water, which takes up about 2 or 3 parts per 1000, and this is removed from the filtered, usually colourless, aqueous solution by shaking with chloroform. Upon evaporation of the filtered chloroform solution the oleandrin is left as a transparent colourless mass, or only perceptibly yellowish coloured when in very thick layers, very easily soluble in chloroform and alcohol, but not so soluble in ether and benzin; in contact with water it gradually becomes opaque and crumbly, and after drying forms a loose white or faintly yellowish coloured, easily pulverizable substance. When solutions in alcohol and water are very slowly evaporated oleandrin separates partially in the form of thin tables of irregular contour, showing no double refraction, and presenting no crystalline structure under the microscope. After being kept some time the colourless substance assumes a lemon colour, which is not entirely removed by treatment of the alcoholic solution with charcoal. Oleandrin is also soluble in tolerably strong acetic acid. By concentrated sulphuric acid it is dissolved with a brown colour, which upon the addition of potassium bromide passes into a rather bright red.

Upon boiling oleandrin with very dilute acids a substance is formed which reduces cupric oxide in alkaline solution, and is probably glucose, and a yellow resinous body, very slightly soluble in water, but freely soluble in alcohol, chloroform and ether, which gives the bromine and sulphuric acid reaction like digitaliretin, and like it and toxiretin produces convulsions in frogs, followed by muscular paralysis. The boiling of the oleandrin must not be suspended too soon, or a portion remains unaltered and cannot be separated from the resinous decomposition product. In such cases the action of oleandrin is produced in frogs as well as the action of digitaliretin (oleandretin). Upon boiling oleandrin more strongly with concentrated mineral acids there is found again, as in the case of digitalin, a yellow or yellowish-brown inactive resinous substance, which also gives the bromine and sulphuric acid reaction. Further, upon oleandrin being kept, besides change of colour it undergoes decomposition, oleandretin being formed and, apparently, neriantin. The relations of the latter to the mother substance can not, however, be stated.

Oleandrin possesses all the physiological properties characteristic of the group of digitalin poisons. To produce systolic pause in the heart of a frog the average dose required is 0·25 milligram.

3. *Neriantin.*

The crude neriantin obtained by the process described is most suitably purified by dissolving it in a little warm alcohol containing water, treating this solution with so much ether that a thin layer of aqueous liquid is separated at the bottom of the vessel, and removing from this the alcohol-ether solution by decantation. Upon treatment of the latter with a larger quantity of ether and a proportional quantity of water, so that a layer of aqueous liquid is again formed at the bottom, after standing the neriantin separates out from this layer as an almost perfectly white flocculent mass, which after decanting off the ether can be collected on a filter. The removed ether, if shaken with water, usually yields a further quantity of neriantin.

After being dried over sulphuric acid neriantin forms a hard mass, resembling in colour and condition commercial gum arabic. If this be dissolved in hot absolute alcohol and the solution be very strongly concentrated on a water-bath, it assumes a brownish colour, and after long standing, without evaporation, the neriantin separates at the bottom of the vessel in the form of semiglobular brownish granules, the size of a pin's head (sphærocrystals). If the alcoholic solution, without being strongly concentrated, be allowed to stand for a considerable time in a glass vessel, the opening of which is simply covered with paper, a white layer of neriantin is gradually formed upon the bottom and sides of the vessel, which under the microscope appears to consist of closely aggregated roundish disks. The substance is in this way obtained perfectly pure with the greatest certainty. After drying it forms a chalk-white crumbly mass.

From the solution in alcohol and water neriantin separates after a time as a white gelatinous substance, which under the microscope appears to be composed of extremely fine, but very long felt-like interlaced threads. With a larger proportion of water in the hot concentrated solution the entire mass often gelatinizes very rapidly, so that a removal of the separated neriantin from the liquid is not possible. In this behaviour neriantin differs very essentially from digitalin, which under similar conditions takes a granular form, whilst under a very slow evaporation, lasting over a month, it crystallizes in very thin rhombic tables, with which some granules are always mixed.

Prepared in this way neriantin does not show a distinctly crystalline structure. But it is soluble in small proportion in ether, and from this it separates upon gradual evaporation of the ether in long, fine, flexible needles. But this method cannot be adopted for the preparation of large quantities of crystallized neriantin.

In respect of solubility in alcohol, water, ether, chloroform and dilute acids, as far as can be stated without quantitative determinations, neriantin behaves like digitalin. It contains no nitrogen and gives when warmed with concentrated hydrochloric acid a greenish-yellow colour, and upon treatment with concentrated sulphuric acid and potassium bromide the beautiful red colour which is characteristic of digitalin. In this respect it might be referred to chemically pure digitalin.

On the other hand, neriantin differs from digitalin in the properties mentioned above and in its decomposition products. If a solution of neriantin in alcohol and water containing two or three drops of hydrochloric acid in 20 c.c. be boiled until the alcohol is driven off, a colourless pulverulent precipitate separates, which, examined under the microscope, appears to be composed of tolerably large four-sided pyramids, some more or less irregular and some well formed. The liquid filtered from the crystalline precipitate, after cooling, very strongly reduces cupric oxide in alkaline solution; so that neriantin must be looked upon as a glucoside, which under such treatment splits up into sugar and the crystalline body referred to. This, in analogy with "sapogenin" and "digitogenin," may be named "neriantogenin." Neriantogenin behaves towards concentrated hydrochloric acid and sulphuric acid and bromine like the unaltered neriantin, and like it is without any special action on the heart of a frog.

A more thorough investigation of neriantogenin could not be effected through want of material, but would be of especial importance to the chemical history of the peculiar active constituents of both the foxglove and the oleander. The peculiar reactions with hydrochloric acid and sulphuric acid, which distinguish almost all the oleander and digitalin constituents belonging to the digitalin pharmacological group, and reach their greatest purity and beauty in neriantogenin, indicate that in neriantogenin we have possibly to do with the nucleus which, in combination with other atom groups, especially the glucoses, gives rise to the active substances of those plants.

Neriantin, although a glucoside, does not produce the systolic pause in a frog's heart; at most it exercises a weak action, like saponin and digitonin. But it is not improbable that it originates from the very active oleandrin. Digitalein and digitalin give decomposition products which show the two reactions with hydrochloric acid and sulphuric acid and bromine most beautifully and are equally inactive, but have not hitherto been obtained crystallized. The fact appears to be, that the complete breaking up of these bodies results only from the action of stronger acids, which at the same time, as in the reaction with hydrochloric acid, gives rise to an alteration in the nucleus. The decomposition products are therefore almost all yellow or yellow-green.

From digitalin and digitalein there is formed first, upon heating with dilute acids, digitaliretin, and from this, through prolonged boiling with concentrated acids, the yellow-green inactive amorphous decomposition product. It might, however, be possible to effect by other means a splitting off, without a more fundamental decomposition, and thus to obtain a well-characterized crystallizable derivative.

Upon being kept digitalein, as before mentioned, gradually undergoes alteration, a colourless flocculent substance, insoluble in water, being formed, which gives the corresponding reactions with hydrochloric acid and sulphuric acid and bromine. This would appear to be the decomposition product corresponding to neriantin.

The difficulty in procuring these substances in large quantities makes it almost impossible to carry out an exhaustive chemical investigation of them. Digitalein is the most easily obtained, from the German commercial "digitalin." But the material alone for one kilogram of substance would cost five or six hundred pounds (10,000 to 12,000 marks). For the preparation of one kilogram of digitalin at least five or six thousand kilograms of dried digitalis leaves would be required.*

* An exhaustive list of the pharmacological literature of the oleander is appended to the original paper.

INSECTS INJURIOUS TO DRUGS.*

BY WILLIAM EDWIN SAUNDERS, PH.G.

In this paper is given simply what has been noted by the writer during a study of these insects extending over more than a year.

Sirodrepa panicea.—This is the elliptical, reddish-brown beetle, about one-eighth of an inch long, which is found in almost every edible drug, and in some, such as aconite root and capsicum, that would be pronounced far from edible. In addition to these two drugs I have found it in bitter almonds, sweet almonds, angelica, boneset, calumba, chamomile, chocolate, coriander, dandelion, elm bark, ergot, extract of licorice, German chamomile, orris root, prince's pine, rhubarb, squill, and sweet flag.

The larva is white with a brown head, is about twice as long as the beetle when full grown, although it is seldom or never seen stretched out at full length, always remaining curled up in a ball. It will in time fairly honeycomb a piece of root with small holes about one-twenty-fifth of an inch in diameter, at the end of which it is generally to be seen at home. Under the influence of camphor, these larvæ become uneasy, but being apparently unable to crawl away, resign themselves to their fate, and seem to thrive just as well with camphor as without it.

Calandra remotopunctata.—This is a small black beetle, about the size of the last, with what is popularly termed a "snout" projecting from the front of the head downwards. Under the microscope the back, thorax, and head are seen to be finely pitted, giving the insect a rough appearance. It was found in large numbers, the larva feeding on pearl barley, inside of which it lives, the egg being probably laid in the grain by the parent, and on hatching, the little insect makes its home there, eating all but the shel and sometimes attacking the grain from the outside.

Tenebrioides mauritanica, a species of "meal-worm," was found in pearl barley, and one specimen in calumba. It is a dark brown beetle, five-sixteenths of an inch long, the head and thorax forming nearly half the total length, and the mouth being fringed with hair. The back, which at first sight appears perfectly smooth, proves to be, when examined under the microscope, longitudinally corrugated. The larva is nearly half an inch long, white with a brown head, and between the jaws is a row of hair as in the perfect insect. The posterior end is furnished with a pair of jaws very similar, though, of course, for a different purpose.

Trebolium ferrugineum is a flat reddish-brown beetle, about one-eighth of an inch long, appearing smooth to the naked eye, though the microscope shows the back numerously pitted. These insects affect patent foods and similar substances, and the beetles are possessed of remarkable longevity, as proved by the fact that I have kept a few alive for two months in a small box with a little cerealina, which seems to be their favourite food. Whether the beetles themselves eat it or not I do not know, but they certainly have a liking for the dead bodies of other beetles.

Silvanus surinamensis is a narrow, brown beetle, almost one-eighth of an inch long, with a pitted and longitudinally corrugated back. One specimen only was found, on anthemis.

Anthrenus rarius.—This insect has been found only in cantharides, but I believe also attacks other animal drugs, such as castoreum. During the month of July there emerges from the egg a very active larva, densely covered on the tops of the segments with stiff brown hairs, which at the posterior end point towards the centre of the back, forming a ridge, and when the insect is annoyed, it has the power of dividing the ridge in the centre and throwing half down on each side in a fan-like position,

* From an Inaugural Essay presented to the Philadelphia College of Pharmacy. Reprinted from the *American Journal of Pharmacy*, April, 1883.

the object of which movement could not be determined. When the insect has been feeding on the whole cantharides, all these hairs on the back become rubbed off, those forming the ridge being generally last to go, because, being on the downward slope of the body they are not exposed to the same amount of friction. Underneath, however, the hairs are shorter and do not become rubbed off as on the back.

The larva consists of eleven segments, those at the ends being of a much deeper brown than those towards the middle, and the six legs being inserted on the three anterior segments, each furnished with a short, straight claw. The skins are shed quite often during the larval state, and are discarded by a slit nearly the length of the back, terminating indifferently at either end, and through which the insect emerges. The shed skins present a beautiful irridescent appearance under the microscope when viewed by reflected light.

These larvæ feed on the cantharides all winter, and, if in quantity, commit great havoc, leaving only the hard exterior portions untouched, such as the upper portion of the thorax, the green wing-cases and transparent wings. When their legitimate food gives out they have no compunction about first eating their dead parents, and then each other; but on this diet they do not seem to thrive so well.

The beetle emerges in May or June, and is about one-eighth of an inch long, oval, and black, the upper parts being marbled and streaked with whitish and rufous hairs, which are rubbed off after death if the insect is subjected to any rough usage.

Camphor does not kill these larvæ, and after keeping some for a day in a small box about a quarter full of camphor, the only thing worthy of remark in their actions was that they did not seem quite so lively as those kept without it. That they have a distaste for it, however, is proved by the fact that some which were put in a box with holes in it, left the box during the night. The Pharmacopœia direction to keep camphor with the cantharides is, therefore, not a *remedy*, but merely a preventive measure, and not a very good one either. The vapour of chloroform rapidly kills them, so that by putting a small quantity of chloroform in a gallipot on the top of the infested cantharides, the heavy vapour will sink through it and destroy them.

PHOSPHORUS AND A NEW METHOD OF EXHIBITING IT IN PILL-FORM.*

BY H. H. MILLHOUSE.

In choosing the above title as the subject of my dissertation, I would remind you that I am not the first who has been engaged in this field of inquiry. It is well known that many pharmacists have written much on this subject, and for that reason a new form of the administration of phosphorus is looked upon with suspicion, and often after a short time sinks into oblivion. My object is really to introduce to your notice an account of the experiments I have made and of what appears to me to be a new form of exhibiting this remedial agent in solid, *i.e.*, in pill form, which shall contain phosphorus in a free and unaltered state. I may preface my remarks by stating that the kind of phosphorus used was the one recognized in the British Pharmacopœia, viz., the ordinary or vitreous variety.

The medicinal value of uncombined phosphorus is dependent upon it being exhibited in a free, unoxidized and finely divided form, uniform in composition, easily and gradually assimilable, and mixed with ingredients, which do not cause decomposition, do not derange the stomach of the patient, nor counteract the action of the phosphorus.

On reference to several standard works on materia medica and various other sources we find that many medical men raise objections to the administration of phosphorus in solid form, each having different reasons for his assertions. Pereira says it should never be given in solid form, not even in pills. On the other hand Neligan remarks as follows:—

"It is generally stated that phosphorus should never be administered in solid form. If strictly interpreted this is perfectly correct, but it is not so if it be understood that phosphorus may not be administered in the form of pills, as in my opinion this is by far the best and safest way of exhibiting it."

Dr. Kirby in referring to the danger consequent upon the preparation of phosphorus pills, says:—"Bearing in mind the exceedingly poisonous properties of phosphorus and the great difficulties attending its pharmacy and its uncertain action when improperly prepared, I have refrained from publishing the details of my process, which it would be dangerous to undertake, without experience, preferring that its preparation should have proper personal supervision." In spite of this I venture to say that the average pharmacist of our own day is fully competent to undertake without risk the preparation of his own pilula phosphori when a suitable formula is presented to him.

I commenced my experiments by preparing pills from the official formula for pilula phosphori (for which I will refer you to the 'Additions to the British Pharmacopœia'). You will probably agree with me in saying that it is unsatisfactory. My reasons are briefly these. 1st. It is too hard and insoluble, for it has been known to pass through the body unchanged; 2nd. The quantity of phosphorus per cent. is too small, and consequently when other ingredients have to be added it makes the pills inconveniently large; 3rd. Being of light materials, 3 grain pills (usual dose of phosphorus $\frac{1}{30}$ of a grain) are when coated with an ethereal solution of such substances as tolu, sandarac, etc., sugar or chalk, too large. The recommendation to keep under water is both inconvenient and objectionable, the former because when a quantity is to be weighed out great care has to be taken to squeeze out all the adherent moisture, which when soap, spirit, or extracts are added causes the mass to become too soft, the latter because the amount of oxygen naturally taken up by water (4 per cent.) might cause some oxidation of the phosphorus, and thus weaken the preparation. This perhaps might be rendered less objectionable if the vessel containing the mass were filled to the brim with well-boiled and cold distilled water. No doubt other objections may be raised. The French Codex and also the recently published Pharmacopœa Germanica (1882) give no formula for phosphorus pills. I then made some from the formula of the last edition (1882) of the United States Pharmacopœia, which is as follows:—

Take of—

Phosphorus	1 grain.
Powdered althea	80 grains.
Acacia in fine powder	20 "
Glycerine	40 "
Water	20 "
Purified chloroform	50 "
Balsam of tolu.	
Stronger ether (94 per cent.)	q.s.

Dissolve the phosphorus in the chloroform, mix the powdered althea and acacia in a mortar, add the solution of phosphorus, then the glycerine and the water, make into a mass and divide into 100 pills. Coat with a solution of 1 part of balsam of tolu in 1 part of the stronger ether and keep in a stoppered bottle.

Among other suggestions that I have found are the following:—In a paper read at an Evening Meeting of the Pharmaceutical Society in 1873, A. W. Gerrard proposed the use of resin as a solvent. Tolu as a vehicle for pills was recommended by A. C. Abraham in 1874. W. H. Walling, in 1875, pointed out that cacao butter was a good solvent.

* Abstract of paper read before the Chemists' Assistants' Association, March 28, 1883.

Twenty-five grains of phosphorus were agitated with 300 grains of cocao butter until dissolved, and then 200 grains of powdered soap added and shaken until uniformly mixed, which gave a nice combination. W. B. Addington, in the same year, proposed incorporating a solution of phorphorus in carbon bisulphide with a suitable extract, continuing the trituration until the solvent had evaporated. Barnard Proctor recommended a similar formula in which the extract is replaced by soap, tragacanth, liquorice powder and confection of roses. E. Lilly, in 1876, suggested fusing phosphorus under syrup, shaking well so as to finely divide it, then mixing the phosphorus thus divided with flour. Mandl employed the following formula:—

Take of—

Phosphorus	5 centigrams.
Carbon bisulphide	20 drops.
Almond oil	18 grams.
Carbonate of magnesium .	q.s.

Make fifty pills and coat with gelatine.

Tavignot used a pill prepared from an oily solution alone, thus avoiding the objectionable ingredient unnecessarily employed in Mandl's formula.

Balsam of Peru, yellow and white wax, Canada balsam, silica, crumb of bread, borotartrate of sodium, resin, spermaceti, albumen, storax, suet, lard and phosphate of calcium, have also been from time to time recommended as excipients.

The objections which have at different times been raised against the numerous published formula are manifold and various; some of these are subjoined. Cacao butter melts too quickly in the stomach, causing unpleasant eructations and is too difficult to manipulate, and when mixed with tragacanth powder or other plastic ingredients neither of these objections is obviated. Mr. Gerrard's phosphoretted resin process has, in my opinion, as many objections as the British Pharmacopœia one; the complicated mode of preparation is alone sufficient to condemn its adoption, even by those pharmacists who are anxious to follow as far as practicable the advice meted out to them in an eloquent address by a respected professor of chemistry. Then, as Dr. Méhu has remarked, the process is very dangerous and during the operation a portion of the phosphorus passes into the amorphous or insoluble form, the resin being supersaturated with phosphorus. At a high temperature it would probably separate into solid fragments on cooling, and be very liable to oxidation during the pulverization of the resin. Lard and other readily oxidizable organic compounds become rancid and assist the oxidation of the phosphorus.

Personally my troubles with this preparation have been very great, especially when other things have to be added, and I imagined that a formula with a basis having qualities as above described would be a desideratum, so I began by looking up the literature of the subject with the foregoing result. I have tried a great many formulæ, most of which are given below, and they have been prepared both in mass and divided into pills coated with different coatings.

No. 1. Is the B.P. mass rolled out into 3-grain pills and varnished with a solution of sandarac in ether. For objections see above.

No. 2. Are 3-grain B.P. phosphorus pills, each containing in addition ½ of a grain of powdered hard soap. This addition has been recommended by medical men and others to prevent the pills passing through the body unacted upon; it, however, makes them more difficult to manipulate, since they have a tendency to split, and of course they are too large; less soap (⅛ or ¼ of a grain) would perhaps suffice.

No. 3. Consists of—

Phosphorus	5 grains.
Mutton suet	250 grains.
Powdered liquorice	145 grains.
Powdered mastich	50 grains.
	(1 part of phosphorus in 90).

Melt the suet, add the phosphorus, digest with agitation over a water-bath until dissolved; now pour the solution upon the powder previously well mixed, thoroughly dried, and placed in a stoppered bottle standing in hot water so that the melted suet is not chilled, but readily mixed by violent agitation with the powder. When divided into 3-grain pills each pill contains $\frac{1}{30}$ of a grain of phosphorus. They are large and in consequence of the basis being bulky, inconvenient to mix with other ingredients. Possibly they would be improved if a larger percentage of phosphorus were added.

No. 4. Contains—

Phosphorus	2 grains.
Powdered liquorice	120 grains.
Carbon bisulphide,	
Chloroform, of each a sufficiency.	
Glycerine of tragacanth	76 grains
	(1 part of phosphorus in 99).

It was prepared by carefully dissolving the phosphorus in 20 minims of carbon bisulphide, pouring the solution upon the liquorice powder contained in a mortar, mixing thoroughly and making into a mass with the glycerine and tragacanth paste, keeping the vapour of chloroform present during the entire process to prevent undue oxidation. $\frac{1}{33}$ of a grain of phosphorus will be contained in every 3 grains of the mass. This method is frequently resorted to when medical men order phosphorus in the form of pills without giving any basis or guide as to the way in which they wish it to be dispensed. This is the principle carried out in the United States Pharmacopœia. It is objectionable, as it retains the smell of the carbon bisulphide, and cannot safely be preserved in mass.

Carbon bisulphide, which is capable of dissolving phosphorus with greater rapidity and in larger proportion than any other solvent, has also been used in the manufacture of pills by Mandl, Proctor, and many others. M. Gubler has pointed out the fact of it possessing, in a notable degree, the power of counteracting the effect of free phosphorus. It imparts an offensive odour and taste to all preparations in which it has been used; probably even when, as in Mr. Proctor's process, the evaporation of it is calculated upon, the smell of the solvent is retained, and unless very dexterously made, some of the solvent itself.

No. 5. This is a sample which I have procured from one of the leading dispensing establishments in the West-End, and, if in the hands of a clever manipulator, may be rolled out into nice-looking pills, especially when coated with gelatine; but they, however, very quickly become sticky to the touch and unmanageable. The basis of this probably consists chiefly of cacao butter (the ordinary basis for suppositories) and tragacanth. I am informed that 1 part of phosphorus is contained in 60 parts of the mass, a 2-grain pill will therefore contain the usual dose of phosphorus, $\frac{1}{30}$ of a grain, but the ingredients being evidently light, this size pill is proportionately large.

No. 6. This was also obtained from a well-known firm, is similar in its appearance and behaviour to No. 5, and is probably of the same composition with a little soap added. These two preparations (No. 5 and 6) struck me as likely to produce those disagreeable eructations it is so essential to avoid, and my assumption was verified by actual experiment "in vili corpore," for within half an hour of taking a 2-grain pill, I experienced a slight yet disagreeable burning sensation in the stomach, and unpleasant feeling in the throat with the usual "*brimstone-like*" eructation.

No. 7. From a large City dispensing establishment. It is of much better consistence than the two preceding ones, and rolls out well. From its general behaviour I imagine it is slowly dissolved in the stomach and the phosphorus gradually absorbed. From the odour of the mass I should say carbon bisulphide has been used in its preparation, which, together with it being a private formula, is the only objection I can raise against it. I am given to understand that 1 part of phosphorus is contained in 50 parts of the mass; hence, each 2-grain pill contains $\frac{1}{25}$ of a grain of phosphorus, thus allowing of other ingredients being added without rendering the pills inconveniently large. By examination it seemed a probable mixture of liquorice, soap, mastich, phosphorus and moisture.

No. 8. Is an advertised English nostrum which I was unable to procure in mass, it being only sold in divided pills with a white coating; as we are told, it is necessary to have it divided into pills and coated directly it is made, or oxidation of the phosphorus would take place, a fact which of itself would prevent its adoption for general pharmaceutical purposes. The basis probably consists of an inert powder, with extract of gentian. I examined the coating and found it was easily detached when placed in warm water, and was composed of French chalk, sugar and gum.

No. 9. Was the following formula:—

Take of—

Phosphorus	8 grains.
Vaseline	196 grains.
Paraffin wax	36 grains.
Phosphate of calcium	240 grains.

(1 part of phosphorus in 60).

The wax and vaseline were melted together by the heat of a water-bath in a stoppered bottle, the phosphorus added while warm and shaken until dissolved, continuing the agitation until cold. It was then carefully mixed in a mortar with the phosphate of calcium. Here a peculiar phenomenon was noticed immediately after mixing, heat being developed and the mass assuming a semi-solid condition and remaining so in spite of the addition of more phosphate of calcium; when all what seemed to be chemical action had ceased, it gradually acquired a more solid form. This was not proceeded with but laid aside for future investigation, the cause of which peculiar action I hope to be able soon to explain.

No. 10. Consists of:—

Phosphorus	4 grains.
Powdered myrrh	46 grains.
Paraffin wax	30 grains.
Vaseline	70 grains.
Kaolin	90 grains.

(1 part of phosphorus in 60).

The paraffin wax and vaseline were melted together in a porcelain capsule by the heat of a water-bath and poured into a wide mouthed stoppered bottle previously thoroughly dried and warmed by standing in hot water; the phosphorus was now added and the whole briskly agitated until the phosphorus had dissolved and the mixture had finally solidified; when quite cold it was made into a mass with the kaolin and powdered myrrh, previously well mixed in a mortar. This mass is not difficult to manipulate, though it is rather soft in consistence and the pills do not varnish nicely. When divided into 2-grain pills, each pill contains $\frac{1}{30}$ of a grain of phosphorus.

No. 11. Is of the following composition:—

Phosphorus	4 grains.
Cacao butter	100 grains.
Prepared mutton suet	100 grains.
Powdered tragacanth	36 grains.

(1 part of phosphorus in 60).

The cacao butter and suet were melted as described in No. 10, and transferred to a similar stoppered bottle, the phosphorus added and shaken until dissolved and while the mixture was still liquid the powdered tragacanth was introduced and the whole violently agitated until uniformly mixed. The objections to Nos. 5 and 6 will apply to this.

No. 12. Is composed of:—

Phosphorus	4 grains.
Paraffin wax	130 grains.
Vaseline	70 grains.
Powdered tragacanth	36 grains.

(1 part of phosphorus in 60).

The paraffin wax and vaseline were melted by the heat of a water-bath, and the same mode of preparation adopted as in No. 11.

No. 13. Contains:—

Phosphide of zinc	4 grains.
Powdered althea	20 grains.
Resin ointment	24 grains.

Make a mass and divide into twenty-four pills.

This can scarcely be called a mode of exhibiting phosphorus in the free state, inasmuch as an acid must be present in the stomach, causing decomposition with production of nascent hydrogen, which combining with the phosphorus forms phosphoretted hydrogen, and is thus absorbed.

This has, however, of late years been largely prescribed by the medical profession and I find such a combination as the one above to give satisfactory results.

In concluding my list of formulæ, I would specially direct your attention to the following, the latter of which I am given to understand is quite a new method for giving a satisfactory basis for the administration of phosphorus.

No. 14. Consists of—

Phosphorus	5 grains.
Benzoated lard	250 grains.
Phosphate of calcium	205 grains.
Carbonate of calcium	20 grains.

Melt the lard by means of a water-bath, transfer to a strong stoppered and perfectly dry glass bottle made warm, add the phosphorus, shake until dissolved, then pour the solution upon the powders, previously well mixed and contained in a similar stoppered bottle, kept warm by standing in hot water, shaking briskly until the mass is thoroughly uniform in consistence. Each 3-grain pill contains $\frac{1}{32}$ of a grain of phosphorus in the free state.

No. 15. Consists of—

Phosphorus	4 grains.
Powdered mastich	30 grains.
Paraffin wax	50 grains.
Vaseline	66 grains.
Kaolin	90 grains.

Melt the wax and vaseline together in a porcelain capsule by the heat of a water-bath, place them in a strong glass stoppered bottle, previously warmed by allowing it to stand in an oven or other warm place, add the phosphorus (care being taken that the mixture is not too hot, a temperature of 140° F. being quite sufficient to fuse the phosphorus), and shake briskly until cool; when quite cold rub carefully in a mortar with the kaolin and powdered mastich, previously well mixed, until a uniform mass is obtained. It should be kept in a covered pot.

The vaseline used in the foregoing formulæ was kept in an evaporating dish at a temperature a little above its melting point for twelve hours, in order to dissipate all trace of moisture.

These two formulæ, Nos. 14 and 15, I feel confident in strongly recommending, presenting as they do to every pharmacist a practical method of dispensing phosphorus in the free state. Both are easily prepared, and if ordinary care is exerted, the danger of oxidation of the phosphorus is reduced to a minimum. The masses are of a good consistence and easily rolled into pills which possess the advantage of being small in size (in No. 15, more especially, the ordinary dose of phosphorus, $\frac{1}{30}$ of a grain, being contained in a 2-grain pill, which when coated with gelatine is considerably smaller than a 2-grain B.P. quinine pill), and thus convenient to mix with other ingredients, are readily but not too quickly disintegrated in the stomach; consequently the phosphorus is gradually absorbed into the system. Having taken several, I have experienced no unpleasant eructations, but a sensation (after a few hours have elapsed) of what the French would term *bien être*, thus leading me to believe that the active ingredients of the pills had been assimilated. I have used several different coatings (some specimens of the pills coated with them are upon the table), including sandarac varnish, gelatine, isinglass, French chalk, and a mixture of gelatine, sugar and gum acacia dissolved in water; but as pill coating might be made the subject of a very useful and valuable paper by some one of our members, I will merely content myself with according my preference to the latter for coating phosphorus pills, which is but a slight modification of a process recommended in a paper by Clay W. Holmes and published in the *Pharmaceutical Journal*, December 23, 1882. It, however, requires a certain amount of practice before the operator is able to employ it satisfactorily.

Several of my pills were coated by merely placing one on either end of a piece of fine wire bent in horse-shoe fashion, dipping them into the liquefied coating solution and hanging on nails until the coating had firmly set. This, though a tedious process, is nevertheless a very good one, and more easily managed than the pin process advocated by Mr. Holmes.

Before coating with French chalk (pearl coating), these pills should be varnished with an absolute alcoholic solution of sandarac, or other suitable alcoholic solution, ether partially dissolving the basis employed in their preparation.

I should recommend the mass to be kept in a covered pot, in boluses of about two drachms each, wrapped in wax paper to exclude the air and prevent any consequent liability of the phosphorus becoming oxidized. The different masses I have prepared (and placed on the table) have all been kept several months without this precautionary measure having been taken and no deleterious effects have ensued.

I have mixed No. 15 mass with various ingredients, including the following; in each case satisfactory results have been obtained.

No. 16. Contains in each pill—

No. 15 mass . . .	2 grains (equivalent to $\frac{1}{30}$ of a grain of phosphorus).
Sulphate of quinine	1 grain.

This requires no excipient and makes a very nice and workable pill.

No. 17—

No. 15 mass	2 grains.
Sulphate of quinine	1 grain.
Reduced iron	2 grains.

With the addition of a small quantity of glycerine of tragacanth and balsam of Peru these make good and convenient sized pills.

The following method was adopted for approximately estimating the comparative melting points and probable points of absorption of each in the stomach.

A beaker, having a capacity of 10 fluid ounces, was placed upon a tripod and two-thirds filled with cold water, and in this was placed a test tube (an inch in diameter and 5 inches in length), also two-thirds filled with cold distilled water previously boiled, in which was suspended a very sensitive mercury thermometer dipping nearly to the bottom of the test tube. 5 grains of the mass to be tested was placed in the test tube; heat was then applied by means of a Bunsen's burner to the beaker, in such a manner that the temperature rose exactly 1° Fahrenheit per minute, each degree rise being accurately noted. The temperature was taken down at which the mass altered in consistence or otherwise; and to the water contained in the test tube was added, after the experiment was completed, a weak solution of litmus to see if any acid of phosphorus was present. The subjoined are the results obtained:—

Number of pill.	Softens.	Very soft.	Disintegrates.	Remarks.
1 . .	104° F.	114° F.	122° F.	
2 . .	98°	108°	115°	
3 . .	79°	88°	105°	
4 . .	82°	89°	110°	
5 . .	82°	89°		This melts and floats on the top of the liquid at 89° F.
6 . .	77°	82°	86°	Melts at 86° F.
7 . .	79°	88°	105°	
8 . .	102°	114°	118°	Coating readily removable at 102° F., completely dissolved at 130° F.
9 . .				*Vide* remark under this head.
10 . .	90°	98°	102°	
11 . .	84°	90°		Melts and floats on the top of liquid at 90° F.
12 . .	85°	93°	94°	Melts at 94° F.
13 . .				Phosphide of zinc.
14 . .	86°	95°	104°	
15 . .	91°	100°	106°	

The waters in which Nos. 1 and 2 were separately digested, each gave an acid reaction on the addition of a weak solution of litmus. The different portions of water in which the other samples had been individually digested, remained neutral to the litmus solution.

LUMINOSITY OF FLAME.*

BY W. SIEMENS.

The luminosity of burning gases is a secondary phenomenon dependent on the separation and incandescence of solid particles suspended in the flame. Gases from which no such particles are separated burn with a feebly luminous flame, and this luminosity is attributed to the incandescence of the gases themselves. No experiments have hitherto been made to ascertain whether pure gases heated to a high temperature really emit light. In order to examine this point, the author's brother made a series of observations with a Siemens regenerative oven, of the form used in the hard glass manufacture, whereby a temperature of the melting point of steel, 1500–2000° C., could easily be attained. By a suitable contrivance the interior of the oven could be examined, and it was thus found that, provided the experimental room was kept perfectly still, the heated air in the oven emitted no light. The introduction of a luminous flame into the oven caused its interior to be only feebly illuminated. As a result of these experiments, it follows that the supposition that the luminosity of the flame is due to the incandescence of the gas is incorrect. In order to determine the temperature at which luminous flames become non-luminous, the author suggests a repetition of the above experiments with a more refined apparatus. The heat-rays emitted from hot gases are very small in number as compared with those emitted from equally hot solid bodies.

Observations on the behaviour of flames themselves prove equally that the luminosity of flames is not due to the incandescence of the products of combustion. If the gases to be burnt are more quickly mixed, the flame becomes shorter, since the process of combustion is accelerated, and hotter, since less cold air is mixed with the burning gas. The same phenomenon occurs if the gases are strongly heated before they are burnt; but since the ascending products of combustion are maintained for a short time only at the temperature of the flame, the above phenomenon would be reversed were the gases self-luminous. The luminous part of the flame is separated by a line of demarcation from the products of combustion, and is coincident with the termination of chemical action, which is probably the cause of the emitted light.

* From *Ann. Phys. Chim.*, [2], xviii., 311–316. Reprinted from *Journal of the Chemical Society*, May, 1883.

The Pharmaceutical Journal.

SATURDAY, MAY 12, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ANNUAL REPORT.

Though the Anniversary Meeting of the Society will not be held this year until a week after the usual time, the Report of the Council upon the transactions of the past year is already in the hands of the Society's members, and as the hopes which have been entertained of a satisfactory amendment of the law relating to the practice of pharmacy are still deferred, attention will naturally be directed in the first place to that portion of the Report which deals with this subject. As regards the Pharmacy Acts Amendment Bill, which has been submitted to the Privy Council, the position of the Council is still only one of expectancy, and it is unable to do more than state that the draft Bill is engaging the attention of the Government. That the result of the deliberations on the Bill will be favourably influenced by the very general approval it has met with from the Society's members and from the trade at large may reasonably be anticipated; but it must be remembered that if the Bill should be eventually introduced into Parliament there will still be need of the hearty support and thoroughly united action of the entire pharmaceutical body in order that it or any Pharmacy Acts Amendment Bill shall become law. This necessity is forcibly expressed in the Report of the Council, and we trust its appreciation will be so general as to strengthen the hands of the Society's executive for its endeavour to promote the interests of pharmacy and enable it effectually to urge the claims of those engaged in that business.

As bearing upon this point, we may refer to the circumstance that the period has arrived for the members of the Society to manifest their interest in the constitution of the executive body by which they are represented, and in whose hands is placed the power of dealing with such matters as affect their interests. In former years it has afforded ground for regret that a large proportion of those entitled to vote have failed to send in their papers at all or in time to comply with the requirements for their acceptance. We feel sure that this disregard of the exercise of so important a function must be due to a want of proper appreciation of what is requisite from every one connected with the Society. If it be expected that the Council of the Society is to have any useful influence in regard to contemplated legislation, or otherwise as a representative of the pharmaceutical body, it must be evident that the extent to which such a power exists will depend upon the general hearty support the Council receives from all the members of that body. It is to be regretted that so many of them do not belong to the Society; but it is still more matter for regret that among its members there should be any who give reason for supposing that they are indifferent as to who are elected to represent them in the way we have referred to.

As a matter closely connected with special pharmaceutical legislation, the introduction of a Medical Acts Amendment Bill into Parliament is next referred to in the Council Report. As we have already pointed out in a former article, this Bill does not propose to interfere in any way with the legitimate exercise of the business of chemists and druggists; but in regard to one of the duties with which the proposed newly constituted Medical Council is to be charged, the Bill fails to do justice to the claims of pharmacists since it does not provide for any such representative recognition of pharmacy as obtains in all other countries in the production of a national Pharmacopœia. The Council of the Pharmaceutical Society has, on several occasions, had this subject under consideration, and has expressed its sense of the desirability of practical pharmacists being officially associated with medical men in carrying out the work of revising the Pharmacopœia. The Medical Bill, however, merely adopts the provisions of the existing law that the Medical Council shall from time to time cause to be published under its direction a British Pharmacopœia. According to the practice hitherto followed the work of revision would thus be done by a committee of the Medical Council consisting solely of medical men and assisted by such chemical, pharmaceutical and other experts, as it may deem desirable to engage, for the sake of making their special knowledge available.

This mode of carrying out the work of Pharmacopœia revision for Great Britain and Ireland is, however, one that does not accord to the possessors of pharmaceutical skill such a position as is consistent with the advance that has been made during late years in their educational and practical qualifications. The Council is therefore taking steps to obtain an amendment of the clauses of the Medical Bill, when it comes before the House of Commons in Committee, of such a nature as to provide for the adequate representation of practical pharmacists in the body charged with the preparation of a national Pharmacopœia.

In the effort to be made in this direction, the Council of the Pharmaceutical Society of Ireland has expressed its willingness to co-operate, and it is but natural that a desire should be entertained on the part of Irish pharmacists to have a voice in the preparation of a book which constitutes the law by which they are to be bound, no less than their English and Scotch colleagues.

The unexpected prominence that has been given to this matter by the recently disclosed proceedings of the present Medical Council, has led to some expression of dissatisfaction on the part of the President of the Pharmaceutical Society of Ireland, on the ground that the principle of centralization had been applied in such a way as to leave the Irish Society out in the cold; but however much we are disposed to acknowledge that Irish pharmacists have not been considered as they should be, we cannot admit the justice of the complaint so far as the Council of the Irish Society is concerned. On the contrary, it might be contended that there is some ground for charging the Council of the Irish Society with complicity in the arrangement entered into between the Pharmacopœia Committee of the Medical Council and the professors of this Society. At any rate the Pharmaceutical Society of Ireland is to some extent represented in that Committee by its Vice-President and another of its members. If therefore the Irish Society feels aggrieved by the revision of the Pharmacopœia being placed in the hands of three English professors, how much more reason is there for English and Scotch pharmacists to complain of those members of the Irish Council who have helped to prevent the general emancipation of British and Irish pharmacy that might have been promoted by them as members of the Pharmacopœia Committee of the Medical Council.

The present aspect of this matter is, we think, such as to render it one of especial importance to the pharmacists of all parts of the Kingdom, and it would seem to offer an excellent opportunity of urging upon the Government the reasonable claims of pharmacists to recognition. We believe that it is contemplated to submit to the Privy Council a memorial embodying the views of the Council and stating the general case on which action is to be taken. The substance of this memorial will be communicated to the Local Secretaries of the Society for their information and guidance in the endeavour to organize measures for supporting the Council. By this means it will be possible to bring influence to bear upon members of Parliament through their constituents in various parts of the country, with a view of ensuring their aid when the Bill comes before the House of Commons. Of course it will not be until after the Whitsuntide holidays that anything can be done in Parliament; but the interval that will elapse before the Bill is taken in Committee will furnish opportunity for doing the work required, and the coming anniversary gatherings will enable members of the Society to confer together as to the best mode of being severally useful in this important movement.

The financial statement is a very satisfactory feature of the Council Report, showing that the income for the past year exceeded the expenditure by more than one thousand pounds, and it is to be anticipated that this good result will be continued by the improved investment of the Society's capital as proposed for the future in freehold ground rents.

The Benevolent Fund has been considerably augmented, not only by several legacies, but also by the subscriptions sent in through the efforts of the Local Secretaries, who have so zealously given their services for the promotion of that object. It is to be hoped that the publication of local lists of subscriptions and donations, commenced last February in the *Pharmaceutical Journal*, will materially assist towards further advocating the claims of the Fund amongst those who have not hitherto contributed to it from not having had their attention called to the pressing claims for relief which the Council has made upon it constantly from all parts of the country.

The Evening Meetings held during the past session have been more than ordinarily well attended; the papers read have been numerous as well as important, and the participation of younger members in the discussions has afforded much satisfaction.

The Library has been augmented by the addition of five hundred books and pamphlets, and that its importance has received due attention we may infer from the fact that it has been visited by more than a thousand readers during the year.

The Museum has been enriched by several gifts from the Government of medicinal plants from the Botanic Gardens at Ceylon, and cinchona bark from Jamaica and Madras. Dr. Parker has also presented a number of interesting drugs from Madagascar.

During the past year the subjects of education and examination have received much consideration from the Council; but for the present we defer any further detailed reference to the changes that are contemplated in this direction, as the course to be taken in regard to them would depend much upon the future progress of the Bill which the Council has submitted to the Privy Council.

It is with pleasure we mention the Council's intention of recommending the members to pass a bye-law to allow of the election of corresponding members. It is so desirable that the interest which many eminent men take in pharmacy should be enhanced by some official recognition on the part of the Society, as the labours and services of British pharmacists in the same direction are recognized by Continental and American associations, that this mode of associating with the Society distinguished pharmacists and others residing permanently outside the United Kingdom has been thought to be especially adapted to further the interests of the Society and promote the objects which it has in common with those who might thus be attached to it in the character of corresponding members.

We are requested by the Secretary to mention that through an oversight the words "for the use of the Council only" were printed on the copies of the Report intended for the Members and Associates, and that in some instances these words were not erased.

* * *

Another Medical Bill has been introduced into the House of Lords by Lord O'Hagan, and read a second time on Thursday, but its sole object is to amend the Medical Act of 1858 and to confer upon the Royal University of Ireland the power to appoint a member of the Medical Council formerly exercised by the Queen's University in Ireland, now dissolved. If, however, the Government Bill should pass, the necessity for this second Bill would be superseded.

* * *

In reply to the application of the Committee of the Vienna International Exhibition the Imperial Minister of Finance has granted the privilege of introducing into Austria, duty free, such goods intended for the Exhibition as are not sold in the country. The State Railway Department has also decided to charge the usual tariff for conveying goods to the Exhibition, but to make no charge for the return carriage.

* * *

The New York correspondent of the *Standard* states that at a recent auction sale of quinine an aggregate amount of a ton and a half was sold. This is the largest peremptory sale of quinine that has yet taken place in America. It may be added that a few days since there was a sale of sixteen thousand ounces of quinine sulphate in London, and it is understood that a sale of a similar quantity is to take place shortly in Berlin.

* * *

In the *Journal de Pharmacie* for the present month there is an interesting note by Messrs. Regnauld and Villejean on an analysis of some bark from a plant of *Cinchona succirubra*, which had been grown in the open air in the botanical garden of the Faculté de Médecine, Paris. Notwithstanding the unfavourable conditions, climatic and otherwise, under which the plant was reared, the bark is said to have yielded 1·47 per cent. of quinine and 1·05 per cent. of cinchonine.

* * *

The last month has seen the completion of Messrs. Bentham and Hooker's great work, 'Genera Plantarum,' after a lapse of more than twenty-one years from the time when the first portion of the MS. was placed in the printers' hands. The complete work forms three large octavo volumes, written in Latin and printed in small type.

* * *

The *Journal of Botany* quotes the following estimate by Mr. Bentham of the number of phanerogamic plants at present known to science:—Polypetalæ: 82 orders, 2610 genera, 31,874 species. Gamopetalæ: 45 orders, 2619 genera, 34,556 species. Monochlamydeæ: 36 orders, 801 genera, 11,784 species. Gymnospermeæ: 3 orders, 44 genera, 415 species. Monocotyledons: 34 orders, 1495 genera, 18,576 species. Total: 200 orders, 7569 genera, 97,205 species.

* * *

By a recent Proclamation of the Governor of Victoria the schedule of poisons to the Sale of Poisons Act of that colony has been augmented by the addition of—Solutions or admixtures of arsenic, with some exceptions; all solutions or admixtures of strychnia and of other vegetable alkaloids and their salts; all preparations of corrosive sublimate; vermin killers, if preparations of poisons included in the first part of the schedule; solutions and preparations of chloral hydrate; red oxide of mercury; ammoniated mercury, and the tincture and all vesicating preparations of cantharides.

* * *

The *New York Tribune* reports a case in which damages to the amount of 100 dollars have been recovered against a druggist for injuries sustained by the plaintiff through negligence in dispensing a prescription. No more exact information is given as to the nature of the mistake than that a single dose caused the plaintiff to keep her bed for a month; but the defendant, while admitting that a mistake had been made, asserted that the compound ought not to have produced the ill effects complained of.

* * *

The authorities of the Californian College of Pharmacy appear to have invited a General Barnes to deliver an address on the occasion of their last graduating exercises, a compliment which he repaid with some very plain speaking upon the subject of the "patent medicine" trade. Singling out one preparation, "The Balm of a Thousand Flowers," he described it as follows:—"A mixture of oil, potash, alcohol and sugar, boiled together, and flavoured with musk; a bad liquid scented soap, capable perhaps of washing a dirty face and nothing more. Yet the advertisement alone of this fraud has cost over 100,000 dollars, which is said to have been profitably spent, and hundreds of thousands of bottles have been sold by reputable pharmacists, every one of whom knew it to be a fraud." The general's anger against the offending proprietor pursues him even beyond the tomb, and his wish as expressed was not exactly "*Requiescat in pace!*"

* * *

A little later, General Barnes's oratory took another flight. "Your patent medicine fiend swoops down upon humanity as soon as it is launched into the world, with soothing syrups that take the place of nature's healthy rest, and with artificial food better than the pure and healthy fountain which nature gives for its sustenance. It hangs over old age with the lying promise of the restoration of vitality, and squats at last upon its coffin, holding some embalming nostrum that shall make the corpse proof against the ravages of the worm." It is not surprising to learn that at the end of the "oration" one of the professors ventured to suggest that it was the public which most wanted educating in this direction, for as long as the public demanded patent medicines somebody would supply them, even if druggists did not.

* * *

If official reports are worth publishing at all, it is desirable that they should appear within a reasonable interval from the period to which they refer. This can hardly be said of the Eighteenth Annual Report by the Inspector under the Alkali Acts, which was issued a few days since. This report refers to proceedings in the year 1881, is supplemented by a short note dated August, 1882, and is presented to Parliament in May, 1883, after many of the conditions discussed in the report have been affected by fresh legislation.

Transactions of the Pharmaceutical Society.

Errata.—Page 902, col. 2, line 25 from bottom, *for* Barnes, James Burdon, *read* Barnes, James Burden.

Page 913, col. 2, line 28 from bottom, *for* Barnes, James Bunden, *read* Barnes, James Burden.

Our attention has also been called by Mr. Gostling to a misprint in the report of his remarks at the Council at its last meeting (before, p. 908), which evidently referred to the letter addressed by the Professors to the Medical Council on the 7th of November last.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, the 2nd inst., in the College of Physicians, Dublin, at three o'clock.

The chair was taken by Dr. Collins, and afterwards by the President, Professor Tichborne.

The other members of the Council present were:—Messrs. Allen, Brunker, Doran, Grindley, Hayes, Hodgson, Lester, Simpson, Wells and Dr. Montgomery.

Mr. Hugh Fennell, the Registrar, read the minutes of the last meeting, which were confirmed.

Mr. Fennell read a letter from Dr. Kaye, Q.C., Clerk to the Privy Council, stating that that Council had been advised that the amended resolution of the Society relative to the certificate to be required from candidates for the licence was not sufficiently explicit, and that the law officers of the Crown had drafted the following rule, which was forwarded for consideration and approval:—

"Resolution—

"Every candidate for the licence who has not previous to January 3, 1883, passed the Preliminary examination of this Society, or such examination as is accepted as equivalent thereto, shall be required to produce (*a*) A certificate signed by a pharmaceutical chemist or apothecary, keeping open shop, stating that such candidate has served a *bonâ fide* engagement for a term of four years, or for two or more lesser terms, amounting in all to four years, as apprentice or assistant, with and in the sole employment of such pharmaceutical chemist or apothecary, or of a firm of legally qualified pharmaceutical chemists or apothecaries, of which the aforesaid pharmaceutical chemist or apothecary is a member; or (*b*) In cases where such candidate has not served a four years' engagement as aforesaid, in the employment of one such pharmaceutical chemist or apothecary or firm as aforesaid, but has served two or more shorter engagements for terms amounting in all to four years as apprentice or assistant, with and in the sole employment for the time being of a succession of different pharmaceutical chemists or apothecaries or firms of legally qualified pharmaceutical chemists or apothecaries keeping open shop, then like certificates showing that the candidate has served for such shorter terms as aforesaid, each of which certificates is to be signed by the pharmaceutical chemist or apothecary in whose employment the term therein mentioned has been served, or in case of a firm, by a pharmaceutical chemist or apothecary, being a member of such firm at the time of the signing of such certificate. When by reason of the death of the pharmaceutical chemist or apothecary with whom any such term as aforesaid has been served, or where from any other cause it shall become impossible or inconvenient for the candidate to procure a certificate signed as aforesaid, it shall be lawful for the Society to accept in lieu thereof such evidence as it shall consider satisfactory, showing that the candidate has actually and *bonâ fide* served such term or terms as aforesaid."

Mr. Brunker: The resolution follows our view of the case, only that it is expressed in legal terms.

The President: If it embodies the spirit of our resolution we had better let them have it in their own phraseology.

Dr. Montgomery: I think it would be better to refer it to the Legal Committee to look over before we adopt it. There is no hurry about the matter. What is the object of having so many words in the resolution?

Mr. Brunker: To prevent candidates from wriggling through. The rule as we drafted it was too vague.

The President: I think the object is to tighten us down, to prevent our resolution from being used too much against the candidates. The Certificate Committee is the one to consider it.

On the motion of Dr. Montgomery, seconded by Mr. Allen, the draft resolution was referred to the Certificate Committee, with a request that they would consider and report on it.

A letter was received from Mr. Charles L. Peel, Clerk to the Privy Council of England, acknowledging the receipt of a memorial from the Council of the Society to Lord Carlingford, on the subject of the Medical Bill.

The letter was ordered to be marked "read."

The President brought under the notice of the Council a report of the Pharmacopœia Committee of the General Medical Council. That Committee appointed a Sub-Committee on the 1st of July, 1882; and that Sub-Committee had placed the task of preparing a new edition of the Pharmacopœia in the hands of Professors Redwood, Bentley and Attfield. These gentlemen were to receive a sum of £800, which was to include the cost of experiments, etc., and the work was to be carried through the press to the satisfaction of the General Medical Council. The Committee intended to apply to all medical authorities, pharmaceutical and chemical societies, and others that they thought were likely to furnish useful information, in order that the work might be made as complete as possible. This report was satisfactory in one sense, and unsatisfactory in another. It was satisfactory to know that the editing of the Pharmacopœia was to be in such excellent hands as those of the gentlemen named. Professor Redwood was a thoroughly practical man, Professor Attfield had been for many years associated with pharmaceutical education and he would endeavour to make the Pharmacopœia an educational work. As to Professor Bentley, from his position in the Pharmaceutical Society of England, he believed that he was an excellent man also. But the unsatisfactory part of the matter was that the work was exclusively in the hands of the officers of the Pharmaceutical Society of England and that the Irish Society was left out in the cold. Of course they could not help that. It was one of the fatalities of that Island. But it was one of those little things that made constitutional people think that there were grounds for the Home Rule cry. At any rate all those things appeared to tend towards a principle of centralization. They in Ireland had to physic the people according to the directions of their friends on the other side, who had the entire control of the matter.

Mr. Brunker: They propose three omissions from, and twenty-nine additions to, the Pharmacopœia.

The President: One objection to the matter being placed exclusively in their hands, is that they will make the Pharmacopœia according to the London practice. They will probably introduce a lot of footy things, because they are fashionable in London practice, and expunge important articles.

Dr. Montgomery: Are we in a position to make suggestions to them?

The President: We will have to wait until we are asked.

Dr. Montgomery: But even before we are asked?

The President: It would not be consistent with our dignity to do so after what has occurred. I know that Dr. Apjohn took a very prominent part in the preparation of the last Pharmacopœia, and spent an immensity of time upon it, and yet I think his services were hardly recognized.

Dr. Collins said he knew that the services of Dr. Apjohn in connection with the last Pharmacopœia were not sufficiently recognized.

The Registrar read a letter from Mr. T. S. Hance, dated from the "P. L. Surgery, Limerick," forwarding his subscription of £1 1*s.* to the Society, and asking whether the Society would consider his certificates of pharmacy in conformity with the requirements of the Act. The shop he kept was not a public place of business, but he had the sanction of the Local Government Board for taking apprentices, and his certificates were recognized by all the medical boards.

The President: Does he compound prescriptions for the public?

Mr. Wells: He does not. It is not a shop. He has merely the dispensary to the workhouse; and I know that he has taken pupils there for some years.

It was ordered that Mr. Hance should be informed that the regulations required that the certificate should be from a pharmaceutical chemist, or apothecary, *keeping open shop.* His certificate could not therefore be recognized.

A report of the Law Committee was adopted.

A report from the Examiner stated that 10 candidates had passed the Preliminary examination held on April 2.

The following candidates passed the examination for the licence, held on April 4 and 5, and were now registered as pharmaceutical chemists:—

John Robson, 26, Clare Street, Dublin.
John Starrett Shortt, 16, Strand Road, Derry.

Some financial business having been disposed of, the Council adjourned.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fourteenth general meeting of the above Association (the last of the session) was held at the Royal Institution, on Thursday, April 26, 1883, the President, Mr. Councillor Woodcock, in the chair.

The minutes of the last meeting were read and, with some corrections, confirmed.

The following donations were announced:—The *Pharmaceutical Journal*, from the Society; the *Canadian Pharmaceutical Journal*, from the Editor; and 'Suggestions for Students' Classes,' by Mr. H. B. Bare.

At the request of a member, the Chairman submitted the following question to the meeting:—"How can a stannic salt be detected qualitatively in the presence of a stannous?"

To this Mr. Davies replied that he found that nitrate of ammonium admirably answered this purpose, as it precipitated the stannic but not the stannous salt.

Dr. Symes presented a specimen of green ginger, or rather undried ginger, to the Association and made some remarks respecting it.

A discussion upon this subject took place in which several gentlemen took part.

Mr. Mason asked whether Mr. Davies or any other member could give the Association any information as to whether the effects of an explosion were produced equally in all directions or whether the lines of destruction were somewhat erratic. The question was raised in his mind by the effect produced by exploding a match under the foot.

Mr. Davies thought that the gases, except when diverted from their original direction by intervening objects, followed a tolerably regular course, although he would not say that they exerted their influence quite equally in all directions from the centre.

Mr. E. Davies, F.C.S., F.I.C., then delivered a short lecture upon—

The Influence of Suspended Matter on the Indications of the Hydrometer.

In a discussion on milk analysis four years ago a distinguished professor said that floating matter in a liquid, whether heavier or lighter, did not affect the specific gravity of the liquid as shown by the hydrometer. The statement was promptly challenged and abandoned; but as I find that it is still commonly believed, I have made some experiments to see if it could be readily demonstrated that suspended matter has an influence, and if, in fact, the specific gravity, as shown by the specific gravity bottle and by the hydrometer, was the same under these circumstances.

I found that the latter subject was undertaken by Mr. Siebold, in a short communication to the *Analyst*, in 1879, and therefore the quantitative experiments need not be repeated. He showed that precisely the same specific gravity is shown by the hydrometer or by weighing when calcium carbonate or magnesia was suspended in gum water.

My intention to-night is simply to demonstrate that suspended matter exerts an appreciable influence.

At first sight it would appear that suspended matter should have no influence. It forms no part of the liquid and does not break the continuity of the liquid. If the suspended matter has the same specific gravity as the liquid it will not affect the hydrometer at all, and as most suspended matter has the same or nearly the same specific gravity as the liquid in which it floats, the question does not often arise. On consideration it will be seen that if suspended matter is diffused evenly an influence must be exerted, the greater as the difference between the specific gravity of the liquid and that of the suspended matter is greater. For the reason that a hydrometer floats at any given mark is, that the part of the hydrometer which is immersed exactly displaces a bulk of liquid equal in weight to that of the entire hydrometer. That is, each cubic inch immersed displaces a cubic inch of liquid, and that cubic inch of liquid of course included the solid matter floating in it, and the weight of that cubic inch of liquid was the weight of the fluid and solid matters in that cubic inch taken together. It would be so if the solid matter were dissolved; it is equally so when it is merely suspended.

This is true whether the floating matter is lighter or heavier than the liquid. Hence skim milk is denser than fresh, both by the hydrometer and specific gravity bottle. The fat globules displace an equal bulk of the heavier milk, so that a smaller weight being contained in a given bulk a greater bulk of the hydrometer must be immersed in new milk than in skim.

The illustrations were:—First. A hydrometer was floated in pure water. Calcium carbonate was then diffused in the water and the hydrometer now had its stem entirely out of the liquid. Second. A small figure of glass weighted so as just to remain at the bottom of a vessel of water, rose to the surface when powdered glass was sprinkled into the water. Third. Gum water, of density 1·025, was rubbed with a little oil to make an imperfect emulsion; it now showed a density of 1·012.

An experiment previously made with starch showed that $2\frac{1}{2}$ per cent. of starch in suspension in water raised the specific gravity to 1·010. An equal quantity of starch boiled with water and made to the same bulk gave precisely the same density.

This most interesting and valuable communication was illustrated by striking experiments, and was followed by a number of questions, to which Mr. Davies replied.

A hearty and unanimous vote of thanks was passed to Mr. Davies.

The President then read his—

VALEDICTORY ADDRESS.

It is an old and, like many such, a good custom for the person whom you have raised to the highest dignity attainable in our Association—the Presidential chair—to address, on the occasion of the last meeting of the season, some simple words of thanks for the ready and acceptable help he has received during the closing session; for the kind forbearance with which you have glossed over his many shortcomings; and, above all, for the valuable and instructive essays with which you have, often at great personal inconvenience, maintained the interest of the meetings, and the high character of this Association, during the winter that has gone.

It is especially difficult for myself adequately to express the deep sense of obligation, under which I rest, for the courteous and sympathizing kindness I have experienced from you during the period of severe illness that has, most unfortunately, interfered much with my fit performance of the duties appertaining to this high office. I am glad, however, that on all those occasions, during which I was unable to preside, you have secured for chairmen, former presidents who combine experience of the requirements of the position with a higher degree of efficiency than I could possibly lay claim to.

Since I had the honour, in my inaugural address in October last, of delivering a dissertation upon the pharmaceutical "events" of the year, the Council of the Society, which exercises jurisdiction in this country upon matters affecting the welfare of the profession, has drawn up and sent to Her Majesty's Privy Council, the draft of a Bill intended, by amending the faulty Act of 1868, to abolish some existing abuses, and make an onward stride in the direction of that pharmaceutical progress, which is now, as it was in the days of Jacob Bell—of glorious memory!—the keystone and watchword of British pharmacy.

The various provisions of the draft Bill have received full and ample discussion in other quarters, and it is unnecessary for me in this short valedictory address to criticize, or even describe, the character of its provisions. There is one of the clauses, however, of which, whilst willing for the general good to sink all petty differences of opinion, I must express my deep regret at seeing included. I allude to that second clause, which has received so much disapproving criticism from pharmacists in all parts of the country. The Editor of the *Pharmaceutical Journal*, writing last Saturday upon the subject, appears to imagine that misapprehension of the exact purport of the provision lies at the root of this hostile attitude; but I would venture, in all respect to assure him that chemists and druggists are not necessarily babes and sucklings. Dr. Paul asserts, in effect, that as unlicensed persons are at present permitted to retail certain poisons, which the clause in question is intended to affect, it would not be an injustice to pharmacists if some purely formal restrictions were placed upon their sale by persons possessing no knowledge of their properties; and again, that the articles in question are not such as should be entirely intrusted for retail distribution to chemists and druggists. Everybody knows, all pharmacists at any rate, that these poisons are not, and have never been, subjected to any regulations whatever, but our respected Editor forgets that it is the *principle* and not the mere facts to which we take exception; a principle which, in my humble opinion, has been propounded and, to the present time, acted upon from the very foundation of the Pharmaceutical Society. Chemists themselves were first educated; practitioners of medicine were then educated; public opinion was educated; and, finally, Parliament itself had been educated to the belief that *competent knowledge of dangerous drugs is a necessary and important qualification of the person who distributed them to the public*; and now, after forty years of up-hill, though fairly successful labour, we turn round and say, in effect, that it was all a mistake. Qualification is only necessary where grains and drachms, pennyworths and shillingworths are to be dispensed; but where gallons and sovereigns are in question, the sale may be intrusted, without any irksome precautions, to the huckster who defines tinct. camph. co. as "Paddy's got it," and the root of Exogonium Purga as "jollup." But, answer the promoters of the Bill, The Privy Council—Government—refuses to have anything to do with a measure entirely confining the sale of these acids to any class, even although it be a specially educated class. Well, what then? Our duty, as qualified pharmacists, lies very clear. Before stating what that duty is, it will be necessary for us to consider what is the *cause* of the present agitation for another Poison Bill. It is not nitric acid, nor sulphuric, nor hydrochloric, nor even carbolic acid that has raised this cry. *It is entirely the traffic in quack remedies.* Not a word has been said in Parliament, nor even, I believe, in the public press about these acids; it is only the unrestricted sale of scheduled poisons, under the protection of a Government stamp, that has excited the indignant demands for reform from, for instance, the member for Bridport. This brings us to our duty as pharmacists. Government has declared that restrictions must not be placed on these poisons. Very well; the responsibility does not rest with us; our conscience is clear. Draw up a Bill imposing all sorts of restrictions on the sale of these so-called "patent medicines;" include the various other proposals that are contained in the present draft; but do not make any mention whatever of poisonous articles or their regulation. If a lay Government, knowing little or nothing about poisons or their sale, feels sufficient confidence in its own abilities to undertake the task of legislating in that direction, it is welcome to try. Ministers may add the clause; but pharmacists, necessarily knowing far more about the subject than even eminent statesmen, should firmly and decidedly refuse to have anything to do with the proposal. It has been well said that if this Bill becomes an Act, the last poison has been added to part 2 of the present schedule. More; I should not be at all surprised if Parliament amalgamated *that* list with the newly proposed schedule of "Poisonous" articles; oxalic acid, for instance, having quite as large a general and, I may say, unpharmaceutical sale as carbolic.

With regard to the second opinion I have quoted from the editorial remarks in the Journal of last Saturday, there need very little be said. If carbolic and the other acids do not pertain to the proper sphere of pharmacy, neither do potassic cyanide (largely employed by workers in the noble metals), arsenic and corrosive sublimate (both used extensively in taxidermy), or that oxalic acid to which I have just referred. We must, in fact, cease talking about what *should properly* pertain to pharmacy, and think of what *does* belong to it, in England at present.

On this clause I have felt obliged to express freely my dissent from the view taken by our lawfully constituted legislators; but with all the remaining provisions of the draft Bill I am glad to say I heartily agree. I am sorry that the *Chemist and Druggist*, a journal which possesses a large amount of influence, should persist in the policy it has ever adopted of promoting disunion in the pharmaceutical body. Opposition to the Pharmaceutical Society, and above all to the Council of that Society, plainly lies at the root of the captious and irritating manner in which it refers to the "Bloomsbury Clauses" of this Bill. With all due respect to the Editor of the *Chemist and Druggist*, I would assure him that most of the old and nearly all of the new class of pharmacists consider these identical "Bloomsbury clauses" as, at least, equally important with any other portion of the Bill. Their aim—their noble and praiseworthy aim—is *union*, the consolidation of the whole heterogeneous collection of practitioners of pharmacy into a united body, holding the same title of "pharmaceutical chemist," and, it is to be hoped, by some future arrangement, of "Member of the Pharmaceutical Society." For until the two are invariably united, we shall never be able to exercise that powerful influence our numbers and educational standing should command.

At this late hour, and after hearing the interesting paper with which Mr. Davies has favoured us, it would be unthoughtful on my part to detain you longer. I wish, however, to offer my sincere thanks to all the officers, members and associates who have so kindly contributed to the general success of our meetings by their presence and support; to the Vice-President, and other gentlemen, for the courtesy they have shown in occupying the chair during my absence; and last, though by no means least, to Messrs. Haddock, A. C. Abraham, Brown, Davies, Conroy, Farmer, A. H. Samuel, Cariss, Symes and A. H. Mason for the capital papers they have provided for our instruction during the session.

A vote of thanks, moved by Mr. T. Fell Abraham, seconded by Dr. Symes, to Mr. Woodcock for his very interesting address, was put to the meeting by Mr. A. H. Mason, who said that it was his privilege as Vice-President to put that motion and that he would at the same time propose that Mr. Woodcock be unanimously re-elected.

Mr. Woodcock, however objected to this, saying that the election must be by ballot, and, at the same time, asking that no members would vote for him as he could not possibly accept the honour again; his health would not permit of his giving more time to such work than he was called upon to devote to the proper performance of his many other public duties.

Several members having urged Mr. Woodcock, without effect, to re-consider his decision, a ballot was taken. The votes were found to have been given in equal numbers for Messrs. E. Davies and Joseph Woodcock. The latter, however, as President, gave his casting vote for Mr. Davies, who was declared duly elected.

Mr. Davies expressed his thanks for the honour that had been conferred upon him, which, however, placed him in an awkward position, his other duties and the state of his health combining to render him anxious for rest, whilst he was, on the other hand, desirous of doing everything in his power to further the interests of the Association.

The proceedings then terminated.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The twelfth meeting of the session, being the annual business meeting, was held on Thursday, April 12, in the Rooms of the North British Branch, Mr. Peter Boa, President, in the chair.

The minutes of last meeting having been read and confirmed, the Treasurer read the Financial Statement, after which the Secretary read the Annual Report.

The Report commenced with a reference to the highly satisfactory state of the finances of the Association. The income from annual subscriptions last year showed an increase of £1 18*s.* 10*d.* over the previous session; and this year there was a further increase of £1 8*s.* 6*d.* The Association therefore continued to make steady and satisfactory progress. The new scheme of apprentices' prizes, the open meetings, etc., have led to a considerable increase in the expenditure, but notwithstanding this the Committee have been enabled to carry forward a balance of £10 14*s.* 4½*d.* The Committee then drew attention to the gratifying increase in the membership of the Association, which had not been due so much to any special effort on the part of the executive, as to an extended interest in and appreciation of such an Association on the part of assistants and apprentices. In the previous year the membership had shown an increase of thirteen over the previous session; this year there was a further increase of fourteen. The membership last year was fifty-eight and this year seventy-two. The arrangement for having fortnightly instead of monthly meetings had been successfully continued during the present session, all the papers being contributed by members of the Association. As an evidence of the growing importance of the Association the Committee mention, that at the opening meeting of the present session the members had been honoured with the presence and cordial expressions of goodwill of the President and three prominent members of the Council of the North British Branch. Two open meetings had been held during the session; one in November and the other in January. Both were largely attended and seemed to be highly appreciated by the members generally. The attendance during the session again compared very favourably with the previous ones. One of the most important changes during the present session had been the institution of the new scheme of apprentices' prizes, which was unanimously resolved upon at a special meeting of the Association, held on May 18, 1882, and the Committee congratulated the Association on the success which attended the carrying out of the scheme. The examination papers were of a very high order. The Committee next recommended that the sum of one guinea be devoted, as formerly, to the Benevolent Fund of the Pharmaceutical Society. It also recorded its high appreciation of the important and valuable assistance invariably received from the Secretary to the North British Branch.

On the motion of Mr. A. L. Fraser, seconded by Mr. J. Low, the Financial Statement and Report, together with the recommendations, were unanimously adopted, and on the motion of Mr. J. B. Robertson, seconded by Mr. MacEwan, a vote of thanks to the retiring office bearers and Committee was heartily accorded.

The office bearers and Committee for next session were then elected as follows:—President, Mr. Claude F. Henry; Vice-President, Mr. W. S. Turnbull; Secretary, Mr. S. G. Crowden; Assistant Secretary, Mr. William Pirie; Treasurer, Mr. W. S. Adamson, and as members of Committee, Messrs. Duncan, Dunlop, Forret, Fowler, Fraser, Hendry, Robbie and Stephenson. An Apprentices' Prize Committee was also appointed, consisting of the President, Vice-President, Secretary, and Messrs. Boa, Hill and MacEwan.

The remaining business having been disposed of, the meeting was closed.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, May 3, Dr. W. H. Perkin, F.R.S., President, in the chair

The following certificates were read for the first time:—

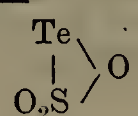
G. S. Bowler, A. Esilman, C. T. Heycock, H. Heap, W. J. Livingstone.

The Secretary then read a paper from Japan—

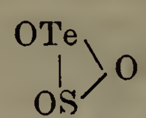
On a New Oxide of Tellurium. By E. DIVERS and M. SHIMOSÉ.—When the compound of sulphur trioxide and tellurium, SO_3Te, which was prepared almost simultaneously by R. Weber and the authors of the present paper, is heated *in vacuo*, it decomposes between 180° and 230°, evolving sulphur dioxide, and forming a new oxide of tellurium, TeO. This oxide can be prepared in small quantity by the action of water on the sulphoxide. The oxide is black in colour with a slight brown shade and shows, when pressed with a hard body, a graphitic lustre; it is quite stable in dry air at ordinary temperature. Potassium hydrate has but little action upon this substance, but it is readily decomposed by acids. No compound of TeO could be obtained; but the authors have specially compared this substance with a mixture of tellurium and tellurium dioxide and find that its behaviour with chemical reagents is quite distinct from the reactions of the mixture.

Two papers by the same authors were also read—

On Tellurium Sulphide.—The authors state that they had discovered this body before the arrival of the *Berichte* and the *Journal of the Chemical Society* which contained R. Weber's account of its formation. Their results are not, in some respects, quite in accord with those obtained by the above chemist. The tellurium was obtained from the mud in the lead chambers of the Imperial Japanese sulphuric acid works in Osaka. The liquid sulphur trioxide was poured on to the tellurium, both substances being contained in a sealed glass tube. The sulphur trioxide adhering to the sulphoxide was removed by heating the latter to 35° and exhausting with a Sprengel pump; a long tube packed with borax being interposed to absorb the trioxide. The sulphoxide is a red amorphous solid which softens without melting about 30°. It is vesicular in structure and, when pure, is quite stable, at ordinary temperatures, in sealed tubes. Details of its analysis are given. When this sulphoxide is heated to 90° in a vacuum its colour changes to a bright fawn colour, no gas is evolved, and its composition remains unaltered. The authors suggest for the red variety the cosnstitution—



and for the brown—



Similar modifications of selenium sulphoxide seem to exist.

On a New Reaction of Tellurium Compounds.—Sulphuric acid dissolves only small quantities of tellurium dioxide or its sulphate, but this solution furnishes a most delicate reaction for the presence of tellurium. By pouring some of it into a hydrogen apparatus containing zinc and dilute sulphuric acid and passing the escaping hydrogen telluride through a second portion of the telluretted sulphuric acid, the red colour of tellurium sulphoxide is rapidly developed in the previously colourless liquid.

$$2TeH_2 + TeO_2 + 3H_2SO_4 = 3SO_3Te + 5H_2O.$$

Dr. Williamson was strongly impressed with the care shown by the authors in this research and with the value of their results; the existence of this protoxide raised some interesting points bearing on theoretical questions. In the first place the evidence adduced by the authors of the difference between this oxide and a mixture of tellurium and dioxide seemed to him decisive in establishing its existence, but it was curious that the authors could not prepare any corresponding compound. Now, although it has generally been required that an oxide should have its corresponding chloride, etc., as a guarantee of its existence, yet it seemed that there was no reason why an oxide should not exist without a corresponding chloride, so that the non-discovery of the chloride must not be taken as a proof that the oxide did not exist.

The Secretary then read a paper—

On a Simple Modification of the Ordinary Method for Effecting the Combustion of Volatile Liquids in Glaser's Furnace with the Open Tube. By WATSON SMITH.—The author having observed that some of the students in the Chemical Laboratory of the Owens College were not able to make presentable analyses of a sample of chemically pure benzene when using Glaser's furnace, etc., devised this modification. The end of the combustion tube containing the liquid in a bulb is made to project from the furnace, beyond the liquid is inserted a plug of oxidized copper. This plug is warmed by a Bunsen burner, and thus the gas current is heated sufficiently to volatilize the liquid slowly and regularly. Two analyses of benzene and absolute ether are given, the results closely approximate to the theoretical numbers.

Mr. G. BEILBY then read a paper—

On the Production of Ammonia from the Nitrogen of Minerals.—In the present paper the author, who has worked at the distillation of coals and shales in connection with William Young for some years, gives the results obtained by distilling two shales, one a typical oil shale from Midlothian, the second a coal shale from Ayrshire. These shales were distilled (1) by the usual process of distilling at a low red heat; (2) at a low red heat in a current of steam; (3) at a low red heat in a current of steam, the residual coke being afterwards subjected to the prolonged action of steam at such a temperature that the whole or a large part of the carbon being consumed by the steam, the nitrogen is liberated as ammonia. The soda lime process was used for the determination of the nitrogen. The results are given in pounds of N per ton. No. 1 shale gave with the first process 2·70 pounds of N as NH_3 in the watery distillate and 1·20 pounds in the coke. The nitrogen combined with carbon amounted to 8·88 pounds in the coke. By using the second process, all the ammonia in the coke came over in the distillate, and 3·9 pounds of N as NH_3 were found in the watery distillate, the N combined with carbon remaining untouched. In the third process, however, the N as NH_3 in the watery distillate amounted to 12·0 pounds; the N combined amounted to only 0·78 pounds. Similar results were obtained with No. 2 shale. In the third process the carbon, steam and temperature should be so adjusted that the reaction is $C + 2H_2O = CO_2 + 2H_2$.

Mr. BEILBY also read a short paper—

On the Specific Gravity of Paraffin Wax, Solid, Liquid, and in Solution.—The specimen melted at 38° C. Its specific gravity solid at 21° C. was 0·874; when dissolved at 21° in heavy paraffin oil, 0·7956. By taking the specific gravity of fused samples at various temperatures and continuing the curve thus obtained, the specific gravity of fused paraffin at 21° would be ·796.

In reply to Dr. Armstrong the author stated that the above improved process (No. 3) of distillation was very successful commercially, the results being startling. In one case a coal shale which furnished only 18 pounds of ammonium sulphate per ton, now yielded from 75 to 98 pounds. The whole of the nitrogen could not be economically obtained; much difficulty was met with in the fusion of the ash. If the coke was valuable no one would dream of burning it away; the process was particularly useful with small and bad coal.

The Society then adjourned to May 17, when Captain Abney will deliver a lecture on "Photographic Action Studied Spectroscopically."

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, April 26. Mr. R. H. Parker, Vice-President, in the chair.

Mr. T. S. Dymond read a paper upon the "Synthesis of Uric Acid."

The author gave an account of the synthesis of uric acid which had recently been made by Horbaczewski from glycocol and urea. Horbaczewski stated that when these substances were heated together to a temperature of 230° C. uric acid resulted, but had not in any way explained the nature of the decomposition which occurred. Mr. Dymond had made two experiments, closely following the directions given by Horbaczewski, but had failed to obtain any evidence of the formation of uric acid; but he was still working upon the subject, and hoped to communicate his results to the Association at a future meeting. In the meanwhile, the above experiments must not in any way be taken to indicate that uric acid is not formed in the above reaction, but only that the directions given by Horbaczewski are evidently insufficient. The paper included a detailed account of previous work, showing the constitution of glycocol, hippuric and uric acids, specimens prepared by the author being exhibited.

A discussion followed the reading of the paper, in which the Chairman, Secretary, and other members took part.

A vote of thanks was passed to Mr. Dymond.

Mr. R. A. Cripps read a paper upon the "United States Pharmacopœia Process for the Estimation of Hydrocyanic Acid," which is printed upon page 917. In the discussion that followed, the Chairman, Secretary, Dr. Senier and Messrs. Greenish, Short and Taylor took part.

A vote of thanks was passed to Mr. Cripps.

The Reporter upon Pharmacology, Mr. H. G. Greenish, then made a Report upon "Convallaria majalis," which will be published in a future number of this Journal. A discussion followed the reading of the Report, in which the Chairman, Secretary, Dr. Senier and Messrs. Corder, Cripps, Crow, Elworthy, Hamilton and Ranken took part.

After the discussion had concluded,

The Chairman said that he had an announcement to make which he knew would be heard with extreme regret by all present, the death of their former Vice-President and Reporter, Mr. Charles Herbert Hutchinson. Mr. Parker had known Mr. Hutchinson since his student days at the School of Pharmacy, when they worked next to each other in the laboratories, and felt very much grieved at his premature death.

Dr. Senier then moved the following resolution:—"That the School of Pharmacy Students' Association hears with deep sorrow of the death of Mr. Charles Herbert Hutchinson, in whom the Association loses a former Vice-President and one of its most active and distinguished members, and that the members of the Association take this opportunity of expressing their sincere sympathy with the relatives of their late fellow worker."

Dr. Senier in moving the above resolution spoke in high terms of Mr. Hutchinson, whom he had known and admired since Mr. Hutchinson first became a student under him in the laboratories of the Pharmaceutical Society.

The Secretary (Mr. Dunstan), in seconding the resolution, referred to his high regard for Mr. Hutchinson's scientific and personal worth, and specially dwelt upon Mr. Hutchinson's connection with and exertions for the Association.

The resolution was supported with the same feeling by Messrs. A. J. G. Lowe, H. G. Greenish and F. W. Short, and upon being put to the meeting was carried unanimously.

The meeting then adjourned.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Professors and the Pharmacopœia.

Sir,—It appears from the report of the last Council meeting, as published in your Journal, that some remarks were made relating to our position in connection with the Pharmacopœia, which we think are not justified by the facts of the case; and as the general tendency of the discussion is calculated, through its publication, to create a prejudice to our serious injury, we beg to offer the following brief statement in reply.

The appointment of editor or editors is a preliminary step required to be taken by those who are responsible for the production of a work such as the Pharmacopœia, in the compilation of which information has to be obtained from many sources. One of us has occupied the position of editor in connection with the present Pharmacopœia, its additions and reprints, for the last eighteen years, during which time nothing has ever been said to indicate that he had done wrong in accepting or retaining the office. On the present occasion when applied to with a view to the renewal of similar duties, seeing that there would be a large amount of new work to be performed, he wished to be relieved of part of the duties of the office, and, with that object, preferred to be associated with his colleagues in Bloomsbury Square rather than with any other persons. This arrangement was suggested and discussed in the latter part of last year, at which time the Medical Bill had not made its appearance, nor had any special attempt been made by the Pharmaceutical Council to obtain an alteration of the law which assigns to the Medical Council the duty of causing new editions of the Pharmacopœia to be published, when required, under their direction.

When application was made last August by the Sub-Committee of the Medical Council to their former editor for a renewal of his services, he suggested that a committee appointed by the Pharmaceutical Society would be of great assistance to the editors in collecting and preparing matter for the new edition, but he was informed that arrangements of that description must have the sanction of the Medical Council, which would not meet for several months. It was clearly understood, however, that medical and pharmaceutical authorities throughout the country would be invited to co-operate, as was done in producing previous editions of the work, with the view of making this edition as complete and perfect as possible.

We received our provisional appointments on the 12th of last January, but we were not at liberty to make public the arrangements then made, partly because they were only provisional, and partly because it was contemplated and thought desirable that the arrangements when confirmed by the Medical Council should be communicated by *that* body to the Council of the Pharmaceutical Society, together with the invitation for their co-operation in the work.

We regret that the announcement of the arrangements when completed have not yet been made by the Medical Council in the way that was anticipated, but we most emphatically deny that there has been any ground for the imputations made to our disparagement, nor do we consider that the interests of the Pharmaceutical Society have suffered or are likely to suffer from our action in this matter.

T. Redwood.
Robert Bentley.
John Attfield.

Sir,—I write to express my indignation with the action of the Professors in engaging themselves in the work of such a very important matter as a revision of the Pharmacopœia without consulting the Council.

Men of "light and leading" amongst pharmacists have been striving for a considerable period to have their claim to a share in the production of the national Pharmacopœia acknowledged, and that such action should have been taken by the Professors just when the goal was well in sight, suddenly placing the prospect under a blacker cloud than ever, is a very disheartening fact.

The question remains, What is to be done? At any rate I hope that the false steps already taken will be retrieved, as far as possible, by prompt action on the part of the Council.

Perhaps thorough discussion of the subject would discover a loop-hole from which to escape from the present embarrassing situation.

The Pharmacy, E. Bridges Walton, Ph.C.
Richmond, Yorks.

Pharmacopœia Revision.

Sir,—In last week's article on Pharmacopœia revision, you refer to a proposed recognition of the fact, that absolute purity in chemicals is not attainable. It is, however, to be hoped that, whilst being protected from the excessive zeal of a too officious analyst, we may not be deprived of some standard to guide us in the examination of our drugs and chemicals.

As the tests of purity at present stand, it is impossible for anyone, however anxious, to get chemicals in all cases up to the British Pharmacopœia standard.

For example, under "Carbonate of Bismuth" we are told that when it is "added to sulphuric acid coloured with sulphate of indigo, the colour of the latter is not discharged." Can such carbonate of bismuth be prepared by the official process? I have not been able to find any such, the best out of several samples discharging the colour from ten times its weight of B.P. solution of sulphate of indigo.

Likewise under "Precipitated Carbonate of Lime," it is stated, that when dissolved in nitric acid, it produces no precipitate with nitrate of silver. But precipitated carbonate of lime, for which the best price is paid, generally contains from 0·1 to 0·4 per cent. of chlorides, and of course yields a very distinct precipitate when treated as described.

If, as in the above cases, traces of impurities are unavoidable, then recognize the fact and fix definitely the limit of such impurity.

Purified animal charcoal, we are informed, leaves on ignition "only a slight residue." Would it not be much better to state how much, say 5 or 7 per cent.? On examining a sample of this substance lately purchased, I found it left 74 per cent. ash, and returned it to the makers, stating it was "unpurified," and received in return another lot just as bad. Is 74 per cent. a slight residue?

By all means let us have a standard as high as is practically attainable, but let it be one that we may expect the manufacturers to adopt.

St. John's Wood. W. H. Symons.

The Draft Pharmacy Bill.

Sir,—The notice of motion which Mr. Sandford proposes submitting to the Annual Meeting is, I think, most desirable, but in order that the general feeling of the trade may be more fully represented than is possible at such meetings, would you allow me to suggest, through your pages, the desirability of provincial associations at once bringing the subject before their local members, and by resolution or otherwise forwarding an expression of opinion thereon to the President?

Belgrave House, West Brighton. Edwin B. Vizer.

Nigella sativa.

Sir,—The "Month" of April 28 contains a summary, in a few lines, of a recent investigation of the seeds of *Nigella sativa* by Pellacani. As these seeds have been the subject of more than one communication by myself to the *Pharmaceutical Journal*, I may be allowed to make a few observations on a point of some importance in Pellacani's research.

In the course of his paper the author alludes to the beautifully fluorescent solution yielded by the seeds and the steps taken to isolate the fluorescent substance itself.

Some time ago I drew attention in the columns of this Journal (vol. xii., p. 681) to the extensive substitution, especially in Germany, of the seeds of *Nigella damascena* for those of *N. sativa*. Amongst other characters of the former I especially noted the peculiarity that all the samples at my disposal yielded fluorescent solutions, and I stated that this was not the case with any sample of *N. sativa* I had examined.

It is, therefore, I think, more than probable that Pellacani's seeds were not those of *N. sativa* at all, but consisted, entirely or principally, of *N. damascena*. The latter may be recognized by their rounded form, the transverse furrows, and the fragrant odour of strawberries they exhale when crushed. Whether the seeds to which Dr. Canolle referred in the *Journal de Medicine*, Feb., 1882 (a paper, by the way, that I have been unable to trace) were identical with those examined by Pellacani still remains to be shown. And the latter will, I fear, have made but a slight addition to our knowledge unless he can satisfy us of the origin and freedom from impurity of the seeds he has worked upon.

H. G. Greenish.

Salicylic Acid for Corns.

Sir,—For nearly twelve months past I have made and used a mixture, similar to that described on p. 884 of the Journal, as a remedy for corns. I soon found it dvantageous to employ a certain proportion of flexile ollodion, and also to make the relation of the alcohol to ether somewhat higher, in order to obtain a satisfactory, adherent, and permanent film. Care, too, is requisite in making the mixture, or gelatinization ensues, in which condition the application is neither so easy to use nor so efficacious.

South Norwood, S.E. J. H. Baldock.

Syrup of the Phosphates and Potassium Chlorate.

Sir,—A conclusion one might draw from the letter of one of your correspondents is that potassium chlorate would have no reaction on a compound syrup of phosphates carefully prepared with pure phosphoric acid and free from HCl. I think, however, the following data will show that a reaction, quite as remarkable in another way as the one which has been under discussion, does take place.

A sample was prepared in the proportion mentioned by Mr. Prosser and allowed to stand four days; shortly after mixing, turbidity ensued, and at the end of the time mentioned a distinct precipitate had formed while the colour had gradually lightened. The precipitate collected on a filter and washed was found to consist of the phosphates of iron and calcium; the filtrate contained the phosphates of sodium and potassium with a trace of calcium and the colouring matter.

The reaction would probably be as follows:—

$$2\,KClO_3 + H_3PO_4 = K_2HPO_4 + 2\,HClO_3$$

The free phosphoric acid by which the phosphates were held in solution being decomposed, the insoluble phosphates of iron and calcium would be precipitated, the soluble ones of potassium and sodium remaining in solution; the action of the chloric acid formed being to gradually oxidize the colouring matter.

30, *Weston Road, Hove.* Ernest F. Salmon.

Royal Naval Reserve Dispensing.

Sir,—Could any reader of the Journal state whether it is usual for the Admiralty and other governmental branches to hand over their dispensing to medical men? The reason I ask is this. In our locality there is a Naval Reserve and Coast Guard station, and during the course of each year a considerable amount of medicine is consumed by the men on drill. This, however, is all supplied by the medical man who prescribes it, who is an M.D., and one of that, alas! numerous family of M.D.'s who consider it madness to send a recipe to a druggist.

We enquired at the Director-General, Admiralty, for the conditions on which the dispensing was undertaken, and asked, as registered dispensers, to be allowed to offer, but we were informed that the Director-General must "decline" to deprive the medical man of the dispensing.

Now, sir, here is a grievance, and in our opinion a very glaring one. If the executive of H.M.'s Government encourages dispensing by medical men, who, we may ask, will discourage it?

We trust you will give this note a place in the columns of the *Pharmaceutical Journal*, with the view of eliciting any suggestions and shedding some light on the subject.

Quærens.

D. B. Shearer.—See the *Pharm. Journ.* for Dec. 23 last, p. 510.

E. P. Reid.—We are unable to comply with your request.

W. B. Jevons.—Hardwich's 'Manual of Photographic Chemistry,' the ninth edition of which has been published recently by Messrs. Churchill.

Junior.—(1) Dip the bottles into warm water for about a minute after the pomade has cooled. (2) A colouring may be made by digesting gamboge in olive oil.

J. Knight.—The following is quoted in Cooley's Cyclopædia:—Blanched almonds, 2 oz.; rose water, 8 oz.; orange-flower water, 2 oz. Make an emulsion, strain, and add sal ammoniac., 1 dr.; simple tincture of benzoin, 2 dr.

B. J. Kent.—The prescription is probably a German one, and the artificial Carlsbad salt ordered is official in the German Pharmacopœia. A formula will be found in the present volume of this Journal, before, p. 26.

S. H.—The Pharmacopœia is the final authority upon the point in question.

Communications, Letters, etc., have been received from Messrs. Kingzett, Howard, Alcock, Presley, Rhei.

SOME FACTS CONCERNING FILTRATION.

BY CHARLES SYMES.*

The process of percolation has engaged so much attention of late years that it is not surprising to find the less important although kindred one, filtration, somewhat neglected. It may be thought that all has been accomplished that could reasonably be desired for rendering this operation as complete as it can be, or that it is too simple to merit much consideration. Be this as it may, practical pharmacists know quite well that they are not unfrequently troubled to conduct it to their entire satisfaction.

The more serious difficulties connected therewith do not perhaps occur to each individual very often, hence the danger that the experience gained on one occasion is overlooked or not made available when circumstances again arise for its application.

The subject seems naturally to divide itself under three heads, viz.:—The liquid to be filtered, the medium through which it is to pass, and the form in which that medium is presented. As it is not intended, however, to make these notes exhaustive, it will be unnecessary to deal with it in precisely this order. Let us rather take some facts as they occur and see if we can by their consideration render available anything of practical value for every-day use.

The most simple operation of this kind is to filter through paper in small quantity a liquid containing a solid body for which it has no affinity.

Text-books tell us at the outset that it is very necessary to use a funnel the sides of which form an angle of 60°, this being the angle formed by the folded paper. Now I take exception to this very exacting requirement. We do not get our straining bags or percolators made of such a shape, and that because our experience teaches us how much more suitable is a form in which the angle is decidedly more acute; the same volume of liquid in this latter form producing a longer column, and consequently a greater downward pressure. Then, as to the paper fitting the funnel; we know quite well that all else being equal, the less perfectly it fits, the more rapidly filtration proceeds, so that, for any useful purpose it is quite unnecessary to insist on this very orthodox shape. One has, say, a pint of fluid to filter, and for this purpose a funnel of about 8 ozs. or 10 ozs. capacity is taken. I would use one of the long French pattern, fold the filter in plaits and before opening it out, place it fairly well down in its position in the funnel; or if there were reasons for not plaiting the filter, then it should be folded first in half, and then the two outer portions, representing rather more than one-eighth each of the entire paper, should be turned back so as to overlap each other slightly at the top, and not to form a very acute point. In either case, the paper whilst being fairly well supported would have comparatively little surface adhesion and but small resistance would be offered to the passage of the fluid in any part. Funnels of this shape in much larger sizes can be used with advantage, but it is then desirable to have them ribbed. The ribs of funnels (especially of large ones) to be of any real value should be much deeper than they usually are, and should not run vertically, but spirally. A piece of muslin placed between the paper and funnel not only strengthens and supports the paper, but assists filtration by preventing adhesion; a cone formed of coarse hair cloth is still better. For larger sizes, say of from 4 to 8 pints, it is advantageous to dispense with the funnel altogether, and to use an inverted cone formed of linen or stout calico; the edges being fastened to a wooden hoop, which, resting on a deep earthenware pan, forms an efficient support for the paper, the liquid passing through with equal facility over the entire surface, a suitable cover placed over it excluding the air, and the process goes on under comparatively satisfactory conditions. A self-feeding arrangement can be fitted to this, if it be so desired, in a very simple manner.

When, by exhausting the receiver, atmospheric pressure is brought to bear on the liquid in a funnel, then the latter should be of the *orthodox* shape, as with it air is less likely to pass; but this requirement militates against the advantages that such a method would otherwise possess. The point of the filter should be supported by a cone of platinum or zinc, or by a packing of tow or prepared wool.

English paper makers do not appear to have devoted much attention to the production of filters in any variety, and for this reason we derive our supplies chiefly from the continent. It is a well-known fact that holding almost any of the common filters up before a strong light they are seen to be perforated more or less with minute pinholes, so that when in use it is only after these have become filled up that the whole of the solid matter is separated, and the liquid passes through bright. Each time a fresh portion of liquid is added, the disturbance caused thereby is liable to remove some of the particles which are acting as a filling, and if this occurs filtration again becomes imperfect. These filters, although very cheap, do not pay to use if time and convenience are taken into consideration. There is, however, considerable difference in the efficiency of the various kinds of filtering papers, even when free from this defect. The presence of animal matter, as in the grey filter, increases the strength, but diminishes its working capabilities, and the existence of mineral matters therein does the latter but not the former. The papers specially prepared by Messrs. Schleicher and Schüll are practically free from all extraneous matters, the pulp having been treated with hydrochloric and hydrofluoric acids, etc. They are an example of what can be accomplished in this respect, but at the same time they are too expensive for general pharmaceutical purposes, and, indeed, are only made in comparatively small sizes suitable for analytical work. For operations requiring filters of 7 inches diameter (before folding), the Rhenish papers, No. 595, are, in my opinion, the most suitable; for larger sizes the French stout plaited or plain papers, taken in all their qualities, give the best results. The French also make a paper specially suitable for syrups, thick to support the weight, and yet sufficiently pervious to allow of fairly rapid filtration. I find, however, in very large sizes, a double sheet of Rhenish paper in an inverted case of linen, as already described, answers even better.

Some fabrics, such as swansdown, close textured twilled calico, etc., filter as brightly as paper does, and may be used for that purpose as distinct from ordinary straining, provided the solid particles separate from the liquid in which they are suspended with ease, but when this is not the case they are of much less value; indeed, with paper as a medium, slimy

* Read before the Liverpool Chemists' Association.

deposits present considerable difficulty. Pepsine wine, prepared from the fresh, undried pepsine, might be regarded as typical of this class of liquids; the tendency being to choke up the pores of the filter almost immediately the operation commences. In such cases some kind of coarse straining material placed within the paper cone helps materially to obviate the difficulty. Hair cloth and thin coarse flannel answer well for this purpose; they operate by collecting on their rough projecting surfaces the larger proportion of the undissolved slimy matter, without becoming sufficiently choked up to materially impede the progress of the operation.

Succus taraxaci, as expressed from the root and mixed with spirit according to the B.P. instructions, is typical of a class containing a large quantity of starchy matter and where subsidence in a closed vessel previous to filtration is of great service. The liquor from poppy capsules, in the process of preparing syrupus papaveris alb., furnishes us with an example of a liquid containing a large quantity of albuminous matter and mucilage which, when coagulated by spirit, has to be filtered off, and here again subsidence in a closed vessel helps the separation materially. The greater portion of the liquor can, after a time, be poured almost bright into the filter, and the remaining soft mass can with care be slowly pressed almost dry; the chief difficulty in this latter operation being to press sufficiently slowly to separate the liquid from the solid, and yet not to expose it to the air long enough to lose much spirit by evaporation, as in that case some of the solid portion would be again taken up in imperfect solution.

For removing suspended particles from strong acids, spun glass, known as 'glass wool,' answers best, but this might be regarded as straining rather than filtration. With ordinary liquids, when there is but little insoluble matter, absorbent cotton not only strains, but by fairly tight packing filters brightly. In cases where it is desired to save the deposit, and possibly to dry or incinerate it, asbestos paper can be recommended; the liquid passes through it slowly, but it is very strong, and it is indestructible by heat. Paper lint, as introduced from America some few years ago, answered well as a filtering medium, being both strong and absorbent; but I am not certain whether its manufacture has been continued.

So far we have considered filtration as conducted only in funnels or funnel-shaped arrangements, as the various forms in which atmospheric pressure is commonly employed are described in works which treat of such matters. They are chiefly those in which a long column of liquid is carried above the point of filtration, as in Mr. Proctor's arrangement; where exhaustion is obtained by means of a syringe underneath; or suction by means of a bent tube, as described by Mr. Schacht at the meeting of the Conference at Birmingham in 1865. Recently there has been advertised a "Filtre Rapide," in which the filtering material is placed on a frame or support rising up within the cylinder and forming a space in the centre into which the filtered liquid flows laterally to a receiver below. It is a compact and ingenious arrangement, but I have not any experience from which to speak of its usefulness.

To my mind upward filtration is the direction in which we should work, and from which we may expect the best results.

Some years ago Mr. William R. Warner, of Philadelphia, invented an oil filter on this principle, consisting of two vessels in superposition, measuring altogether about 40 inches in height by 10 inches in diameter, and which is said to be capable of filtering a barrel of oil per day. This of course would depend on the nature of the oil and the temperature at which it is used.

Recently I have devised a form of upward filter in one vessel only, and have added to it a suction tube. It occupies comparatively little space, is simple in construction, efficient in action, and can be made by any tinman at little cost.

It consists of a plain tin cylindrical vessel (A) with a tap-hole (B) 1½ inch from the bottom; it is 22 inches high and 8 inches diameter. A tin tray (C and fig. 2), 7 inches in diameter, with a vertical rim 1 inch or 1¼ inch deep, has a hole (B′) in the rim; this and the hole near the bottom of the cylinder being fitted with a short

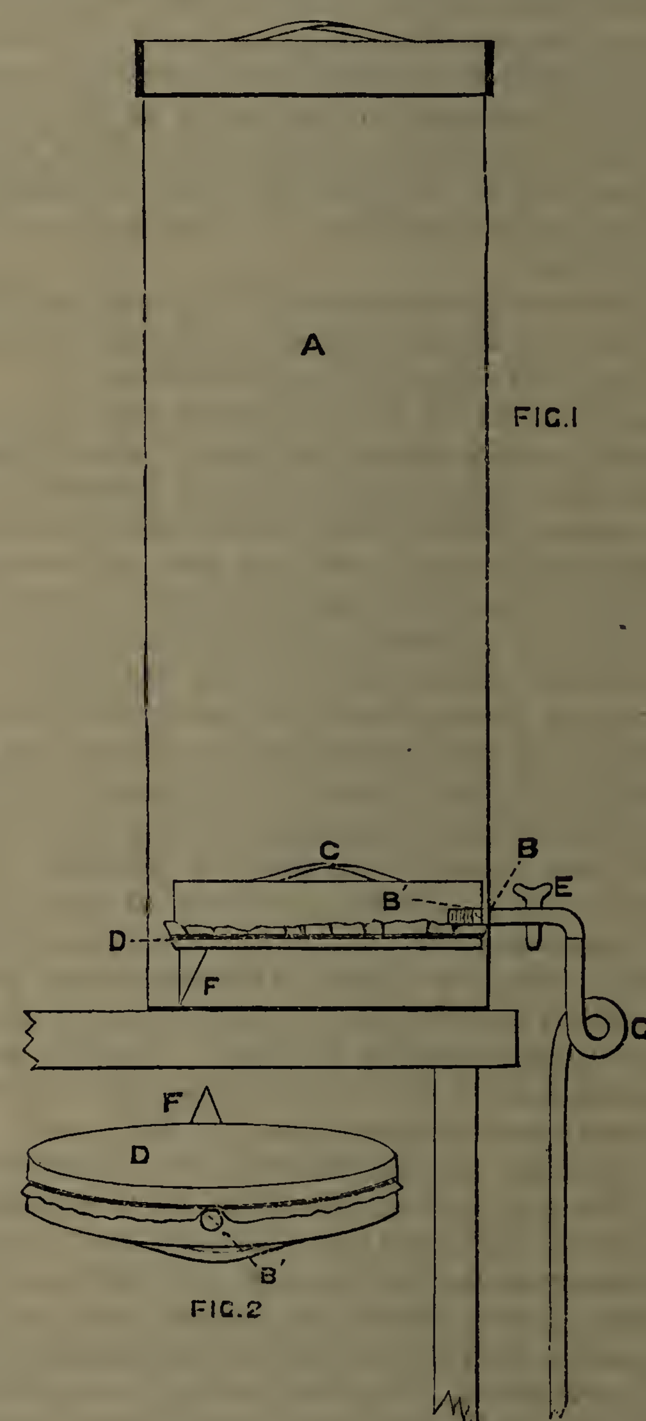


FIG. 1

FIG. 2

female screw of the same pitch of thread. Over the tray the filtering material (D) (flannel, calico, paper supported by muslin, or any other that may be suited to the liquid to be operated on) is tied securely; it is then inverted and placed in the cylinder so that the holes B and B′ are exactly opposite one other. A tap (E) with a bend at a right angle is screwed in so that it holds the two together and assists a short leg (F) in supporting the tray in position. To the end of the tap is attached an india-rubber tube turned on itself (G), or a long glass tube of similar construction (in fact like a large safety funnel deprived of the thistle head), which can be attached by a short piece of rubber tube. It will be obvious that any communication between the tap and the contents of the vessel must be made through the filtering medium which covers the inverted tray and that any deposition which takes place must be on the bottom of the vessel itself or on the opposite side of the tray, but not on the filtering surface, and herein lies the special advantages of the filter I now introduce. The use of a long delivery tube is not new; it formed part of an oil filter patented by Mr. Britten, of Liverpool, some years before Mr. Schacht's application of it to his filter. Neither is upward filtration new, as already stated; but the combination of the two and in this particular form will, I believe, commend itself to anyone who will give it a trial.

The dimensions given furnish a filter of about 3 gallons capacity at a cost of some ten or twelve shillings.

COLOURED INSECT POWDER.

BY W. L. HOWIE, PH.C., F.C.S.

Mr. Conroy has done good service in calling the attention of the trade to the adulteration of insect powder in the paper read before the Liverpool Chemists, Association and published in a recent Journal.* I have been working on the same subject for some time past, and as my experience and results differ from Mr. Conroy's, I think it well, without further delay, to throw my notes into form for publication.

The adulterant mentioned in the report of the Liverpool meeting as having been found by Mr. Conroy is fustic, which is one I have not met with although particularly looked for. I have not yet, however, hit upon a satisfactory method by which one can readily detect small proportions of this substance, as well as other yellow dye stuffs, which I have reason to suspect are used to "reduce" the powder. I have found microscopical examination unreliable, artificially coloured insect powders, to my knowledge, being passed as genuine even by a skilled microscopist, and I have found comparison with test samples prepared by blending various pigments with genuine powder in a mortar very misleading, as little difficulty is then experienced in detecting the specks of the colouring ingredient, but in the commercial powders the pigment is without doubt added during the grinding process, and if well selected, becomes so incorporated with the vegetable tissue as to escape any but an experienced eye, even when aided with the polariscope. I have, therefore, not relied upon the microscope as far as my investigation has proceeded, finding chemical method more exact and trustworthy.

I have examined about twenty samples, none of which was supplied to me specially for examination, but purchased in packets, or obtained as *boná fide* samples offered by wholesale dealers to retailers in the ordinary way of business. With the exception of No. 3 following, all are powders from well-known firms, most of whom claim to be grinders. Selecting twelve as typical, both as to source and general character, I placed them side by side and arranged them according to their depth of yellow colour, with the following result:—

* *See* before, p. 869.

Vendor's Definition.	Colour.	Adulterant.
No.		
1. "Insect Powder" .	Drab . . .	Genuine.
2. " " .	" . . .	"
3.	Olive drab .	"
4. "From closed Flowers" . . .	Yellowish . .	"
5. "All closed Flowers" . . .	" . .	"
6. "Open Flowers" .	" . .	"
7. Packet Powder . .	Yellow . .	Chrome.
8. " " . .	" . .	"
9. "Opt"	" . .	"
10. "All closed Flowers" . . .	" . .	Turmeric and chrome.
11. "Foreign" . . .	" . .	Chrome.
12. "Dalmatian" . .	Very yellow .	Turmeric.

After arranging the powders in this manner by the eye, it was apparent that between the colours of 6 and 7 there was a preceptible gap, and when by testing it was proved that Nos. 7 to 12 were artificially coloured, it will be seen that appearance is some indication of genuineness.

For further examination I discarded the first suggested plan of igniting the powder with potassium nitrate and testing the residue, and prefer what I think a more delicate and easy, if somewhat crude method. Incinerate say 20 grains of the suspected powder on platinum foil and carefully weigh the ash as well as note its character. For example, take No. 3, which had been reduced to powder in a mortar by myself from authenticated flowers. The ash was grey in colour and weighed 1·2 grain. This is placed in a test-tube, and a few drops of strong hydrochloric acid added, which causes some effervescence; heat is then applied to dissolve the ash, which consists chiefly of potash salts. The solution is colourless and the addition of a little water prepares it for the application of the usual tests.

Sulphuretted hydrogen gives no precipitate nor potassium iodide a yellow colour nor precipitate; but it ought to be here noted that ammonium sulphide and potassium ferrocyanide give the characteristic reactions indicating iron, which I found in small quantity in the ash of the genuine flowers, as well as in all the powders. This metal seems to exist in greater abundance in the florets, and in much less proportion in the seeds, and the indications of iron must be noted, as I have found two powders containing it in such quantity as to suggest that some ferruginous earth, such as ochre, had been used to make weight or colour. One of these powders is a proprietary article, and the other a small odd sample, which I cannot replace, therefore neither appears amongst the selected twelve.

The behaviour of a powder coloured with the usual adulterant, viz., yellow chrome, is quite different. The ash is brownish, or showing brown patches at the most exposed parts and the weight is greater; thus No. 7 yielded 2·1 grains. There is the same effervescence with HCl; but part is insoluble and the solution on heating becomes distinctly green, which with a black precipitate with H_2S may be taken as conclusive proof of the presence of lead chromate. KI gives a yellow colour, and if the HCl be not in excess a yellow crystalline precipitate separates.

Any attempt to judge of the amount of added chrome by estimation of the lead present I found futile, which is readily understood when it is remembered that the finer chromes are said to be "struck" on magnesia, and undoubtedly the alkaline earths are found to bulk largely in the composition of many.

No. 12, although of a strikingly deep yellow colour, gave only 1·2 grain of grey ash, and thus suggested that some vegetable colouring had been used, and on the sample being tested by the method devised by myself for the detection of artificial colouring in rhubarb and other powders (*Pharm. Journ.*, [3], vol. iv., 354) the supposition proved to be correct.

Pieces of white blotting paper corresponding to the number of samples are taken and named or numbered, and a few grains of the suspected powder placed in the centre and pressed compactly down with a piece of paper or a spatula. Chloroform (or other menstruum) is then carefully dropped from a pipette on the centre of the powder till it has moistened all and extended some distance beyond the powder. The paper is then allowed to dry, wiped free of the powder, and the stain if any, tested by suitable reagents.

Treated in this manner the genuine powder yields a slight yellow colour to the paper; but No. 12, and in less degree No. 10, gave a very distinct stain, which an atom of boracic acid and a drop of HCl at once identified as due to turmeric. The stain from genuine powder becomes bluish green with nitric acid, brownish with sulphuric, and only exhibits a slight darkening with potash solution. The turmeric stain becomes reddish brown with nitric acid, dark brown with sulphuric acid or potash. Fustic seems to yield nothing to chloroform, but a yellow stain obtained with alcohol becomes a distinct brown with nitric acid and shows little change with sulphuric acid or potash. Solution of a ferric salt strikes a bluish black both with the fustic and pyrethrum stain obtained with alcohol.

When fustic is boiled for some time in water with zinc and sulphuric acid, the solution gradually assumes a bright red colour owing to the transformation of one of the colouring principles, morintannic acid, into phloro-glucine and machromine.

The flowers of *Pyrethrum cinerariæfolium* treated in the same fashion show no change, but I have been unable to get this very promising reaction to indicate distinctly anything under 20 per cent. of fustic in insect powder, although I am hopeful that an improved method may yet result in greater delicacy.

No.	Percentage of ash.	No.	Percentage of ash.
1	6·2	7	10·5
2	7·1	8	9·6
3	6·	9	9·2
4	6·8	10	8·0
5	6·2	11	9·4
6	6·2	12	6·0

The above table shows the percentage of ash yielded by the twelve samples, and comparing that with the names given by the vendors little relation will be observed between them. From more exact analysis I take the first six to be genuine powders, with the exception of No. 6 which has a suspicion of some dye wood, which I have not yet identified, attached to it. Numbers 7 to 11 are adulterated with chrome from 3 per cent. to nearly 6 per cent. No. 10 has the addition of a very small percentage of turmeric, and No. 12 quite 5 per cent. of that root. It is not to be assumed that excepting these slight admixtures these powders are genuine; for although undoubtedly it is bad enough when having ordered a hundredweight of insect powder one finds 5 to 7 pounds of chrome yellow, costing 4*d.* to 10*d.* per pound, as part of the delivery, the presence of such extraneous colour is suggestive of its being merely a cloak for a more weighty adulteration, such as Mr. Conroy has discovered, or as that referred to by Mr. E. V. Riley (*Pharm. Journ.*, [3], vol. xii., 789), who says that "the stalks and leaves are ground with the flowers in the proportion of one-third of their weight;" whilst on the authority H. Kalbruner (*Pharm. Journ.*, [3], vol. v., 305), "The plant itself (minus the flowers) powdered appears to be quite inactive."

In face of the foregoing facts it seems advisable that purchasers should avoid the foreign powder, which seems to be always coloured, and not too trustingly accept any guarantee, even of professed grinders, but verify for themselves each purchase, which by the means above stated can readily be done in a few minutes even by a junior assistant.

NOTE ON VORTMANN'S METHOD FOR THE SEPARATION OF CHLORIDES, BROMIDES AND IODIDES.*

BY J. B. BARNES, JUN.

In 1880, G. Vortmann (*Ber.*, xiii., 325–326) proposed a process for the detection and estimation of chlorine in the presence of iodine and bromine. The method was based on the different action of manganese dioxide and lead dioxide towards the halogen elements. The author stated that iodides are decomposed by either of the oxides even in a neutral solution, and that the separation of iodine is complete if the liquid be boiled with acetic acid. Bromides are not decomposed by either oxide in a neutral solution; but in the presence of acetic acid, lead dioxide causes the separation of bromine, while manganese dioxide has no action. Chlorides, on the other hand, are not affected by either oxide in neutral or acid solutions. Chlorine is detected in the presence of the other halogen elements by boiling the substance with lead dioxide and acetic acid until the liquid becomes colourless and ceases to smell of iodine or bromine. Any lead iodate that may have been formed is separated by filtration together with excess of oxide used; the filtrate contains all the chlorine free from bromine and iodine. When chlorine is present with a large quantity of iodine, the use of manganese dioxide is to be preferred, to avoid the formation of the difficultly soluble lead chloride, and when there is a large quantity of chlorine in the presence of bromine, potassium sulphate should be added so that the chlorine may exist as a potassium salt.

The above process has been examined by C. L. Müller and G. Kircher (*Ber.*, xv., 812–818), who stated that they found chlorides to be decomposed by lead dioxide and acetic acid with liberation of chlorine and formation of mono-chloracetic acid, which is partially oxidized to carbonic anhydride, lead chloride being formed at the same time. When manganese dioxide was used no chlorine was liberated, but carbonic anhydride and manganese chloride formed. The action of lead dioxide and acetic acid on bromides and iodides was confirmed, but manganese dioxide and acetic acid were said to act alike on iodides and bromides. Both oxides acted slowly on iodides and bromides in neutral solutions, but neither had any action on chlorides.

Vortmann replied to this in a short paper (*Ber.*, xv., 1106), in which he stated that potassium chloride is not decomposed by lead dioxide when evaporated with a 2 to 3 per cent. solution of acetic acid, even when the

* A paper read before the School of Pharmacy Students' Association, March 29, 1883.

evaporation is repeated five or six times, whilst potassium iodide when similarly treated is readily decomposed, and potassium bromide, although with greater difficulty, is completely decomposed on repeated evaporation. Potassium chloride is decomposed with difficulty by the use of 5 per cent. acetic acid. Again, manganese dioxide with 2 to 3 per cent. acetic acid readily decomposes potassium iodide, but has no action on potassium bromide. With 10 per cent. acid only traces of bromine are liberated.

Since the publication of his last paper Vortmann (*Monatsh. Chem.*, iii., 510–530) has given detailed methods for the estimation of chlorides, bromides and iodides, by his process, of which the following is a brief *résumé*.

Estimation of Chlorine in Presence of Bromine.—The mixture of chloride and bromide is evaporated two or three times over a water-bath with lead dioxide and acetic acid 2 to 3 per cent. Bromine is evolved, the residue is treated with water, sulphuretted hydrogen passed to precipitate lead, solution filtered, and chlorine estimated by precipitation with silver nitrate.

Estimation of Chlorine in Presence of Iodine.—This may also be effected by the same method, or by using manganese dioxide in the place of lead dioxide. The latter method is preferable.

Estimation of Bromine in Presence of Iodine.—This estimation is easily effected by evaporating the mixture of iodide and bromide with manganese dioxide and dilute acetic acid several times over a water-bath.

Estimation of Chlorine in Presence of Iodine and Bromine.—Two processes are given. 1st. The mixture is boiled down several times with lead dioxide and dilute acetic acid, the lead dioxide being added to the mixed acidified solutions when in a state of ebullition, to prevent the formation of iodic acid, produced by the mutual action of the iodine on the bromine. The lead is then separated by sulphuretted hydrogen, and chlorine estimated in the usual manner. 2nd. The mixture is heated with manganese dioxide and dilute acetic acid till all the iodine is evolved, lead dioxide is now added and the boiling continued till the expulsion of bromine is effected; the filtrate, after separation of lead, is then employed for the estimation of chlorine. The latter process is said to give more exact results, as the iodine and bromine are expelled without the formation of oxy-acids. The author remarks that he has obtained satisfactory estimations of chlorine in the presence of iodine and bromine, when relatively large quantities of chlorine are present, but when much bromine is present the results came out rather too high. The estimation of iodine in the presence of bromine and chlorine gave good results; while that of bromine is at present unsatisfactory.

The experiments recorded in the following note had for their object the testing of the process as one for use in qualitative analysis.

(1.) 10 c.c. of a 5 per cent. solution of potassium iodide were mixed with 10 c.c. of 3 per cent. acetic acid and excess of lead dioxide, and evaporated nearly to dryness with constant stirring in a porcelain dish over a gas flame. The vapour of iodine was evolved. 10 c.c. more of acetic acid the same strength were added, evaporation and stirring being continued as before. This was repeated a third and fourth time. During the third experiment iodine was still evolved. The residue after the fourth evaporation was then treated with water, filtered, lead separated with dilute sulphuric acid, and again filtered. Potassium nitrite gave no coloration to the filtered liquid and silver nitrate produced only a slight turbidity.

(2.) In this experiment the same quantities of the solution of potassium iodide and acetic acid were taken, but manganese dioxide substituted for lead dioxide. The process was similar to the first experiment. Potassium nitrite imparted only a slight brown colour to the acidified solution, and silver nitrate gave a slight turbidity.

The inference to be drawn from these experiments is that iodine is practically wholly expelled from a solution of an iodide by lead dioxide or manganese dioxide in the presence of 3 per cent. acetic acid.

(3.) In this experiment, three separate portions of a 5 per cent. solution of potassium bromide were boiled with manganese dioxide and acetic acid of various strengths. The strengths used were 3 per cent., 33 per cent. and about 60 per cent. Paper moistened with solution of potassium iodide and starch paste was held over each dish. The third solution, in which the strongest acid was used, was the only one from which bromine was evolved.

This explains the apparent conflict between the result of Vortmann's experiments and those of Müller and Kircher; for while the former employed 2 to 3 per cent. acetic acid the latter used 50 per cent.

(4.) Here 10 c.c. of a 5 per cent. solution of potassium bromide, 40 c.c. of acetic acid (33 per cent.), and excess of lead dioxide were taken and treated in the same manner as in the first experiment, using 10 c.c. of the acid after each evaporation. After separation of lead, chloroform when shaken with a portion of the solution and a few drops of chlorine water was not coloured. Silver nitrate gave a slight turbidity.

(5.) The last experiment was repeated, but 3 per cent. acetic acid substituted for the stronger. After separation of lead, chlorine water and chloroform were added and the liquid shaken; a distinct red colour was imparted to the chloroform, silver nitrate gave a fair amount of a yellowish white precipitate, insoluble in nitric acid, sparingly soluble in ammonia; proving that 3 per cent. acetic acid and lead dioxide were incapable of removing all the bromine from the solution, even after four evaporations; while stronger acetic acid practically removed it all under similar circumstances.

(6.) In this experiment 10 c.c. of a 5 per cent. solution of sodium chloride, 40 c.c. of strong acetic acid, and excess of lead dioxide were taken and treated in the same manner as in the first experiment. After the fourth evaporation and separation of lead, silver nitrate gave a copious white precipitate, insoluble in nitric acid, soluble in ammonia; proving that the chloride was slightly or not at all affected.

(7.) In this experiment, 5 c.c. each of the 5 per cent. solutions of potassium iodide and potassium bromide, 40 c.c of acetic acid (33 per cent.) and excess of lead dioxide were taken and treated as before, but the acidified solutions were first boiled and the lead dioxide added, little by little, whilst in a state of ebullition. After the fourth evaporation and separation of lead, potassium nitrite gave no coloration, chloroform when shaken with another portion of the solution and a few drops of chlorine water was not coloured, and silver nitrate gave only a slight turbidity; proving that both iodine and bromine were wholly removed. If lead dioxide be added to the cold acidified solutions and heat subsequently applied, the mass, as it approaches dryness, changes from brown to yellow, accompanied by rather violent action; on further heating it blackens and chars, and finally assumes a yellowish red colour, due doubtless to the formation of litharge. The residue when treated with water yields a coloured liquid which contains no lead but a large quantity of iodine. Vortmann notices this action and indicates as its cause the formation of oxy-acids of iodine.

(8.) In this experiment 3·3 c.c. each of the 5 per cent. solutions of potassium iodide, potassium bromide and sodium chloride, together with 40 c.c. of acetic acid (33 per cent.) and excess of lead dioxide were taken. The evaporation was carried on as in the other cases, using 10 c.c. of acid each time and lead dioxide being added to the boiling solutions. After the fourth evaporation and separation of lead, the filtrate gave no coloration with potassium nitrite, chloroform when shaken with another portion of the solution and a few drops of chlorine water was not coloured, while silver nitrate gave a copious white precipitate insoluble in nitric acid, soluble in ammonia, proving that all the iodine and bromine had been removed, but that chlorine still remained.

(9.) In this the same quantities of the three solutions were taken and the experiment conducted as in No. 8, except that the iodine was first expelled by manganese dioxide. A small portion of the mass was then tested, and bromine and chlorine found to be present. Lead dioxide was added and evaporation continued with acetic acid till bromine was expelled. Water was added to the mass as before, the liquid filtered, lead separated by sulphuric acid, again filtered, and silver nitrate added, which gave a copious white precipitate insoluble in nitric acid, soluble in ammonia.

From these experiments it will be seen that bromine cannot be removed from a solution of a bromide by using 3 per cent. acetic acid and lead dioxide, although by using a stronger acid this may be effected.

There is one disadvantage in using manganese dioxide, namely, the tendency the solution has to spurt whilst evaporating, which necessitates incessant stirring; this makes the use of lead dioxide more advantageous where the isolation of iodine and bromine is not required. The primary reactions in the above process may be shown thus:—

$$2KI + 4HC_2H_3O_2 + PbO_2 = I_2 + 2KC_2H_3O_2 + Pb2C_2H_3O_2 + 2H_2O,$$

$$2KBr + 4HC_2H_3O_2 + PbO_2 = Br_2 + 2KC_2H_3O_2 + Pb_2C_2H_3O_2 + 2H_2O.$$

$$2KI + 4HC_2H_3O_2 + MnO_2 = I_2 + 2KC_2H_3O_2 + Mn2C_2H_3O_2 + 2H_2O.$$

The results of these experiments indicate that the following modification of the process might be used with advantage in many cases where a solution has to be analysed for any or all of the halogen elements. Add ordinary acetic acid (33 per cent.) to the solution, boil in an open dish, add a few grains of manganese dioxide; if iodine be present the liquid will instantly turn brown. More manganese dioxide must then be added, and the whole briskly boiled till a glass rod moistened with starch paste and held over the dish ceases to be coloured blue, showing that all iodine has been removed. If no coloration be produced when manganese dioxide is added, the solution may be at once tested for bromine After the separation of iodine treat the residue with water and test a portion for bromine. If it be present add lead dioxide and continue the ebullition with acetic acid till a glass rod moistened with solution of potassium iodide and starch paste and held over the dish ceases to be coloured blue, indicating that all bromine has been removed. Treat the residue with water, filter, separate the lead with dilute sulphuric acid or sulphuretted hydrogen and test the clear filtrate for chlorine with silver nitrate.

In conclusion, I have to thank our Secretary, Mr. Dunstan, both for suggesting this process as a subject for a paper and also for the valuable aid he has given me in working it out.

THE ACTIVE PRINCIPLE OF THE ROOT OF APOCYNUM CANNABINUM.*

BY O. SCHMIEDEBERG.

Husemann was the first to point out that the *Apocynum cannabinum*, L., which is used as a remedy in dropsy and like the oleander belongs to the Apocynaceæ, might contain a heart poison belonging to the digitalin class. In fact, from the root of this plant, which in its native country, North America, is official, two substances belonging to the digitalin group can easily be prepared, analogous to oleandrin and neriin.†

Apocynin is a resinous amorphous substance, very easily soluble in alcohol and in ether, but almost insoluble in water, of which a very small quantity is capable of producing the systolic pause in the heart of a frog with the characteristic phenomena. It does not appear to be a glucoside although upon boiling it in alcoholic solution, or suspended in water, with tolerably concentrated hydrochloric acid, a liquid is obtained which reduces cupric oxide in the presence of alkalies pretty freely; but this may be due to other decomposition products resulting from the strong action of the acid. The greater part of the resinous mass appears to remain unaltered; it has, however, become inert, not only in respect to the heart, but generally, and especially a picrotoxin-like action is no longer perceptible.

The second constituent is apocynein, which is a glucoside, and in its characters and solubilities agrees essentially with neriin, or digitalein. But like apocynin, it gives no remarkable reaction with sulphuric acid and bromine.

The preparation and purification of the two substances is effected in a manner similar to that followed for the constituents of the oleander.*

* *Archiv fur experimentelle Pathologie und Pharmakologie*, vol. xvi., p. 161.

† See before, p. 920.

* See before p. 920.

THE ACTION OF CERTAIN METALS ON OILS.†

BY A. LIVACHE.

The action of metals on oils and particularly on drying oils has been made, by M. Chevreul, the object of studies of very great importance. From these studies it follows that under certain circumstances metals exercise a considerable influence on the oxidation of oils. Linseed oil, for example, rapidly becomes drying when it is spread upon the surface of a plate of lead. I have thought that the action of metals might be more efficacious if they were used not in the form of metallic plates, as M. Chevreul did, but in the state of fine division as obtained by precipitation. Experience has verified this supposition.

I have particularly studied the action exercised upon oils by lead, copper and tin; of these metals lead acts the most energetically.

Lead used in the experiments was prepared by precipitation from a solution of some of its salts by means of a plate of zinc; it was washed quickly, by water first, then by alcohol, then by ether, and dried rapidly *in vacuo*. If the lead thus prepared is moistened with a certain quantity of oil and exposed to the air, its weight will increase in a short time, and this increase of weight is greater as the oil is naturally more of a drying oil. Operating for example with raw linseed oil, the increase of weight reaches its maximum in thirty-six hours, whereas, exposed by itself to the air, this oil requires several months to reach its maximum. At the same time it appears to form a solid and elastic substance, analogous to that obtained in exposing boiled linseed oil to the air. With non-drying oils, the increase of weight, much less in amount, requires more time for its complete development.

The results which I propose to detail cannot be attributed to a simple mechanical division of the matter, which permits the air to circulate more freely through the mass, because the same experiment made with different substances in fine powder shows no analogous augmentation of weight; the process of oxidation goes on just as in the case of an oil exposed simply to the air in a thin layer.

The preceding experiment, made with different oils, shows that the increase of weight is practically proportional, except for cotton seed oil, to that observed with the fatty acids of the same oils, exposed to the air for several months. The drying is only more rapid because of the difficulty with which the air penetrates into the solid mass of the fatty acids. This is shown in the following table:—

† From *Comptes Rendus*. Reprinted from the *Oil, Paint, and Drug Reporter*.

Oils experimented with, using precipitated lead.	Increase of maximum weight, after 2 days per ct.	after 3 days per ct.	Increase of weight of fatty acids exposed to the air for a period of 8 months, per cent.
Linseed oil . .	14·3	—	11·
Nut oil . . .	7·9	—	6·
Poppy seed oil .	6·8	—	3·7
Cotton seed oil .	5·9	—	0·8
Beech nut oil . .	4·3	—	2·6
Colza oil . .	0·0	2·9	2·6
Sesame oil . .	0·0	2·4	2·0
Peanut oil . .	0·0	1·8	1·3
Cabbage seed oil	0·0	2·9	0·9
Olive oil . . .	0·0	1·7	0·7

Cotton seed oil, which is a drying oil, presents the only exception, the fatty acids, which are derived from it only acquire a slight increase of weight. This is, without doubt, the reason why they can, in the industrial arts, make it play the *rôle* of drying or not drying oil, in mixing it with either linseed oil or olive oil.

Again it is the direct action of the metal, and not, as might be supposed, the action of the air, to which is due the transformation which gives the oil power of increasing its weight and changing its physical state in oxidizing. If, in fact, linseed oil and a small quantity of precipitated lead are mixed and kept out of exposure to the air and light from time to time, the oil will soon be seen to acquire a slightly reddish tint; then if this oil be spread upon a plate of glass, the oil bleaches, and dries as rapidly as boiled oil, undergoing also as great an increase in its weight. The contact with precipitated lead, with exclusion of air, has communicated to the oil the property of rapidly absorbing oxygen.

In studying the oxidation of oils, M. Clorez has shown that this oxidation is always accompanied with total disappearance of glycerine; it appears, probably on account of the phenomena I am about to describe, that it is upon this glycerine that the precipitated lead exerts an equal part of its influence in modifying it. In effect, if we place in a flask, from which air is extracted, glycerine and precipitated lead, the lead will rapidly disappear, oxidizing at the expense of a part of the product and then dissolving. If raw linseed oil is taken in one instance, and in another instance boiled oil which has been acted on by precipitated lead with exclusion of air is taken; then if precipitated lead is moistened with these two oils, and each sample exposed to the air, an identical increase in weight will be observed, and consequently an equal capacity for absorbing oxygen, proportional, as I have shown, to the increase of weight acquired by the isolated fatty acids.

The preceding facts explain besides how, by a simple digestion at the natural temperature of linseed oil and litharge or minium, prolonged for some time, oil drying rapidly in the air can be obtained; nevertheless the oil thus obtained always retains some fatty matter (*du gras*); it dries less well and less rapidly than boiled oil. The boiling, especially if prolonged, and if the temperature is high enough, has the effect of producing a partial decomposition of the glycerine.

The study of the action of other precipitated metals, such as copper and tin, fails to give any results of interest; they only slightly increase in drying power. M. Chevreul already has announced this fact, from his experiments with plates of these metals.

Finally, it seems probable that the action of precipitated lead on the drying oils can be utilized to a certain extent in the arts.

In the first place, in the facts which I have made known will be found a rapid method for distinguishing drying oils (nut, linseed, beech nut, cabbage seed and cotton seed oils), from non-drying oils. The addition, now so frequent of cotton seed oil, for example, to linseed oil can be easily detected.

In the second place they give a means of substituting for the old-fashioned boiling, a simple agitation or stirring of the oils, or better yet, with exposure to air and at the natural temperature, the linseed oil can be circulated over plates of iron or zinc, on the surfaces of which metallic lead is precipitated. Oils thus obtained will be always less coloured, and will preserve a high degree of fluidity, while at the same time the disagreeable odours and danger of fire encountered in the present process will be avoided.

SYRUP OF SQUILL AND SYRUP OF IPECAC, SIMPLE AND COMPOUND.*

BY R. ROTHER.

It is almost a truism that, where there is a ceaseless effort to improve some process, there must abide a radical and obnoxious defect. Now, if the obstacle is radical in its nature, the aberrant cause becomes the dominant feature in the process, and remains a rich source of of empirical methods, until its principle is understood. For a long time fermenting syrups were a standing menace to elegant pharmacy. Not until alcohol in sufficient proportion was applied did the agitation in this regard end. For an equally extended period the pectose derivatives spoiled tinctures and syrups, until alkalies were employed to suppress the odious jellies. Many resins, which long were troublesome, likewise yielded to the solvent action of alkalies, especially in the presence of sugar. An extensive array of tinctures presented various defects in the way of turbidity, deficient strength, and retarded percolation and filtration, owing to the use of too weak alcohol in their preparation. An increased strength of the alcoholic menstrua swept away this multitude of grievous objections. Saline menstrua now serving excellent special purposes will eventually become more generally important. Acidulated menstrua have many particular uses, but some mischief and positive inconvenience has resulted from their too general employment, where their aid was by no means indicated. Syrup of squill is an example of such cases. Vinegars and wines are probably relics of primitive pharmacy. The fermented liquors earliest in use were so deficient in alcohol that acetic acid was speedily developed by secondary fermentation. The resulting vinegar being found possessed of antiseptic qualities naturally met with frequent application for this purpose. Hence, medicines as well as perishable articles of food were prepared with this acidulated solvent and preservative. Wines, perhaps, came later into use when improved methods produced them of greater alcoholic strength. When, however, distillation yielded still stronger alcohol, its use became general, and vinegars and wines dwindled to lingering rudiments in the modern organism of pharmacy. Syrups were originally made from medicated vinegars, and syrup of squill is prepared in that manner to this day. But an acidulated preparation of squill is contra-indicated in all its therapeutical applications. Squill is almost invariably given in connection with alkaline, saline or neutral mixtures. In pharmacy, also, a great disadvantage results when such mixtures are compounded, owing to the fact that physicians forget the acid nature of syrup of squill. This syrup is not only medicinally and chemically incompatible with alkalies and carbonates, but also mechanically with the latter by reason of the persistent frothy effeverscence set up in a syrupy liquid. Furthermore, when a fresh vinegar of squill is converted into syrup, the yet unchanged pectose derivative becomes insoluble as a bulky gelatinous precipitate.

The activity of squill is readily extracted by water, but a mixture of the drug and water gets rapidly putrid; if, however, an aqueous menstruum, containing one-eighth its volume of alcohol, is used, putrefaction and fermentation are prevented. Such an extraction yields no precipitate with sugar, and produces an elegant syrup, readily miscible with alkalies and acids without change. When the filtered macerate is treated with ammonia, a

* From the *American Journal of Pharmacy*, Feb., 1883.

considerable greenish precipitate is formed, which rapidly subsides and again quickly dissolves on the addition of sugar, but is wholly prevented when the order of mixture is reversed. Pharmacists will find a neutral syrup of squill very convenient in all such cases where the ordinary syrup is incompatible.

In the preparation of this syrup as well as of others, and also many tinctures, the method of remaceration proposed by the writer is far preferable to percolation and often more exact. Most crude drugs, such as roots, barks, and leaves, have a pretty definite normal of absorption, that is capacity for imbibing and holding menstrua. When this has been determined, a simple mathematical calculation will show how much loss is sustained, after obtaining a certain measure of decanted liquid. The normal of absorption of squill with one-eighth alcohol, is rather high, but since the drug is cheap, a loss of 20 per cent. is immaterial, when there is more than a corresponding gain in definiteness and quality of the product and facility in the process.

The application of heat in the preparation of syrups is chiefly objectionable on account of the large volume of liquid to be heated, and the difficulty of straining it whilst hot. To obviate all this, percolation was suggested. But this presents so many objections, that its few advantages were small by comparison. The cold process, by simple mixture and agitation, is so vastly superior to all others that it is fast coming into general favour. In cases of very dense syrups and such containing much alcohol, some difficulty is found in dissolving the last portions of the sugar. In preparing simple syrup such a residue is not objectionable, but in all other cases complete solution is imperative. To this end the writer divided the menstruum and used portions successively on the saccharine residue. However, an equally effective, but more facile method consists in mixing the whole, then stirring until most of the sugar has dissolved, decanting the syrup, heating the remainder until dissolved, uniting the whole, and straining. One gallon of neutral syrup of squill is prepared as follows:

Take of—

Squill, whole	10 troy ounces.
Sugar, granulated . . .	96 „
Alcohol } Water }	of each sufficient.

Mix alcohol and water in the proportion of one measure of the first and seven measures of the second, and pour 57 fluid ounces of the mixture upon the squill contained in a wide-mouthed bottle. Macerate this mixture for three or four days, with occasional shaking, and decant 32 fluid ounces of the liquid. Upon the residue pour 32 fluid ounces of the menstruum, and after three or four days decant as before. Mix the two decantates, filter and pour the filtrate on the sugar contained in an appropriate vessel; stir the mixture until most of the sugar is dissolved, decant about six pints of the syrup, heat the residue until dissolved, then mix the whole and strain.

Syrup of ipecac is another one of those protean compounds whose radical fault not being understood has caused it to pass through a great variety of changes. In this case the presence of a small amount of pectosic matter is, however, only part of the difficulty. The main cause of aberration resides in the large amount of resin that is contained in the root. In some of the former processes for this syrup it was assumed, on the statement that emetine, the active principle, being insoluble in water, that acetic acid must be used to render this soluble. But acetic acid brought no advantages for preventing a cloudiness which invariably appeared in the syrup. The resin was excluded in subsequent methods by mixing a fluid extract or a condensed alcoholic extraction with water, filtering and then adding the sugar; but the cloudiness still appeared although less obtrusively. The great and particular defect in this method was the fact that the acid resin carried with it a considerable portion of the activity. Later the writer extracted the root with acidulated water containing only enough alcohol to prevent fermentation. Under these conditions the gelatinous cloud was yet manifest, but subsiding rapidly left the supernatant syrup clear and bright. Deeming the jelly to be of pectosic origin and finding that a fluid extract of ipecac when mixed with ammonia remained clear the writer then employed an ammoniacal menstruum and found that both emetine and resin were readily and completely exhausted. The resulting deep brown solution produced a magnificent dark brown, clear, and permanent syrup on the addition of sugar.

The resin of ipecac is distinct from ipecacuic acid. The resin is insoluble in water, but extremely soluble in alkalies, especially ammonia. The thorough exhaustion of the root by means of an ammoniacal menstruum lends the appearance that if the acid resin formed native insoluble compounds with emetine these were dissolved by the ammonia. But this assumption is superfluous, since the statement of the investigators of emetine in regard to its insolubility in water is incorrect. Although emetine is precipitated from moderately concentrated solutions of its salts by ammonia and unaffected by an excess of the latter, it is yet quite freely and amply soluble in the large volume of water used in its extraction from the root. The writer found that when the ammoniacal extraction is evaporated to a syrupy liquid, again alkalinified with ammonia and shaken with a mixture of equal volumes of ether and acetic ether, a yellowish ethereal solution of emetine is obtained. This solution, on spontaneous evaporation left a yellowish crystalline residue of emetine. This when treated with water is converted into a cream coloured amorphous emetine hydrate. The crystals as well as the hydrate are promptly and perfectly soluble in acids from which ammonia precipitates bulky flakes of the hydrate in not too dilute solutions. Emetine is further remarkable in being much more bitter than its salts. Acetic ether is the great solvent of emetine, but owing to the ready miscibility of ethyl acetate with watery liquids, ordinary ether is advantageously added in the extraction from the crude residue. Emetine, although insoluble in ethyl oxide, is yet soluble in a mixture of the two ethers.

Returning now to syrup of ipecac, we have the formula for 4 pints, as follows:—

Take of

Ipecac, coarsely bruised . .	$4\frac{1}{2}$ troy ounces.
Sugar, granulated	48 troy ounces.
Calcium carbonate	$\frac{1}{2}$ troy ounce.
Ammonia water	$\frac{1}{4}$ fluid ounce.
Alcohol, } Water, }	of each sufficient.

Mix alcohol and water in the proportion of one volume of the first and seven of the second, and pour 25 fluid ounces of the mixture together with ammonia water upon the ipacac contained in a wide-mouthed bottle. Macerate the mixture for three or four days, shaking it up occasionally; then decant 16 fluid ounces of the liquid. On the residue pour 16 fluid ounces of the menstruum, and after three or four days' maceration decant 16 fluid ounces as before. Mix the two decantates, add the calcium carbonate, agitate and filter. Pour the filtrate on the sugar contained in a proper vessel, stir until most of the sugar has dissolved and decant about 3 pints of the syrup. Heat the remainder until solution is effected, then mix the whole and strain.

The compound syrup of ipecac, or substitute for Dover's powder, is extensively in use. But it is not properly prepared, being fermentable and otherwise unsatisfactory. A permanent and elegant syrup containing $\frac{1}{2}$ a grain each of opium and ipecac in the fluidram is prepared by the following ready formula:—

Take of—

Deodorized tincture opium . .	8 fluidrams.
Syrup of ipecac	10 „
Simple syrup, sufficient to make.	75 „

Mix.

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REPORTS OF THE GOVERNMENT VISITORS ON THE PHARMACEUTICAL EXAMINATIONS.

THE reports of the Government visitors on the examinations conducted by the Pharmaceutical Society, which have lately been published, are more than ordinarily interesting this year, since they deal with several of the proposed alterations which have received the approval of the Council as well as with the general results of the examinations during the past. Dr. GREENHOW'S report refers only to the year 1882, but Dr. MACLAGAN'S report embraces a period of three years ending in January of the present year. In one very important point both reports concur most thoroughly, viz., the opinion that all who pass the qualifying examination as at present conducted are fit to carry on the business of a chemist and druggist with safety to the public. Dr. GREENHOW with justice regards this as the essential purpose and requirement of the Pharmacy Act, and Dr. MACLAGAN expresses his belief that the Minor examination affords ample security for the public safety at the hands of those who obtain these diplomas. But while agreeing in this view with Dr. GREENHOW, he admits that there is still need for the creation of a class of pharmaceutical practitioners possessing higher scientific qualifications than either the Minor or even the Major examination provides for, and he expresses a hope that if the proposed alterations are carried out the standard of the qualifying or pass examination may be raised at least up to the level of the present Major.

It may, therefore, we think, be inferred that the satisfaction felt by Dr. MACLAGAN, at least in the results arrived at by the system now in force, is due rather to the efficient manner in which the examinations are conducted than to any profound belief in the sufficiency of the regulations applying to them. It is indeed conceivable that with a less careful and conscientious body of examiners the results obtained under the present regulations might be far less satisfactory even from this point of view which is taken by the Government visitors. If this be a correct inference, it would to a great extent justify the recommendations of the Council with a view to making the examinations a more complete test of competence. In fact, Dr. GREENHOW, in reviewing the effects of various changes that have already been made from time to time, admits that those changes have unquestionably raised the standard of the Minor, and he expresses his approval of this result, which he considers to have been inevitable and necessary if the intention of the Pharmacy Act was to be fulfilled. He well points out that in commencing a system of compulsory examination it would have been manifestly inequitable to have passed at once from the laxity which previous to the enactment of the Pharmacy Act permitted persons to carry on the trade of a chemist and druggist without any recognized qualification, and to have exercised a degree of strictness which would have made the examinations press hardly upon a large number of candidates whose education had been commenced before the Act came into operation. At the same time he also admits, what is really the logical consequence of such a considerate application of the system of examination, that at a later period it was quite proper to make the examinations more thorough and practical, and to introduce such changes as experience may have shown to be desirable.

It would, we think, be unwise to assume that the necessity for such a gradual raising of the standard of the qualifying examination has ceased to exist, for whatever may be thought of the competence of those who pass it, we must not lose sight of the fact that the large number of rejected candidates furnishes evidence of a want of adequate preparation for the ordeal, and, as Dr. MACLAGAN says, of ignorance of what constitutes preparedness. The great desire with too many is to pass, and merely to pass by any means, without any proper regard to what is requisite in order to make the passing of the examination a matter of course.

The provision that passing the Preliminary examination should be essential before the commencement of the period of apprenticeship or pupilage would no doubt contribute largely to reduction in the number of candidates rejected at the Minor examination, and we are glad to see that the proposed alteration has the entire approval of Dr. GREENHOW, as well as that requiring the candidates for the Minor examination to produce evidence of apprenticeship or pupilage of not less than three years with a duly registered chemist and druggist.

Dr. GREENHOW is a strong advocate for adherence to the system of apprenticeship, and he thinks the Pharmacy Act to be defective in not having made it compulsory. His argument in favour of that opinion is a strong one, and we are quite in accord with him as to the value of long and constant practice as a means of acquiring practical acquaintance with drugs and the manipulative skill required in compounding them. But it must not be forgotten that compulsory apprenticeship affords no sufficient guarantee that the apprentice will be enabled to gain the knowledge and skill desirable, and Dr. Maclagan very pointedly refers to this circumstance in his report by stating that there can be little doubt members of the pharmaceutical profession to a large extent do not do their duty properly to their apprentices. He adds that if the apprentice is merely to learn the routine duties which fall on anyone standing behind a counter, six months would be enough for the purpose, and the three years' apprenticeship might be abolished with advantage.

It behoves those who complain of the difficulty in obtaining apprentices to consider well the remarks of Dr. Maclagan on this subject, and to inquire whether they may not be to blame for the want they experience rather than any supposed undue stringency of the examinations which is sometimes put forward as the reason why apprentices cannot be obtained. If the apprenticeship system is to be merely a device for obtaining cheap labour it can but contribute towards the maintainance of the large number of rejected candidates for the Minor examinations, and if, as now intended, it is to furnish evidence that candidates have had opportunities for acquiring practical skill and knowledge of their business, it should imply a certain responsibility on the part of the master for the pupil's progress.

On the general subject of a curriculum of study the opinions of the two Government visitors of examinations are less in accord. While Dr. Maclagan, in referring to his previously expressed recognition of the necessity for pharmaceutical students going through a regular curriculum of study, again states that the results of the last three years have led him to observe how much candidates, whether successful or not, require more methodical instruction, Dr. Greenhow is not disposed to think it necessary to enforce attendance on a regular course of lectures, though he would not discourage candidates from attending such a course of instruction at their option.

Dr. Greenhow's opinion on this point is based upon the statement in the preamble of the Pharmacy Act, that for the safety of the public it is expedient that persons keeping open shop as chemists and druggists, etc., should possess a competent practical knowledge of their business. He infers from this that no restriction beyond what is necessary for the safety of the public was intended to be imposed upon pharmacists, namely, that they should be examined as to their practical knowledge. We have on previous occasions pointed out that though this view is one that is sound from the standpoint of a public official it fails to take into account what is requisite for the advancement of pharmacy or for attaining the objects set forth in the preamble of the Pharmacy Act, 1852, and in the Society's Charter of Incorporation.

ELECTRICAL UNITS OF MEASUREMENT.

The last of the series of lectures on the practical applications of electricity, arranged by the Council of the Institution of Civil Engineers, was delivered by Sir William Thompson on the 3rd inst., the subject being "Electrical Units of Measurement." Premising that no real advance is possible in any branch of physical science until practical methods for a numerical reckoning of phenomena have been established, the lecturer pointed out that the first advances towards a system of measurement in electrical science were made in the last century by Cavendish and Coulomb, and that further and rapid progress towards a complete foundation of the system was effected by Ampère, Poisson, Green, Gauss, and others. But as late as ten years ago, regular and systematic measurement in electrical science was almost unknown in the chief physical laboratories of the world. Now, however, electric measurements are of daily occurrence, not only in scientific laboratories, but in workshops; ohms, volts, ampères, coulombs and microfarads have become common terms, and measurements in these units are commonly practised to within 1 per cent. of accuracy. It seems indeed as if the commercial requirements of the application of electricity to lighting and other uses of every-day life are destined to give an important impulse to the higher region of scientific investigation.

Sir William described the first step towards the numerical reckoning of properties of matter to be the discovery of a continuously-varying action of some kind, and the means of observing and measuring it in terms of some arbitrary unit or scale division; while the second step would necessarily be that of fixing on something absolutely definite as the unit of reckoning. Gauss's principle of absolute measurement of magnetism and electricity is merely an extension of the astronomer's method of reckoning mass in terms of what may be called the universal gravitation unit of matter, and the reckoning of force, according to which the unit of force is that force which acting on unit of mass for unit of time generates a velocity equal to the unit of velocity. Gauss's work was of great importance, as was that of Weber. But it was the British Association Committee which, after eight years of labour, fairly launched the absolute system of measurement, subsequently accepted at the International Conference for the Determination of Electrical Units, held in Paris in 1882, and which also effected arrangements for the supply of resistance coils, in terms of a unit, afterwards named an "ohm," to be as nearly as possible 10^9 centimetres per second.

The ultimate principles of scientific measurement were illustrated by the case of an ideal traveller through the universe who desired to make for himself a metrical system agreeing with that which he had left behind him on the earth, but who possessed no weights, measures, watch, chronometer, standard vibrator, or spring balance, but merely Everett's 'Units and Physical Constants' and a complete memory and understanding of its contents. It was shown experimentally how he could readily and accurately recover his centimetre by ascertaining how many wave-lengths of sodium light there were in the distance between the bars of a grating that he could engrave for himself upon a piece of glass. Having recovered his centimetre measure, he would have the choice of various methods for recovering the unit of time. One way would be to take an accurately measured Leyden jar of known capacity, arrange a mechanism for charging it to an accurately measured potential and discharge it at frequent regular intervals through a galvanometer coil; this would give an intermittent current of known average strength, measurable in electro-magnetic measure by an ordinary galvanometer. The number found upon dividing the electrostatic reckoning of the current by the experimentally found electromagnetic reckoning of the same is v in centimetres per the arbitrary unit of time which the experimenter has used in his electrostatic and electromagnetic details. It is hoped that before long the value of v will be known within one-tenth per cent., but at present it is only known that it does not probably differ 3 per cent. from $2{\cdot}9 \times 10^9$ centimetres per mean solar second.

The remainder of the lecture was occupied with an explanation of the application of the absolute system in all the branches of electric measurement, and the definition of the practical units founded on it, now known as ohms, volts, farads, microfarads, ampères, coulombs and watts. In addition the name "mho"—being the word "ohm" reversed—was suggested for a unit of conductivity, the reciprocal of resistance, together with the subdivision "millimho," which would be exceedingly convenient for the designation of incandescence lamps.

We understand it is probable that the company at the Annual Dinner on Tuesday next will be more numerous than on any similar occasion for some years past. It is therefore extremely desirable that persons still requiring tickets should communicate at once with the Honorary Secretary, Mr. Richard Bremridge, as it will be imperatively necessary to close the sale sufficiently early to enable proper arrangements to be made.

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It may interest some of our readers to learn that at the Society's Conversazione on Wednesday next the music in the North Court of the South Kensington Museum will be performed by the Hungarian Band, under the direction of John Kalozdy, and that the glee singing in the Lecture Theatre will be supplemented by the singing of ballads by Miss Clara Samuell.

* * *

The second reading of the Medical Acts Amendment Bill, which was fixed for the 10th inst., has been deferred until Monday, the 21st inst. As, however, it is preceded in the list by seven other orders of the day, some of them of considerable importance, a further postponement seems inevitable, especially as the Bill is "blocked" and, therefore, cannot be brought on after half-past twelve.

* * *

From a memorandum by Professor Chandler Roberts on the recently issued Report of the Deputy-Master of the Mint it appears that the expression of the composition of gold ingots by the carat system, which has survived from the earliest times of which there are Mint records, is likely to be abandoned in favour of a decimal expression. As is known, the "carat" system consists in recording the alloy to be so many carats "better" or "worse" than standard, and is founded on an ideal unit, the "carat pound," which is divided into twenty-four parts, termed "carats," British standard gold containing twenty-two carats of gold and two carats of alloy in every twenty-four parts. The "carat" is sub-divided into four "carat grains," the "carat grains" into "eighths of a carat grain," and these are again subdivided into seven and a half parts, constituting "excess grains," being each equal to $\frac{1}{5760}$ of the carat pound. The method newly adopted is the decimal form, the report being expressed to the 0·0001 part.

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The *British Medical Journal* quotes a curious instance of the curative effects following the scientific use of the imagination, though not in exactly the sense intended by the inventor of the phrase. A hysterical patient, who had previously suffered from chorea, was received into the Charité, unable to raise herself in bed and with marked contraction of the lower limbs. After one or two hypodermic injections of morphia, she was given "a more energetic remedy," which she was told to use cautiously. The patient finding herself in possession of such a medicine was seized with a desire to poison herself with an overdose and swallowed the whole. The immediate effects she described as being terrible; but soon afterwards she found herself able to walk, and the cure was completed by a further dose of—bread pills!

* * *

The Executive Committee of the International Pharmaceutical Exhibition to be held in Vienna next August, under the presidency of Herr A. von Waldheim, appears to be sparing no pains to ensure its success. It has just issued a circular to pharmaceutical associations generally, as well as individual pharmacists, asking them to contribute towards its success by exhibiting old documents and other objects of antiquarian interest, as well as pharmaceutical collections and apparatus. In consideration of the scientific object of the exhibition the Imperial Foreign Office has expressed a wish that all possible assistance may be given to it by the consular staff. The time for receiving applications for space will definitely expire on the 31st inst.

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The Programme of the Meeting of the British Association at Southport in September next has just been issued. The first general meeting will be held on Wednesday, September 19, at 8 p.m., when Sir C. W. Siemens will resign the chair, and Professor Cayley will assume the presidency and deliver an address. On the next evening there will be a soirée and another on Tuesday, the 25th. On Friday evening, September 21, Professor R. S. Ball, Astronomer-Royal for Ireland, will deliver a discourse on "Recent Researches on the Distance of the Sun," and on Monday evening, September 24, Professor McKendrick will deliver a discourse on "Galvani and Animal Electricity." The concluding general meeting will be held on Wednesday, September 26. Dr. J. H. Gladstone will be the President of the Chemical Science Section.

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The second Annual Meeting of the British Association of Inspectors of Weights and Measures is to be held in Sheffield on Thursday, May 31, and following day.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The Draft Pharmacy Acts Amendment Bill.

A special meeting of the Chemists and Druggists' Association of Glasgow was held on the evening of Wednesday, May 2, in Anderson's College, Glasgow, for the purpose of discussing the paper by Mr. Daniel Frazer, delivered to the Association on April 10 (see before, pp. 845 and 865), on the proposed changes in the Pharmacy Act of 1868. Mr. McAdam (of the Glasgow Apothecaries' Company), President of the Association, occupied the chair. There was a large attendance of members.

The Chairman said the Secretary had endeavoured to fix this adjourned meeting so that Mr. Frazer could have been present, but, unfortunately, Mr. Frazer had had to go to London, so that the arrangement had not suited him. It was, therefore, necessary to proceed in his absence, and he would be glad to hear the opinion of members upon the subject.

Mr. A. Kinninmont, after a passing reference to Mr. Giles's paper in the *Pharmaceutical Journal*, said while listening to Mr. Frazer's lecture he had been irritated to hear one word reiterated throughout the whole of it, and that was the word "monopoly." "Monopoly" was a word now only used in a bad sense. It was something to throw at an opponent and to condemn his position without argument; it was begging the question by an epithet. He entirely denied that the present trade of chemists and druggists was in any sense a monopoly. In the preamble of the Act it was said, "Whereas, it is expedient for the safety of the public that sales of poisonous articles should be regulated;" that showed that the trade was a restricted one, and that the restrictions existed not for the purpose of bringing profit to those who carried it on, but for the safety of the public. The trade stood in a similar position to many other businesses. For instance, you may wish to manufacture dynamite or gunpowder: the trade is open to you, but before you can do so you must comply with certain conditions intended to insure the public safety. Before you can become the captain of a ship you must qualify yourself for the duty, and no ship is allowed to sail unless on board it there are at least two persons holding masters' certificates. These were restrictions, but not monopolies, and the trade of a chemist and druggist was similarly placed. To call it a monopoly was an abuse of terms. It was a word that would prejudice their case, because in these days of free trade the words monopoly and protection went together in the popular mind. As for the Bill he had no objection to the preamble. Mr. Frazer objected to the definition clause; but if any one wished to get a thorough understanding of it he should read the decision in the case of the Pharmaceutical Society against Mackness, and he would then see the necessity for this clause. He would see that in that case, because the word "corporation" was not included in the Pharmacy Act of 1868, that the judges were of opinion that corporations could do things that individuals had no power to do. That was a most dangerous doctrine, but he thought this Bill would put an end to it. Mr. Frazer seemed to be very angry about the sale of "poisonous" articles. But chemists now claimed no special right to sell these "poisonous" articles. All the articles that were proposed to be called "poisonous" were sold by anybody; by ironmongers, by hucksters and by many others. But what objection could there be, on the ground of public safety, to the proposals in the Bill? They knew that when a man in the dark drank a bottle of poison in the belief that it was ale or something of the kind, that there was one fool less in the world. Still, it was necessary to guard against accidents, and if a man found a label on a bottle he would be cautious before he drank its contents. This was an unselfish proposal; it was made solely in the interests of public safety. Mr. Frazer underrated the danger. There could be little objection to drysalters being compelled to label the poisons they sell, the same as chemists always do, with the name and address of the seller. Then as regarded wholesale houses it was provided that every wholesale dealer shall keep a record in writing of the name of such poison, the quantity sold, the name and address of the purchaser, and the date of sale, and should preserve such record for twelve calendar months. He could not see that there was any hardship in that. It affected only certain sales. Some of his hearers might remember the case of poisoning in Glasgow by Dr. Pritchard. Many members of the Glasgow Druggists' Association were examined in evidence upon that case, and the poisoning was brought home to the criminal solely by the fact that the doctor had purchased some poison, which he did not pay for at the time, and had he paid for it the crime might never have been traced. This would show the necessity for this clause in the interests of public safety. Then there was the clause as to the labelling of patent medicines being or containing a poison. It had always been his opinion that patent medicines containing poisons were not covered by the Pharmacy Act of 1868. An Act of Parliament could not have a private interpretation, and it could not be stated with certainty what an Act meant until a judge's opinion on it was obtained, as a decision carried authority with it and settled the question. But a passage in the Act seemed to settle the question. In section 16 it says:—"Nothing hereinbefore contained shall extend to or interfere with the making or dealing in patent medicines," and, observe, "nor with the business of wholesale dealers in supplying poisons in the ordinary course of wholesale dealing." In section 17 it says—"It shall be unlawful to sell any poisons, either by wholesale or retail, unless the box, vessel, wrapper or cover, in which such poison is contained, has the name and address of the seller." If the intention had been to have covered patent medicines it would have been distinctly stated. Mr. Frazer spoke of the strength of the patent medicine interest. But what was that patent medicine interest? Mr. J. Walker gave some statistics about it a month ago. The whole transactions in patent medicines would give each holder of a patent medicine licence at the very most £67 a year. As he (Mr. Kinninmont) held licences for two shops, Mr. Frazer for two, and the Apothecaries' Company for two, it could be seen what a small trade it was. This trade, before which Mr. Frazer bids the Pharmaceutical Society recoil, meant a yearly value of about £650,000, and that included stamps. The proposed clause was necessary in the public interest. He would pass over several clauses now, for he could not find any fault with them. Mr. Frazer, however, objected strongly to the 9th clause—"Duly qualified persons to sell medical prescriptions and sell poisons." It seemed to him (Mr. Kinninmont) that the dispensing of medical prescriptions should be restricted to competent people. He did not see on what grounds Mr. Frazer thought that in this there was any breach of free trade. He could not see how Mr. Frazer came to that conclusion, unless on the ground that having never been in any shop but his own, and having never seen trade as conducted by ignorant people outside, he did not know the danger the public were in. Many of his hearers who had been about the country would be able to recall instances where want of skill, while not perhaps endangering life, at least hindered recovery. A customer should get exactly what is ordered for him, and only competent and skilled persons could give that. Then there was the clause as to the registration of the names of proprietors of shops. That was a very important question. As Local Secretary of the Pharmaceutical Society, he had occasion to go about asking the names of proprietors of shops; and although the question was not a pleasant one, he had never had an uncivil answer, or been received uncivilly, during his expeditions; still there was great difficulty sometimes in finding out who was the real proprietor of a shop. He thought this clause would settle the question. As regarded penalties, that was a thing they could not say much about. Section 12 of the Bill raised a most important question. As at present carried on he thought—and he had been an examiner for some years—the examinations were quite equal to all requirements for the safety of the public; and while he would wish to do nothing in regard to the subdivision of examination that would make it easier for a candidate, he would oppose anything that would make it more difficult or more expensive. He was not afraid of any action of the Council of the Pharmaceutical Society in this matter. Observe the class of men who were the leading pharmaceutists in London; they were all men in high position. In this matter they had nothing to gain by the advancement of the trade generally, but everything to lose. Their skill and position raised them above the trade generally, and their efforts to elevate the trade to their own level tended to make their prominence less. As regarded these examinations, he held, like Mr. Frazer, that it would be sufficient for the public safety, and for the candidate's convenience, that they should be made by a society like the Pharmaceutical Society. He thought, too, these examinations were needed for the public safety. He could not say that they brought chemists profit, but they might bring them position. The public was not sufficiently thankful to them for the care they took in insuring its safety. One reason was that it did not know. There was one thing that had struck him very much in connection with the discussion on this Bill, and that was Mr. Frazer's "pharmaceutical politics." He talked as if the Bill were directed against stores, such as co-operative and civil service stores. That was a mistake; he (Mr. Kinninmont) did not think the Bill was directed against these stores, nor did he think anything chemists could do could prevent these stores from dispensing. On a previous evening he had explained how easily it could be avoided by stores engaging a qualified man, and putting up "John Smith, pharmaceutical chemist, in connection with the Civil Service Association." In concluding, Mr. Kinninmont said he would be glad to answer any question that might be put to him on this subject.

On the suggestion of Mr. D. Lees it was agreed to go over the Bill clause by clause, the Secretary (Mr. Paris) reading each clause as it came up for discussion.

Mr. D. Lees moved, and Mr. J. Walker seconded, that the preamble be approved; and the motion was adopted.

Mr. D. Lees proposed to reject the definition clause. It was admitted that this clause was directed entirely against stores. The Bill was for the safety of the public, but was there any more safety offered to the public by a man having a branch over which he could take no control than by a co-operative store managed by a qualified assistant? He would object to co-operative stores being allowed to have shops without qualified assistants; but at the same time he would object to chemists and druggists having more shops than one. He thought it would be necessary either to leave out the eighth clause of the Bill, giving chemists the privilege of having branch shops, or to reject this definition clause.

Mr. Chalmers seconded the motion.

Mr. A. Kinninmont objected very strongly to the motion, because every member of a co-operative store might call himself a pharmaceutical chemist because there happened to be one on the premises. He claimed the right to have as many branches as he chose. The law did not require there should be a qualified man in any of them; but a co-operative store might open a hundred branches and not have a qualified man in the whole concern. Mr. Lees seemed to think there was no difference between an unqualified man carrying on business and a qualified man, but he would find himself much mistaken. Let him try to manage a business for which he was not qualified, and he would see his mistake. Although a man might have twenty branches and only visit them once a week, he could still exercise an oversight and care over everything that was done in them. He (Mr. Kinninmont) had a dislike to branches in his youth, because he was so much troubled with them, but he now considered the objection to branches a pharmaceutical phantasy. He would move as an amendment that the definition clause be supported.

Mr. John McMillan seconded the amendment.

On a vote, the amendment was carried by a majority of three votes.

The second clause was then taken up.

Mr. R. Brodie said some of the articles proposed to be included in the "poisonous" schedule were more dangerous than some of the things which were included in the original schedule. For instance, more accidents had arisen through the misuse of carbolic acid than almost any other thing, and that not through the carelessness of the chemist, but through the carelessness of people who drank it without first smelling it.

Mr. A. Kinninmont said carbolic acid was largely sold by ironmongers in the country for sheep-dip; that brought them again into the monopoly question, about which Mr. Frazer talked.

Mr. R. Brodie said he was not aware it was used for that purpose.

Mr. J. Walker moved that this clause be supported. He failed to see what difference there could be between a bottle labelled by an ironmonger and one labelled by a druggist; the labelling of poisons was what was wanted.

Mr. J. Walker said the third clause affected the wholesale trade, and if the meaning of it was that a separate poisons book had to be kept, such as was kept by retailers, he would oppose the clause simply on the ground that it was not necessary, except in the sense Mr. Kinninmont referred to in his remarks on cash sales. In all the wholesale houses he ever heard of, all that would be necessary would be to look over their wholesale books.

Mr. A. Kinninmont said the clause was framed to cover such cases as Lamson's, Pritchard's and such like.

The clause was adopted.

On clause 4, Mr. J. Walker said it would be quite competent for the seller to put the word "poison" on the outermost wrapper if the maker did not do so, because in the case of patent medicines coming from France and America, unless this could be done, the question would be raised as to whether it would be safe to keep them.

Mr. R. Brodie said he did not know which patent medicines contained poisons. Winslow's Syrup contained a poison, yet the editor of the *Chemist and Druggist* said a few years ago that he had tested it in all manner of ways to see if it contained morphia, but he failed to discover any, and he had no hesitation in saying that it did not contain poison. How was the seller to find out such as contain poison?

Ultimately the clause was adopted.

Clauses 5, 6, and 7 were then adopted without comment.

On clause 8, Mr. Lees said he should have had something to say on this had the definition clause been rejected, but since it had been approved he would offer no objection to clause 8.

The clause was approved,

On clause 9, Mr. J. Walker moved that this clause be not approved of, in so far as that part relating to patent medicines is concerned. Notwithstanding the remarks of Mr. Kinninmont, there could be no doubt that a great deal of these things were put in—it might be called monopoly or anything else—to keep their trade to the chemists and druggists. There was no use in saying it was for the benefit of the public, for they had passed a clause which would compel all persons who sell patent medicines containing poisons to label them as such. The public was no safer by a chemist selling patent medicines than by a grocer.

Mr. A. Kinninmont said in England many places of business held patent medicines licences, and it was as much against these as anything else that the clause was directed. If they were to admit—which he did not—that the patent medicine stamp covered poison, then any poison could be sold as a patent medicine. He did not think the clause would interfere with any legitimate business.

The amendment was dropped, and the clause was adopted.

Clauses 10 and 11 were approved.

On clause 12, Mr. Lees said, as an amendment to this clause, he would move that the following part be omitted, "and to require and regulate periods of time and of practical experience, or any course of study, lectures, examinations, or any divisions of the same." The part he wished left out was the part which would give the Pharmaceutical Society the power of enforcing a curriculum. This curriculum was recommended because it was said the examinations were imperfect at the present time and afforded no sufficient test of a candidate's ability. The real question was, supposing the examinations were imperfect, could an enforced course of study be a sufficient remedy? He did not think so. It was possible for students to attend classes or lectures and be very ignorant of the subjects they were supposed to be studying until within the last month or so, and then cram up for the examinations. It was impossible to prevent students from adopting some such method as that. So long as the knowledge was secured it was not easy to understand why any objection should be urged against it. Students might, also, only get up the subjects to be set before them for examination, without understanding those subjects or their relations to each other. He thought the proper way was to let a student get his knowledge how and where he pleased, so long as he passed his examination. He approved, however, of giving the Pharmaceutical Society power to subdivide their examination. It was a mistake to conduct the examination in one day. At all events, the examination should be conducted so as to afford undoubted proof of the candidate's ability. He would not object to making the examination more stringent, but he very strongly objected to a particular course of instruction, as it was neither necessary nor desirable. It would be a pleasant change for an assistant to leave the counter for a few months, but by doing so he might lose a comfortable situation and his master a valuable assistant. It would involve a considerable pecuniary loss, scarcely to be compensated by £70 or £80 a year. He admitted that the trade was overcrowded, but he did not think that an enforced curriculum would be a sufficient remedy for the evil.

Mr. A. Boyd seconded the motion.

Mr. A. Kinninmont said that the examiners at present resembled London University. They say, "Where is the knowledge?" and not "Where did you get it?"

Mr. A. B. Chalmers said it was a pretty general opinion in Glasgow that while there is no doubt that this curriculum might be injurious to the prospects of many who are at present connected with the business, there was but one opinion as to its practical utility. Any young men about to enter the business would be prepared, of course, to undergo this curriculum and they would go about their work in a systematic manner. The result could be nothing but gain to themselves and their business. For himself, and many more in the same position, it would have been satisfactory if the Pharmaceutical Society had enforced a curriculum ten or twelve years ago, because in that case they would have stood in a very different position in regard to it now.

The clause was adopted with Mr. D. Lees's amendment.

On clause 13, Mr. A. Kinninmont said he objected to that clause in the Council, but he had been told it did not apply to Scotland, seeing that they did not bind apprentices there. It was intended for the protection of apprentices.

Mr. W. Paris proposed that this clause be not approved of. He said he was in the trade twelve months before he knew there was such a thing as an examination at all.

Mr. J. Arnot seconded the motion.

The motion was adopted, and the clause rejected.

Clauses 14, 15, 16, 17, 18, 19, 20, 21 and 22 were agreed to without comment.

On clause 23,

Mr. Lees said he would propose an extension of the time for the Act coming into force on the date stated. He was not afraid of it passing this session, but he did not want to admit that it would be desirable to let it come into force in 1884. He thought a year or two should intervene, so that all might be prepared for it.

The suggestion by Mr. D. Lees was adopted generally.

The Bill as amended was then approved of generally, and it was agreed to transmit the amendments and suggestions to the Council of the Pharmaceutical Society and to all interested in the Bill.

The meeting then separated.

HAWICK PHARMACEUTICAL ASSOCIATION.

At a meeting of chemists' assistants and apprentices, held in the Chemical Laboratory, on Tuesday, 17th ult., it was resolved, after a short discussion, to form the Hawick Pharmaceutical Association. A constitution having been adopted, the following office bearers were elected:—Honorary President, Mr. Thomas Maben; President, Mr. John Grieve; Secretary and Treasurer, Mr. James A. Hislop; Librarian, Mr. W. B. Rawlinson.

The first meeting of the Association was held on Tuesday, 15th inst., when there was a good attendance. The President, Mr. John Grieve, occupied the chair and, after a few preliminary remarks, briefly introduced Mr. Maben, who delivered the following inaugural address on—

The Pharmacy of the Future.

It was with very great pleasure that I heard of the formation of this Association by the young men connected with pharmacy in Hawick, although that pleasure was not quite unalloyed when you requested me to become its Honorary President. I feel it, however, to be my duty not to shirk the responsibility, and having consented to take the position you so kindly assigned me, it is I presume, in the usual course that we meet to-night to hear the inaugural address, so that in some formal manner the work of the Association may be begun.

The formation of this Association ought to mark the beginning of a new era in the pharmacy of our old border burgh, while its inception will, we trust, be happily coincident with the greater epoch in the pharmaceutical history of the country which, it is hoped, will render memorable the year 1883. In view of the upheaval which is now going on, and which threatens to obliterate some of the old landmarks of our profession, or rather proposes to remove them further out, so that we who are within may have more scope for our energies and more space to breathe, it is pre-eminently fit that you should have seized the present as the opportunity for establishing an Association, the object of which is the pharmaceutic and scientific enlightenment of its members. If pharmacy is to improve its position, the younger men must prepare themselves to be ready to enter in and "possess the land," and no surer means to that end can possibly be made use of than the work of an association such as this. Since 1868, the old order of things, which few of us know anything about, has been rapidly passing away; the present is a time of transition, a probationary period, if I may so speak, and we are now standing on the threshold of the new order which must soon develop itself. What the pharmacy of the future is to be lies absolutely in our own hands, and it is a matter of the utmost concern, not only that the present crisis should be well and safely over, but that the youth among us should be wisely and judiciously trained in view of the time when on them shall have fallen the mantle of those to whom it is given for a season to mould the destinies of the profession. I propose to-night to give you my idea of the pharmacy of the future, but in order that you may have an intelligent appreciation of the whole question, I shall refer briefly to the past, then give a short sketch of what is being done at present, and from these we may be able to forecast what is in store for us.

The passing of the Pharmacy Act of 1868, beyond which we need not go, constituted a most important epoch in the history of pharmacy. Previous to this any person, qualified or unqualified, was at liberty to retail poisons, with what results all of us may readily imagine. The condition of pharmacy was, in the opinion of an eminent member of the Medical Council, a disgrace to the country, and the safety of the public, not to speak of other considerations, urgently demanded reform. The outcome of the agitation which had been going on for many years previous to 1868 was the passing, in that year, of the Act to which I have just referred. This Act was for all practical purposes simply a Poisons Act, though as a necessary consequence it provided for the qualification of those who should be entitled legally to sell poisons. It may be not unfairly summarized as an Act to provide for the registration of all pharmaceutical chemists and chemists and druggists, qualified by examination or otherwise, who alone could legally sell by retail certain specified poisons. These poisons, however, are in such constant requisition by the public, and occur so frequently in medical prescriptions, that the Act practically prevents all unqualified persons from engaging in the business of a chemist and druggist. This enactment, the result of an agitation carried on more or less vigorously for the previous twenty-five years, marks the beginning of what I have already called our present period of probation.

The fifteen years that have since gone by have more than proved that this Act cannot be regarded as a final settlement of the question, and this is just what might have been expected. That from the comparative chaos which previously existed, a perfect cosmos should at the first attempt have been produced was improbable, and it is a gratifying circumstance that the progress already made has been so marked. But though pharmacy occupies a much higher position now than twenty years ago, we are still very far from the goal towards which we may legitimately aspire.

There are several points in which the Act of 1868 has proved defective, and these I shall as briefly as possible indicate.

1. While it is true that the law relating to such poisons as arsenic, strychnine or opium may be stringent enough, there are a class of very dangerous substances which are not, but which ought to be included in its scope. Provision was made in the Act for adding from time to time to the list of scheduled poisons, the ultimate authority in such cases being the Privy Council, and several additions have consequently been made, such as chloral hydrate and nux vomica and its preparations. There still remain, however, a large number of other poisons, *e.g.*, carbolic, hydrochloric, nitric and sulphuric acids, butter of antimony and hellebore, which, although as liable to fatal misuse as any poison in the schedule, are not regarded as poisons by law. Without doubt, every druggist with a reputation to sustain, is careful to label these articles "poison;" but he is under no legal obligation to do so, and any person is at perfect liberty to deal in them to any extent he chooses. In the course of last year, the Council of the Pharmaceutical Society resolved that these articles should be poisons within the meaning of the Act, but the requisite sanction was refused by the Privy Council, the nominal reason being that the change was inexpedient in view of probable early legislation on the whole subject.

2. It is a remarkable fact that a druggist cannot retail solution of morphia without labelling it "poison," while he or any one else may sell it in any quantity under the name, *e.g.*, soothing syrup, provided only there is a patent medicine stamp on the bottle; and whereas a poisonous dose of prussic acid could be got with the utmost difficulty and only after elaborate precautions had been taken, a would-be suicide might obtain from the nearest patent medicine dealer, twenty doses of poison and no questions asked if only he invests in a bottle of somebody's chlorodyne. This is an utterly anomalous condition of things, and one that demands immediate remedy. It is of grave importance that the public should know that when they use certain patent medicines they are handling deadly poisons, but as a rule there is no indication on the labels that this is so, and hence there need be little wonder that repeated deplorable accidents should occur through the lack of proper precautions in this respect. Perhaps it is somewhat out of place for me to refer to this matter here, but I would fain give expression to the feeling of disgust with which every true pharmacist regards the patent medicine trade. Were it not that by keeping it in our hands we can, to a certain extent, restrain the evil, I am certain that very many among us would throw the whole traffic overboard.

3. Another point where the Act has failed is in what I may call personal qualification. Before a person can be duly qualified to open a shop and conduct business he must pass at least two examinations. The first of these is Preliminary, the object being to ascertain whether or not the candidate has received such an elementary education as will fit him for the position to which he aspires, and give a guarantee that he will, so far, be capable of going forward to the qualifying or Minor examination with a prospect of success. In addition to passing the Preliminary the student requires to be engaged for three years in practical pharmacy before he is permitted to attempt the Minor examination. The possession of the Minor certificate is sufficient to qualify a man to keep open shop, but it has been found by experience that a large number of candidates come up to the examination who are not educated, but simply stuffed full of words and phrases and answers to questions. Undoubtedly a certain proportion of these pass the examination in the same way as the turkeys whose crops were loaded with shot took the prizes at a Cumberland show the other day; but alike in the examination and in the show, success is the result of fraud, though in the former case discovery comes too late, the now disgorged examinee being safe with his certificate. But there are one or two particular instances in which the Act breaks down in this matter of personal qualification, independently altogether of what is called "cram." The first of these is branch shops. At the present moment a druggist may have any number of branch shops, and may carry them on by means of apprentices if he choose to do so. For example, any Hawick druggist might open shops in Melrose, Jedburgh or Galashiels, and put mere boys in them, and no one could interfere with him, even though he were in them only once a month. This would be a palpable evasion of the law, and yet the detestable system is carried on to a very large extent. Again, there is a second and quite a common case, where an unqualified person opens a druggist's shop and borrows for the signboard and labels the name of a qualified pharmacist or even of a medical man, though the latter may have no connection whatever with the business, save perhaps that he draws a few pounds per annum for the use of his name! There is still a third case in which the law is being systematically evaded in certain parts of the country. A number of unqualified men form themselves into a company, open a shop, and employ a qualified assistant, whose name is printed on the labels, though he is in no sense the owner of the business, but simply the servant of the company; and while this is undoubtedly a violation of the spirit of the Act, the courts of law have decided that it is not out of harmony with its letter.

Fortunately, we here are free from any such equivocal methods of construing the Act; we do not ourselves indulge in the doubtful luxury of branch shops, nor are we harassed by the undue competition of unqualified traders. Not a prescription is dispensed in town save by one or other of the druggists, and enjoying, as we do, the confidence on the one hand of the medical profession, and on the other of the public, we may fairly conclude that we are quite as well off as most of our brethren, and that our lives have certainly not fallen to us in unpleasant places.

4. When the Act was passed the Pharmaceutical Society was appointed to carry out its provisions. Two classes of pharmacists are eligible for the membership of the Society, those who were in business before 1868 and those who pass the Major examination. All others, *i.e.*, those who pass the Minor examination, are eligible as associates, the practical difference between member and associate being that the former only can occupy positions of honour and responsibility in the Society. As a matter of fact the one is as good as the other in the eyes of the law, in so far as his ability to conduct a business is concerned. It has been found that relatively to the number who enter the profession, too few go up for the Major examination, and the inevitable result is, or will by-and-by be, that the governing body of the Society will be very much out of proportion to the remainder, who are already in a large majority. This certainly was not contemplated in 1868, the idea rather being that quite a large number would take the higher qualification. In this respect the framers of the Bill "reckoned without their host," as the percentage of Major passes has, during the past few years, been miserably small, and, therefore, it is clear that the Act requires amendment in so far as the constitution of the governing body is concerned.

If I have dwelt on some lengths on these points, it is only that you may be in a position to understand clearly the drift of a new Bill which has been framed by the Council of the Pharmaceutical Society, and is about to be introduced into Parliament, as well as any comments I may make concerning its provisions. Regarding these, the most diverse opinions have been expressed, but no more weighty utterances have been published than the addresses of Mr. Giles and Mr. Frazer delivered some six weeks ago, the one in London in defence (so far), the other in Glasgow in condemnation of the Bill. The former took up the position that the Bill is the logical conclusion of all our past efforts, and if we know our own minds, we are bound to hail it with delight and enthusiasm. Mr. Frazer, on the other hand, entered into a caustic criticism of what he seems to think is the culmination of a long series of errors, and urged that members should, at the Annual Meeting, demand its immediate withdrawal. It is somewhat difficult to understand how any two men can hold such diverse opinions on the same subject. Here are two leading pharmacists, equally high in the profession. both able and eloquent, both earnest and eager in their endeavours to promote the welfare of their brethren and their craft, and yet when a measure is brought forward with a view to the settlement of some disturbing questions in connection with the latter, we find the opinion of the one diametrically opposed to that of the other. This seems strange at first sight, but it ceases to be so when we remember that parallel cases may be found every day in our political, social, and even theological life. The curious thing is that in this instance the natural order is reversed. Mr. Giles seems to represent what I may call the Conservative side of pharmacy, yet he strongly advocates progress and reform, whilst Mr. Frazer, whose tendencies are of a distinctly Radical type, goes in as strongly for the *status quo*, forgetful, apparently, that—

"Progress is nature's unexcepted law,
Stagnation is an universal curse."

The Bill consists of twenty-three clauses, together with a schedule of poisonous articles, and without going into a separate examination of each clause, I shall briefly indicate the main features.

1. *Poisonous Articles.*—The previous Pharmacy Acts took cognizance only of "poisons," but this Bill introduces, in addition to these, a number of "poisonous articles." The appended schedule of these consists of sulphuric, hydrochloric, nitric and carbolic acids and butter of antimony. The Bill requires that each of these shall be labelled with its name, the word "poisonous," and the name and address of the seller. Their sale is not confined to pharmacists; any person may deal in them, provided they are duly labelled as above.

This provision seemed to me at first sight to be a mistake, but I find a difficulty in suggesting any change if we are not to allow matters to remain as they are. The safety of the public demands that something should be done with reference to these articles, and since the Privy Council has declined to place them in the list of scheduled poisons, the next best course is to take the utmost precautions possible in order to prevent calamitous accidents, and I am therefore compelled to conclude that the framers of this clause have really chosen the least of several evils.

2. *Patent Medicines.*—All patent medicines containing poisons within the meaning of the Pharmacy Act, 1868, must "be labelled with the name and address of the first seller, the name of the patent medicine and the word 'poison.'"

To most minds this would seem to embody, what I may call, a self-evident proposition, but there will no doubt be a few individuals who will, with the patent medicine proprietors, oppose it tooth and nail. Mr. Frazer is one of these exceptions, and though he has not a shred of argument to advance in support of his position, he is loud in his protest against what he calls the assimilation of our laws to those that obtain on the continent. For my part, I am of opinion that the time has now arrived when an effort should be made, in connection either with our own Bill or the Medical Bill, to "assimilate" at least to this extent, viz., to make it compulsory for all proprietors of patent medicines to publish the formulæ of such, or at all events to submit them to some authorized body.

Whilst I heartily agree with the principle of the clauses, I freely admit that the subject is a difficult one, and I certainly think that better means for recovering the penalties might be devised, as it is obvious that the process provided for in the Bill will render litigation exceedingly tedious, expensive and annoying. This portion of the Bill will probably not pass without alteration, more especially if the motion of which Mr. Sandford has given notice for the Annual Meeting receives anything like strong support. In the event of the Bill becoming law as it stands, I would not hesitate to label any patent medicine with the word "poison" should there be the slightest suspicion that the first seller was evading the law.

3. *Prescriptions.*—By the Act of 1868, the only articles of which the sale was confined to pharmacists, were poisons. The new Bill proposes to include physicians' prescriptions in this restriction, so that no one shall be allowed to dispense them, save properly qualified pharmacists, and also, of course, medical men.

In my opinion, the change here proposed is superfluous. At present we have comparatively little to complain of in this respect, and if the remainder of the Bill becomes law, there would be small chance of much harm to the public, seeing that the amount of illicit dispensing would be reduced to a minimum.

4. *Branch Shops.*—Every branch shop must be conducted by a duly qualified assistant.

Every keeper of an open shop shall be liable for his assistants and apprentices; the latter being deemed to be the agents of the seller on whose behalf the sale is made.

5. *Companies.*—The shareholders of companies keeping

open shops must, as proprietors of said shops, be duly qualified, failing which they are liable to a penalty. This is not stated in so many words, but is the meaning of the legal phraseology employed.

To all of these provisions I give my hearty assent, as they embody the principle of personal qualification, which the 1868 Act in some instances has failed to secure.

6. *Preliminary Examination.*—This must be passed previous to apprenticeship, and any pharmacist who shall take as an apprentice a person who has not so passed, shall be liable to a penalty. The Bill also seeks extended powers with reference to the other examinations, and in this connection I may say that the Council of the Pharmaceutical Society has resolved to require evidence of a regular curriculum of study at some recognized school or university from all candidates for the Minor examination after a certain date.

Generally speaking, this meets with my warmest approval and support. Some time ago I made a note of all the young men whom I have known personally in Hawick as apprentices. There were in all fourteen, not including those who are still here. Of these fourteen, two passed the necessary examinations and are now in business. Three are engaged as assistants, but have not yet passed the Preliminary examination, and one has emigrated. Of the remaining eight, one passed the Preliminary during apprenticeship, but owing to ill health took up another occupation; while the other seven who had not passed have each and all left what to them could never be anything but the "trade." Now these statistics point their own moral, and prove more conclusively than any amount of argument, the desirability, if not the absolute necessity of this provision. Had it been in force since 1868, all these young men would have required to attempt the Preliminary before apprenticeship. If they had failed there would have been an end of it, and some of their best years would have been spent in other walks of life; if they had passed (as most of them doubtless would), instead of 50 per cent. leaving the *trade* because they could never reach the *profession*, we would have had 50 per cent. of them fully qualified men. I somewhat fear, however, that the penalty clause will be found to be unworkable. A druggist who wished to evade it could do so with the utmost ease by simply making an arrangement whereby the apprentice would be styled the message boy, while on the other hand many conscientious pharmacists, who desire to do their duty towards their apprentices, but have a difficulty in obtaining them, will hardly thank the Legislature for hanging the sword over their heads in this fashion. The desired end would in most cases be obtained by adopting the recommendation made by the Council's Committee last year, viz., requiring three years' attendance in a shop after the Preliminary is passed, before the candidate is eligible for the Minor.

7. *Membership of Pharmaceutical Society.*—All chemists and druggists, as well as all pharmaceutical chemists, shall be eligible for membership of the Pharmaceutical Society; and further, every person who shall pass the qualifying examination after December 31, 1886, shall be entitled to be placed on the Register of Pharmaceutical Chemists.

As I have already indicated, the former of these provisions is rendered necessary on grounds of policy, and it is almost certain to meet with unanimous approval. The latter will tend to abolish in course of time the unnecessary distinctions among pharmacists, while it does not bind the Society not to have an honorary title should such be desired.

This completes the hurried review of the present aspect of things, and more especially of the Bill which every true pharmacist hopes soon to see on the statute book of the country, and there now only remains for me time to indicate in a sentence what, in my opinion, are likely to be the characteristic features of the pharmacy of the future.

In the first place, the pharmacy of the future will be in the hands of a uniform body of highly educated men, a statement the truth of which is so self-evident that I need not enlarge upon it. As a natural consequence, these men, by virtue of their higher education, will possess, more than this generation does, the confidence of the medical profession. For our part, we in Hawick are well off, as I have already shown, and the same remark may be applied to Scotch druggists generally; but things are different in many districts in England, where the druggists are regarded by the medical men with suspicion,—a suspicion, I fear, sometimes not unwarranted. This increase of confidence will have the effect of diminishing dispensing by the medical men, while the increase of education will tend to diminish prescribing by the druggists. It will generally be found to be the case that the pharmacists who know their own profession best, are least ready to intrude on the domain of the doctor; and so long as we have a class of druggists who have "a little learning," just so long will we have this "dangerous" system of counter prescribing pursued. It is an everyday experience of all of us that the man who pretends to know all about his neighbour's trade knows little about his own, while the converse is equally true. Again, the pharmacist of the future will, as an educated man, command the respect and confidence of the public, who rarely fail to know a genuine article when they see it.

All these conditions will, by a process of natural selection, inevitably tend to bring about a pure pharmacy, where there shall be no taint of the grocer, drysalter, or oil and colour merchant. It is impossible to be perfect in two or three businesses at the same time, and the sooner a regular divorce is brought about, by which pharmacy will "come out from among them," the better will it be for all concerned. Finally, we shall have a great and united Pharmaceutical Society, truly representative of the educated pharmacists of the country. This will give pharmacy a position and power that it has never yet possessed, divided as it has been into several different parties, each of which has "its own hatchet to grind." It is only by uniformly raising the standard of education and qualification that all these sections can by-and-by be fused into one mass.

And now, perhaps, you will ask me what all this has to do with our Association? It has to do with it and with us to this extent, that it shows us we have a history behind us, and the possibilities of a great future in us. It is not for us, the "heirs of all the ages," to decline the responsibility which the present brings, and the remembrance of what has been done in the past will help to nerve us to do our duty in and for the future. This Association, if modestly carried on and kept faithfully in the lines laid down in its constitution, will do something towards bringing about the state of matters I have tried to depict; and even if its original members fail to see the ultimate triumph of the cause of progress and reform, they may rest assured that their labours will not have been in vain.

A vote of thanks having been accorded to Mr. Maben, on the motion of Mr. Dechan, seconded by Mr. J. A. Hislop,

Dr. Penman, on the invitation of the Chairman, expressed the pleasure with which he had listened to Mr. Maben's address. The medical men, he said, ought to be interested in a society of this nature, as they had to depend entirely on pharmacists for the proper treatment of their patients. He did not know much about dispensing, all that he had learned during a three months' course at a pharmaceutical chemist's having been to make a few seidlitz powders. He might say that in Hawick there was no dispensing done by the medical men, and he thought that the two things should be kept entirely separate. He was much pleased with the strong remarks made regarding patent medicines, and thought the Government should insert in the Bill very strong provisions against the selling of these. Many diseases were caused and many were much aggravated by injudicious mothers giving these medicines to their children.

Mr. Maben, in reply, hoped that every member would try and do something to further the interest and usefulness of the Association. They should not go too far afield for subjects, but take those near at hand.

After a number of gentlemen had been proposed as honorary members and members, the Secretary intimated that the library would be opened on June 6, and that the next meeting of the Association would be held on June 12.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The ordinary monthly meeting was held in the Society's Room, Market Place, on Wednesday evening, May 9. In the absence of the President, the chair was taken by Mr. G. Carr, Vice-President, when a paper was read by Mr. E. R. Learoyd, entitled "Notes on the Organs of Vision."

Mr. Newsholme proposed, and Mr. Furness seconded, that the best thanks of the meeting be given to Mr. Learoyd for his interesting and valuable paper, which was carried unanimously.

MEETING OF CHEMISTS AND DRUGGISTS AT LEICESTER.

On Thursday, May 3, a meeting of the chemists of the town was held at the Masonic Hall, to discuss the proposed Pharmacy Bill.

Mr. W. Thirlby was voted to the chair, and in a few preliminary remarks, explained the reasons for calling the meeting and the nature of the business to be brought forward.

Mr. W. B. Clark then gave a very able *résumé* of the proposed Bill, calling special attention to the clauses dealing with the labelling patent medicines "poison," and the peculiar position a retailer would be placed in through any inadvertence on the part of the original vendor.

A long and interesting discussion ensued, and ultimately the following resolution was carried unanimously:—"That this meeting approves generally of the Pharmacy Act Amendment Bill, but specially wishes to point out that clause 4 may prove injurious to some proprietors of patent medicines, in cases where the quantity of poison in the whole package is very small."

A hearty vote of thanks to Mr. Clark for his paper, and to the Chairman for presiding, brought the meeting to a close.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, May 10, Mr. H. G. Greenish, Vice-President, in the chair.

Mr. H. S. Elworthy read a paper upon "Acetic Acid and its Derivatives," in which a detailed account of the constitution of acetic acid was given and also of its more important derivatives. The action of various reagents upon acetic acid was fully entered into, and the constitution and properties of the compounds thus produced were fully described.

A discussion followed the reading of the paper, in which the Chairman, Messrs. Baily, Cripps, Crow and Ranken took part.

A vote of thanks was passed to Mr. Elworthy.

Mr. R. A. Cripps, the Reporter upon Practical Pharmacy, then read some—

NOTES ON THE UNITED STATES PHARMACOPŒIA.

This subject was treated botanically, pharmaceutically and chemically, the sources of official drugs being discussed, and the various chemical tests and pharmaceutical operations criticized. The chief points of interest in the Pharmacopœia were gone into, such as the preparation and composition of abstracts, fluid extracts, etc.; the use of glycerin in tinctures, fluid and solid extracts; the preparation of unofficial infusions, decoctions, etc., for which formulæ are given under the various series of preparations; and the use of oil of theobroma for suppositories instead of the B.P. basis. Observations were made upon the more important drugs, with special reference to the following:—Cinchona, conium, elaterin, balsam of Peru, citrate of iron and quinine, aloes, digitalis, jalap and asafœtida. The paper also included the following:—

Note on the Estimation of Water in Carbolic Acid.

The United States Pharmacopœia states that if a definite volume of carbolic acid be mixed with an equal volume of chloroform the water will rise to the surface and will represent the percentage of water present.

The following experiments were made with the object of determining the value of this test.

1. A solution of carbolic acid was made containing 20 per cent. of water. 450 parts by volume of this were taken and mixed with 450 parts of chloroform. On standing till the water had completely separated (which was about sixteen hours) only 63 parts were obtained, corresponding to 14 per cent. of water.

2. One hundred parts of 50 per cent. carbolic acid were shaken with 100 parts of chloroform and yielded 44 parts of water, corresponding to 44 per cent.

3. Ninety-five parts of carbolic acid were mixed with 5 parts of water and 100 parts of chloroform added and well shaken; a perfectly clear liquid resulted, with not the least separation of water.

4. The same experiment was repeated, using carbolic acid containing 8 per cent. of water; a clear solution resulted, from which no water separated after fourteen hours.

The addition of a very small quantity of water to the last solution caused a cloudiness, and after a time the separation of about ·5 per cent. of water.

From these experiments it will be seen that the method is quite useless, an acid containing as much as 8 per cent. of water being passed as pure.

In the discussion that followed, the Chairman, Secretary, Messrs. Crow, Ranken and Ransom took part, after which the meeting adjourned.

Parliamentary and Law Proceedings.

POISONING BY LAUDANUM.

On Tuesday an inquest was held by Mr. Hawkes, Birmingham borough coroner, at his court, Moor Street, on the body of Margaret Mycock, aged 54 years.

The deceased's daughter said for the past three months her mother had suffered from bronchitis and rheumatics, and could not sleep at night. Last Friday night deceased directed witness to fetch her a pennyworth of paregoric and a pennyworth of laudanum, which she drank. Witness had fetched the same kind of poison for her on two previous occasions, and about two months ago she purchased some from Mr. William Henry Reedman, chemist, of 404, Monument Road. When she obtained it she was not asked either her name or residence, neither did she sign any book. Witness did not tell the chemist what she wanted it for.

The Coroner: Do you mean to say that you, a perfect stranger, go to a chemist's where you are not known, and there purchase a pennyworth of laudanum and a pennyworth of paregoric without being asked anything about it?—Yes, sir.

And the chemist puts a poison label upon the bottle. Is that what you mean to say?—Yes, sir.

Last Friday you went again to the shop, and got another bottleful.—Yes, sir.

Witness added that she put the contents of the bottle into some water, and deceased drank it at about 10 o'clock the same night. Deceased took the same quantity when it was bought for her two months before. In half-an-hour after that she went into her room and found that deceased was unconscious. From that time to the time when the doctor came she did not regain consciousness. They made no effort to get a doctor during the night, because they thought she was sleeping.

Evidence of a similar character was given by one of the sons of the deceased, who also stated that deceased's friends would be entitled to about £11 4*s.* from an insurance office in consequence of her death.

Mr. Leech said he had attended the deceased in April last, when she was suffering from bronchitis, Bright's disease and rheumatism. When he saw her at about 1 o'clock on Saturday morning she was in a state of coma. Altogether she had taken 6½ grains of opium, which was therefore dangerous. He endeavoured to restore animation, but failed, and deceased died shortly after 2 o'clock. He did not think, even if prompt means had been taken, that she would have lived, because of her diseased condition.

Mr. Reedman, the chemist from whose shop the poison was purchased, said the laudanum and paregoric were served by his assistant. He had conformed to the Act regulating the sale of such drugs by putting a label on the bottle stating that it contained poison.

The Coroner said he simply wished to know whether there had been any irregularity in the selling of the poison.

The Coroner summed up, and the Jury returned a verdict "That death had been caused through misadventure."—*Birmingham Daily Post.*

Review.

Notes and Statistics of Cinchona Bark. By John Hamilton. London: J. W. Collings.

This little pamphlet of seventeen pages professes to give rough statistics of the importation of cinchona bark into some of the leading European countries and into the United States. The compilation of tables of statistics might appear, at first sight, to be an easy matter; but there are so many possible sources of error, and so many difficulties in the way of obtaining information, that the author may be congratulated upon being able to obtain even rough statistics on so complicated a subject as the commerce of cinchona bark. Mr. Hamilton has evidently taken much pains to collect reliable information, yet he has been unable to obtain any account from Spain and Austria; from the latter country because all importations of drugs are classed under one heading. There must naturally be much difficulty in making divergent accounts from different sources agree, and hence it can hardly be wondered at, that the statements on page 6, of the amount of cinchona bark exported in 1881 from England to France and the United States does not agree with that of the quantity imported from England in the same year by those countries, on pages 10 and 11. This is more especially the case when one is at the mercy of printers. Thus in a foot-note on page 6, Mr. Hamilton remarks that he received the following reply anent the Table A, when making inquiries as to the difference between statements obtained from the Board of Trade and others published in the *Ceylon Observer*:—

"The Board of Trade monthly accounts only give approximate quantities and value; the great difference in the values of 1878 arises from a printer's error in the monthly accounts."

Nevertheless tabular statements are always of considerable value, if even only approximately correct, and must of necessity afford abundant food for reflection. Thus the conclusion is arrived at that England is the chief market of the world for cinchona bark, and the value of its importations is shown to have increased from £218,565 in 1870 to £1,816,501 in 1881. Although more than half of the imports are again sent out of the country the value of the exports is less than that of the portion retained, indicating that the best cinchona barks remain in Great Britain. It is also an instructive fact that the value of the imports of East Indian Barks has increased from £22,682 in 1876 to £248,894 in 1881.

Comparatively little is said concerning the West Indian barks, these having only entered into commerce within the last few years. There could, however, be no difficulty in obtaining information from Jamaica under the present active administration of the Botanical Department. So far as can be gathered from the tables, it would appear that most of these barks find a market in the United States.

Another singular fact revealed by these statistics is the speculation which takes place in the cinchona market. The variation in the price of quinine, of which 6*s.* 6*d.* in 1875 and 13*s.* in 1878 may be taken as examples, has led to frequent interchanges of bark where least expected. Thus England has imported cinchona bark from France and Germany, although it has sent back in the same year more than it received. America also has imported cinchona bark from twenty-eight different countries, instead of only from those which produce it.

It is interesting to note also that while the Java bark received in Amsterdam in 1881 amounted to only 268,540 lbs., in the same year 1,864,912 lbs. of East Indian bark was imported into the United Kingdom. The care taken in the cultivation indirectly comes out in the fact that the Java *Ledgeriana* bark has steadily increased in percentage of quinine from the maximum percentage of 5·48 in 1872 to 9·00 in 1881. There are many other important facts and much useful information afforded by this little *brochure*, which should be in the hands of every one connected with the cinchona trade.

It may be hoped that in a second edition the author will be able to add some tables of the respective values of the different varieties of cinchona barks, such as would give to planters same idea as to the species which would pay best in cultivation, and as to the country which would afford the best market for special varieties.

Obituary.

Notice has been received of the death of the following:—

On the 5th of April, Mr. Felix Padman Hubbard, Chemist and Druggist, Walsall.

On the 23rd of April, Mr. Richard Morgan Evans, Chemist and Druggist, Porth, Rhondda Valley. Aged 39 years.

On the 23rd of April, Mr. William Walpole, Chemist and Druggist, White Lion Opening, Great Yarmouth. Aged 75 years.

On the 24th of April, Mr. John Maitland, Pharmaceutical Chemist, Chester Place, Hyde Park Square, W. Mr. Maitland was one of the Founders of the Pharmaceutical Society.

BOOKS RECEIVED.

Kommentar zur zweiten Auflage der Pharmacopœa Germanica, nebst Uebersetzung des Textes sowie einer Anleitung zur Massanalyse. Zum praktischen Gebrauche bearbeitet von O. Schlickum. Leipzig: Gunther. 1883. From the Publisher.

Proceedings of the American Pharmaceutical Association at the Thirtieth Annual Meeting. Philadelphia: 1883. From the Association.

Address on the Treatment of Pulmonary Consumption, with a Note of a Visit to Davos-Platz. By Dr. M'Call Anderson. Glasgow: Maclehose and Sons. 1883.

Disease and Putrescent Air. By Thomas Rowan. London: E. and F. N. Spon. 1883.

Dispensatory of the United States. By Dr. Geo. B. Wood and Dr. Franklin Bache. Fifteenth edition, re-arranged, thoroughly revised and largely re-written. By H. C. Wood, M.D.; Joseph P. Remington, Ph.G.; and Samuel P. Sadtler, Ph.D., F.C.S. Philadelphia and London: Lippincott and Co. 1883. From the Publishers.

Materia Medica. A Manual for the Use of Students. By Isambard Owen, M.D. London: J. and A. Churchill. 1883. From the Publishers.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Professors and the Pharmacopœia.

Sir,—So far as I know, our own and similar corporations cannot afford to, and do not retain the whole of the time and services of professors. That being so, our Council, in expecting our Professors to announce an engagement with the Medical Council, expected what might amount to disloyalty to the latter Council, a fault which the long services of our Professors forbid us to assume they possess.

As to any unofficial intimation of their appointment, not only have we now their own statement that they were not at liberty to mention it, but I hear on indisputable authority, that for ordinary business reasons, unconnected with pharmacy, the editors were requested not to anticipate the Medical Council in the announcement.

The anger of Mr. Schacht, the sadness of Mr. Hampson, and the *non-sequiturs* of Mr. Symes may be disregarded; but I am sure that Mr. Young and others at the last Pharmaceutical Council Meeting, would not have said what they did, had Mr. Greenish, in reading what he termed the words of the Report of the Pharmacopœia Committee, read the whole of those words, those in which the Medical Council state that they will themselves communicate with the Pharmaceutical Council. Besides, personal charges by our Council against those they employ should be made in committee, and with reasonable opportunity for defence, and only published, if at all, after the most rigid scrutiny.

I think an apology is due to our Professors for this publication of such ill-founded defamatory censure.

We are, in my opinion, distinctly nearer to pharmaceutical representation on the Pharmacopœia Committee than when no pharmaceutical officer was editor, and nearer than when only one pharmaceutical professor and one other expert were editors. Let us be careful to avoid alienating by unjustifiable reflections the goodwill of three pharmaceutical officers of the Pharmacopœia Committee who have shown that they sympathize with our aspirations as regards pharmaceutical representation on that Committee, and whose loyalty to the Pharmaceutical Society is shown by all their public acts during the past twenty to forty years.

It would have struck me that not only the Council, but the whole of our body of all grades, would have been jubilant at the appointment of our Professors to these offices or functions, an appointment shedding indirect recognition of our claims for fair consideration in this important national work.

280, *Walworth Road, S.E.* Wm. Fred. Smith.

Sir,—When we consider the nature of the work which has to be performed in compiling a new edition of the Pharmacopœia, and the important interests which chemists have at stake while the chains which, in future, are to fetter them are being forged, it is not surprising that a neglect upon the part of the Medical Council to provide due representation upon the Revision Committee should cause a feeling in our ranks somewhat akin to indignation.

The advantage of employing Professor Redwood as Scientific Editor of a new edition of the Pharmacopœia was demonstrated very clearly in the issue of 1867 by comparison with the original British Pharmacopœia of 1864. Consequently, no one can be surprised that the Medical Council should seek to follow up so manifest an advantage by adding the remaining two Professors connected with our school to his staff. Such a course is obviously necessary to prevent a repetition of the unscientific blunders contained in the original edition, and to render the new one as perfect as possible in the present stage of scientific advance; and every chemist will heartily welcome this well-deserved recognition of our able Professors' merits. But surely it is unjust to stop there, for it was fondly hoped that the time had now arrived when the position of the legally qualified chemist would be recognized fully, in that he being engaged in applying his knowledge in a practical form upon the various preparations contained in the Pharmacopœia was indispensable as the element of actual experience in any future Committee of Revision which was formed under a new Act of Parliament.

The question is, Have chemists an interest in the Pharmacopœia? It would be idle to contend for a moment that they had not. If so, it must follow that the only way to secure legitimate interest is by adequate representation. And I venture to ask my fellow chemists "Are they satisfied to be represented by the Professors of our school only?" I will yield to no one in my appreciation of the gentlemen to whom, personally, I owe so much, but I refuse to admit for one moment that such an established body as is represented by the Pharmaceutical Society has received fair play at the hands of the Medical Council by their appointment, especially as it seems to me to have been effected behind the backs of its representatives. I was pleased to see the letter signed by the Professors repudiating any share in the transaction prejudicial to the Society's interests, and, I honestly believe, notwithstanding that in my humble judgment it would have been better for those interests if the Pharmaceutical Council had been made aware of the negotiations while they were being conducted, that our Professors would not in any way knowingly compromise the least of our interests, for it would be a poor compliment to their past labours if after all their years of pupilage no greater advance could be granted to their pass men than merely to stand on one side and see them do the work. What a future! What a relation to exist between Pharmacy and the State!

But I am thankful to see from the discussion which took place at our last Council that this matter is not to be allowed to drift, and that prompt measures will be taken to assert our claims. Let us country members also do our share and further the petitions to the utmost of our ability, for if we fail, pharmacy will sink from her position of handmaid to become the very slave of the medical profession.

Mardol, Shrewsbury. W. Gowen Cross.

"*Edina.*"—(1) *Chrysosplenium oppositifolium*; (2) *Anemone nemorosa*; (3) *Luzula sylvatica*; (4) *Doronicum Pardalianches*, probably: send it when in flower.

J. E. S.—The preparation appears to be a proprietary one, and we do not know that the formula has been published.

O. R.—No, he cannot do so legally.

G. F. Cock.—A little mucilage of acacia added before the liq. quin. ammon. will keep the alkaloid suspended in a minutely divided condition.

Communications, Letters, etc., have been received from Messrs. Deck, Newsholme, Southall, Stark, Pharmacist, Inquirer, Rheim, Quercus, and Querist.

THE ANNUAL DINNER.

The Annual Dinner of the members of the Pharmaceutical Society and their friends was held on Tuesday Evening, at Willis's Rooms, St. James's, and was very numerously attended. Thanks, however, to the introduction of the electric light, in the incandescent form, in the chandeliers, the temperature of the banqueting-hall was appreciably lower than attendants at this festival had been accustomed to. The Chair was occupied by Mr. Michael Carteighe, President of the Society.

Grace having been sung—

The PRESIDENT proposed "The Health of the Queen," which was drunk with the usual loyal enthusiasm; as was also

The next toast, "The Prince and Princess of Wales, and the rest of the Royal Family."

The third toast was rather an innovation at these meetings, being "The Houses of Parliament," proposed by the PRESIDENT, who remarked that it was generally understood that in those elevated regions there was so much time spent in talking that there was very little left for thinking. As speaking, therefore, was essentially the function of members of the House of Commons, he would leave the speaking to the gentleman whose name he would couple with the toast—Mr. McCullagh Torrens.

MR. MCCULLAGH TORRENS, M.P., said it was but seldom that any gentleman who had the honour of responding to such a toast addressed such a truly representative assembly as the one he saw before him. He felt the responsibility which attached to him as a member of the House of Commons, but he must say that increasing years and experience in Parliament in no way led him to wish that that sense of responsibility should be lessened. On the contrary, he felt the responsibility of his position more and more, and never lost the opportunity of seeking counsel and advice from those with whom he came in contact as to the due discharge of the duties which devolved upon him as a member of the Legislature. Measures of great importance to the public interest were constantly coming forward, and he understood that the House of Commons would shortly be asked to discuss in the interests of the medical profession and the public at large a new Medical Bill, to which he had felt it his duty to give some attention. He must say he was somewhat struck in reading over its clauses to find that no mention was made of the body which he now had the honour of addressing, and especially with regard to the preparation of the Pharmacopœia, which, it seemed to him, ought to be a *résumé* of the advancement of science in that particular department, and that unless it were so it must fall behind the requirements of the day. In the preparation of the Pharmacopœia it seemed to him that pharmacists were specially interested, and were specially qualified to take part; and he could only say that in the House of Commons they never ventured on an opinion on any scientific question without calling in the assistance of experts and practical men. He understood that some petitions would be presented in connection with this matter; and though petitions might be lightly esteemed by some people, he would remind them that though the weight of a snowflake was almost inappreciable, the effects of a snowstorm were by no means to be despised.

The PRESIDENT next proposed "The Lord Mayor, the Sheriffs and the Corporation of London." He said he had been informed that this toast ought properly to have been divided, as the Sheriffs represented the county; but by the gracious permission of the Lord Mayor and the Sheriffs, the two toasts would be proposed as one. Some of the earliest combinations of Englishmen for self-protection were to be found in the ancient city of London, and in very early times the great guilds united either to assist the Sovereign or in some cases to resist his encroachment. He would prefer, however, as a pharmacist whose occupation was a very sedentary one, to speak of the great benefits which had been conferred on the whole of greater London in recent times by the Corporation, in being the means of preserving open spaces around the metropolis. The man who after long confinement wanted to feel the turf under his feet, could go to Epping Forest, or Burnham Beeches, or Coulsdon Common, or some other place which had been preserved to the public by the public spirit of the Corporation. He might remind his country friends, who were not so directly interested in these local matters, that the people of London were solely indebted to the public spirit and liberality of this great Corporation for the opportunities they had of enjoying these open spaces; and for this reason, if for no other, he had no doubt the toast would be received with acclamation.

The LORD MAYOR, in responding said, after some few months of experience, he had come to the conclusion that wherever the Lord Mayor happened to show his face, it was expected that the sound of his voice should be heard. He only wished that he could find something fresh to say, but his ideas were naturally led in the direction of the company he had the honour to address, and probably a large section of those he saw before him would expect him to give them a long dissertation on the qualities of certain drugs, and the effects which might be obtained by the admixture of certain essences. He feared, however, if he trespassed on the ground be should be somewhat in the position of the little girl who, when her companion said they had had rhubarb pie and that the rhubarb was grown in her own garden, replied that she also had had rhubarb pie, but that her's came from Turkey. Another section might expect him to enter into a learned dissertation on the art of surgery, and that he would unveil the whole mystery of taking the human heart from the body, cleansing it from all impurities, and setting it to work. But he did not propose to trouble his hearers with either of these subjects, though he was quite convinced that if a Lord Mayor was expected to do so he should have to do it. Only a few weeks since he had the pleasure of dining with the Royal Academy, and there, in returning thanks for the same toast, he had to call attention to the fact that the first Royal Academy owed its existence to the fostering care of the Corporation of London. The Paper Stainers' Company constituted the first Royal Academy, and all the great painters of the time were freemen of that Company, and from that Company at last the Royal Academy was established. It was something similar with regard to the Pharmaceutical Society, which might be said to have owed its origin to the Apothecaries' Company of London. When that body began to practise medicine it was found necsssary that there should be a real Pharmaceutical Society, and hence one was established. The President had been good enough to refer to the past history of the Corporation; he would not presume to go into that subject, for if he did the time at his disposal would not enable him to deal with anything like all the good works it had performed. With regard to the preservation of open spaces, though some of these were a considerable distance from the metropolis, they felt that they were legislating for posterity, and that the time would come when those who came after them would bless the old Corporation of London for having in its foresight taken care to secure those places for their use which, though now far removed, would then be surrounded by the busy haunts of men.

Mr. Sheriff SAVORY in responding, said the Lord Mayor had responded for the ancient corporations, but the institution which he represented was far more ancient. Being a company of pharmacists who were accustomed to follow their motto, "*Habenda ratio valetudinis*," they would understand the blessings of health and would not expect him to make a long after-dinner speech. If, however, it were necessary to show the connection between the sheriffs and the Society it would not be difficult to do so. The sheriffs of London and Middlesex were two pharmacists, inasmuch as they maintained law and order, which contributed more than anything else to the health and welfare of any state or city. It was not necessary for him to refer to the well-known maxim, *Salus populi suprema est lex*, to prove that the welfare of the people must always depend on the maintenance of that order which the sheriffs were appointed to secure.

The VICE-PRESIDENT, in proposing "The Health of the Learned Scientific Societies," said the historian of the nineteenth century would remark one thing particularly, that in the latter half of it there was no lack of scientific research. He would notice the extraordinary activity in scientific investigation which was one of its principal features. In past ages there had been many remarkable men, great geniuses, who had struck out original paths, such as Galileo, Newton, and, in later days, Darwin and Pasteur; but the great contrast between the past and the present was this: the great thinkers of the past threw out their ideas on somewhat barren soil, inasmuch as there were no scientific societies to take part in them, and in many cases they were long years before their ages, and often had to suffer ostracism from the orthodox of society. But in our own day, no sooner did Darwin suggest his great thought of evolution, or Pasteur that of life from germs, but immediately a Tyndall, a Huxley, and a host of eminent workers took up these great thoughts and worked them out in manifold forms. There was not an atom of matter in the heavens above, or in the earth beneath, or in the waters under the earth, that science did not investigate. If there was a trace of 1 ad in Saturn, or the slightest smell of sulphur about Mars, or the faintest possible tinge of tender emotion in Venus, the scientific chemists would immediately show it in delicate colours by spectroscopic investigation. Savants went forth as challengers to the deep, deep sea, and called upon it to yield up its secrets. All this was not simply for the dignity of man, or to ennoble his reason, or to grace his home, but it had a strictly utilitarian aspect. Except the highest form of moral science, there was nothing in the world which had done so much for man as science. By the lessening of human pain and suffering, they showed the truest form of the international and the wisest form of communism; and in all these matters pharmacists were deeply interested. They claimed to be most anxious and interested observers of the work of scientific men; and he was quite confident the toast would be well received, especially as he had leave to couple with it the name of a gentleman of very great eminence in original research, one of the Past-Presidents of the Chemical Society and the present President of the Institute of Chemistry, Dr. Odling.

Dr. ODLING, F.R.S., said if he felt incapable of replying adequately to the toast which had been proposed in such flattering terms he should only confess a feeling which men far more worthy than himself would feel if placed in a similar position. He spoke in the presence of a past president of the British Association, and he must say that to respond adequately he should have to embody the substance of five presidential addresses, and even then he should fall short of the subject. He ought indeed to trouble them not only with five past addresses, but with the quintessence of the addresses of the fifty-two past presidents of the Association, and further to derive from his inner consciousness what the fifty next presidents were likely to say; he must, therefore, withdraw from a task which he felt to be insurmountable, and content himself with replying in a modest way to the good feeling which had been expressed by the Vice-President. Speaking with all seriousness it did seem to him that in a large gathering like that it was not unfit that there should be some recognition of the mutual ties and obligations which subsisted between the learned societies, whose fundamental aim was the advancement of human knowledge, and bodies like the Pharmaceutical Society and the Institute of Chemistry, of which he was the unworthy president; bodies which were devoted mainly, though not exclusively, to the professional applications of knowledge. He might remimd them of some words of wisdom spoken by Sir William Siemens at Southampton, in which, after paying a just tribute to the scientific few who devoted themselves exclusively to the investigation of scientific principles, he observed that our great advances in science, and the civilization which resulted from science, nevertheless depended on the exertions of the much larger classes of persons whose efforts brought them daily more and more into union, and tended to fuse them into one body. He referred to scientific men who, like his distinguished friend Sir Frederick Abel, did not think it beneath them to apply their excellent abilities to the solutions of practical questions, and on the other hand to the busy men of practice who did not disdain to devote a portion of their time to the investigation of scientific problems. Among this last class he need scarcely say the Pharmaceutical Society justly claimed to have furnished a by no means inconsiderable contingent, regard being had either to numbers or eminence. The Royal Society enrolled amongst its members many distinguished practising members of the Pharmaceutical Society, and the Linnean Society and the Chemical Society also found amongst them some of their most esteemed and active colleagues. In connection with this idea of the association of busy men with scientific pursuits he might refer for a moment or two to the association which existed between the Pharmaceutical Society and the Institute of Chemistry. He sometimes heard it said that the golden days of pharmacy were past and that pharmacy was a declining profession, although judging from the brilliant gathering that evening no one could for a moment believe that these expressions could have a substantial foundation. Nevertheless, they were told that there was a pharmaceutical depression as there was an agricultural depression, that the prospects of pharmacy were by no means brilliant, and that the pharmacist, if he wished to hold his own in the race for life, must with the agriculturist wander into fresh fields and pastures new. He did not believe this was the case, but however that might be he could only say that the prospects of professional chemistry were not declining; they were advancing, and in view of the association which subsisted between the two bodies, and in which they recognized the Pharmaceutical Society as their elder brother—though they did not quite acquiesce in its claim to be sole legal proprietor of the title of chemist—at the same time he would say to pharmacists that if their prospects were declining there was no reason why they should not advance their professional prospects. In every town throughout the kingdom there was an increasing demand for professional chemical aid, and it became a question whether the young men entering the pharmaceutical profession might not also have an eye to the chemical profession, and of qualifying themselves and becoming associates in the Institute of Chemistry. However this might be, it was gratifying to recognize the harmony which existed between the two bodies who, he had no doubt, would in the future go forward hand in hand to promote the great cause which they both had at heart.

The PRESIDENT next proposed the toast of "The Medical Profession," the noble profession with which they were daily and hourly brought in contact, a profession which required for its exercise an enormous amount of self-denial. Some pharmacists were apt to complain of the way in which they were daily and hourly at the public call, and thought they were the hardest worked and worst paid body in existence. He should be sorry to dispel the pleasant illusion, but he thought the medical profession had a claim to priority in that respect. After long years of study and patient practice, the medical man had to submit to an amount of selfishness on the part of the British public to which no other profession would for a moment submit. In addition to this self-abnegation, most practising physicians had some branch of science to which they were attached, and on which they contributed original researches, often worked out late at night or early in the morning, and which did not often bring in the pecuniary reward that such labour would produce in other occupations. Pharmacists, being more associated with the medical profession than most people, were better able to judge of these matters than the outside public, and were, therefore, prepared to welcome them at such gatherings, to drink their health and wish them good speed, not only in the particular art which they practised, but also in those original researches by which they added to the sum of knowledge. He would couple with the toast the name of a member of the profession who had not only distinguished himself in the treatment of disease, but who years ago and up to the present time was regarded by biologists as one of the most eminent of his class—Sir Joseph Fayrer, President of the Medical Society of London. He had been long known as a diligent worker in biological science, and he had much pleasure in congratulating him on the position he had attained.

Sir JOSEPH FAYRER, C.S.I., F.R.S., in responding, said the physician and the pharmacist were very old allies. They had both, since the practice of medicine began, been engaged in the struggle which was going on, and ever must go on, with disease and suffering, and also in efforts which ameliorate the condition of life. It was only right that medical men should freely declare how much their branch of the profession owed to pharmacists for the success they had obtained, and it was a very pleasing feature of the present day to see the great strides which both physiology and pharmacy were making. He hoped their success might be as great in the future as it had been in the past.

Dr. FARQUHARSON, M.P., next proposed "Prosperity to the Pharmaceutical Society, and the Health of the President." On some occasions he was able to pose as a politician; but on this occasion he should prefer to pose as a member of the medical profession, and as one who endeavoured, however humbly, to instruct pupils at one of the metropolitan hospitals in pharmacy and therapeutics, which those whom he addressed worked at so successfully every day. He need not say anything farther on the mutual relations of the pharmacist and the doctor. That Society was known in many ways, it was well known by the gathering they were all looking forward to next evening as one of the events of the London season; it was also known by its annual dinner and also by the excellent Museum to which so many in his profession were glad to go occasionally to refresh their memories, but it was much more widely known as the great educational medium which was so widely spreading over the country men who by their beneficent acts and accuracy of prescribing and in a great number of other ways were doing good and faithful service to the public. Again, in scientific research, he had only to mention the names of one or two distinguished men who had passed through its rooms in former days. He would only refer to the honoured names of Hanbury, Bell, Squire and Attfield, or of a gentleman, whom, not to know, was to argue yourself unknown, Thomas Hyde Hills. He could not sit down, however, without saying that in addition to the toast of the Pharmaceutical Society, he had to propose "The Health of the Chairman, Mr. Carteighe." They all knew what his distinguished position had been in the past, and what was his present scientific status, and he could only hope that he would live many years to keep up the dignity of the Society over which he so worthily presided.

The PRESIDENT, whilst thanking Dr. Farquharson for the very complimentary manner in which he had proposed this toast, felt bound to say that he regarded it purely as an official toast, and as a recognition of what had been done in pharmacy by those who had preceded him in that chair. He remembered a celebrated cartoon which appeared in *Punch* many years ago, when a distinguished member of the Conservative party, Mr. Disraeli, was described as having stolen the clothes of the Whigs while they were bathing, and he feared he was very much in that position, having reaped the reward earned by his predecessors. He felt he did not deserve personally the complimentary terms which had been employed, but on behalf of the Society which he represented he thanked Dr. Farquharson for them, and if as a Society they did not deserve those compliments now, he hoped they would all continue to work until such time as they did. Their desire was to aid the physician in the cure of the sick, for the benefit of the public, and to advance the knowledge of the great art by which human suffering could be reduced and human lives preserved. Pharmacists were all anxious to assist in that great work, and if in the smallest degree that Society succeeded, its existence was amply justified.

The President then proposed the last toast, "Our Guests," coupled with the name of Sir Frederick Abel. They had amongst them many gentlemen of reputation, both in medicine and science, and amongst these gentlemen who had laboured for many years in the cause of pure science, and in the applications of that science to many useful arts, none had been more successful than the gentleman whose name he associated with the toast. Some might think it very improper for a distinguished man to devote his knowledge to an examination of explosives and things of that kind, but on the general principle that to be well armed was to be well prepared, if you wished to preserve the peace of the world, it appeared to him that such a course was perfectly justified. At any rate, he might say how sincerely they congratulated Sir Frederick on the honours which his Sovereign had lately bestowed on him, and how thoroughly they all felt that those honours were deserved. To their many other guests he wished, on the part of the Society, to express his grateful acknowledgments for their kindness in coming amongst them, and he was sorry that from want of time he could not ask them all to respond to the toast.

Sir Frederick Abel, F.R.S., said it was indeed an honour that the President should have selected him from amongst the many guests whom the Society had invited that evening, but it was a still greater honour that his name had been so cordially received. It had been his privilege and pleasure to be the guest of the Society on several occasions, and in several different functions, as President of the Chemical Society and as the predecessor of Professor Odling at the Institute of Chemistry. It had been his duty and pleasure to address meetings certainly not more numerous than that, and on several occasions it had been his special pleasure to speak from his heart with regard to the important functions performed by the Society so splendidly represented that evening. He could not in making himself a mouthpiece of the various guests do better than say that the various members of the different professions whom he saw round him, and the different learned and scientific societies, felt especially honoured in being connected,—a connection which increased in intimacy year by year,—with so useful a body as he had the honour of addressing. It had been his pleasure to be associated with the President in working out the details of younger societies, and they had profited in no small degree by the wisdom which had been accumulated in years past by this Society, and he hoped that in the future the same thing might take place.

The President then called on Dr. Andrew Clark to respond for their medical guests.

Dr. Andrew Clark said there was no explanation to be given to the inconsistency of human nature. When he entered the room that evening he did so with the intention of enjoying himself, and that feeling was heightened by knowing that he would not have to reply to any toast. He hated after-dinner speaking, and nothing would have induced him to break the resolution never to speak after dinner if he could help it but one thing, and that was that he felt that in all that had been said that evening not anything like justice had been done to the Pharmaceutical Society of Great Britain. For twenty-eight years he had been practising medicine and he felt that in the practice of the art of medicine there was a great guild of medicine, every element and person of which was related one to the other, and if they did not uphold each other and do the best they could for each other no good would come of it. Instead of Mr. President and Gentlemen, he would say Brethren of the great guild of medicine, which had for its business of all sorts and classes the relief of human suffering and the prolongation of human life. That evening had been very pleasant to him in many ways, and in none more than when he heard one speaker speak of the great functions which the Pharmaceutical Society bore in the important business of the relief of human suffering. He had noticed since he had been in practice that there had been a steadily growing attention to accuracy, minuteness and fidelity in the work of dispensing prescriptions. It might be said that that was a small thing, a mechanical thing. But it was not a mechanical thing; he held that if a great body such as that was could with one mind come together and say, This is the work we have to do, we shall do it to the letter and in the spirit as well, it would not end there. It was not merely doing a thing accurately and well which would benefit them; it might benefit them in a certain mechanical and pecuniary sense; but it also benefited them in a higher sense, in a sense which the Pharmaceutical Society of Great Britain ought to feel, a sense which should animate them all to take their proper position in the social scale—it was that in every work they did it should be a real and true work, and that every faculty they could bring to bear upon it should be brought to bear, and in so doing they would lift up their whole nature. He would only say that if they accustomed themselves to do the smallest act, to make up the pettiest prescription, with the highest idea of perfect accuracy and loyalty, they did a good thing; and it did not end with the idea of doing a good thing, but the repetition of that good thing made in them a nature, a purpose, a feeling, a habit, which would lift up not only the individual, but every member of the Society, and thereby justified them in rising to the station they ought to occupy in the social organization. He as a practising doctor had seen and recognized gratefully the assistance which he had derived from members of that Society, often rendered at great inconvenience, and every member of the medical profession appreciated it. The knowledge they possessed entitled them to a higher position than they had yet occupied. This was very pleasant to say; but there was one thing he had to say which was not so pleasant, one thing which would prevent them, if they did not stop it, from occupying the position they ought to hold in the social scheme. There was rising up amongst the chemists of this country a tendency to bring forward special remedies, secret remedies, to advertise them, and to take all sorts of indirect means of pushing them. The result of that was that it made one or two excessively or undesirably rich, while it injured the whole body. If they took his advice they would not allow any man who did such a thing to hold a place of honour in the pharmaceutical organization. They should have all their work clear, open, straightforward, honest as the day, and then nothing could hinder it. If they did that, they might depend upon it that, like the medical profession—which was their analogue—they would take their just position, which they had not yet reached, in society.

The musical arrangements were under the direction of Mr. Winn, and a selection of part-songs and solos was sung at intervals during the evening with great effect.

The Pharmaceutical Journal.

SATURDAY, MAY 26, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ANNUAL MEETING.

THE number of pages in the present Journal devoted to the Report of the Proceedings at the Annual Meeting of the Pharmaceutical Society on Wednesday last, whilst rendering unnecessary in these columns more than a reference in general terms to what took place, will bear evidence to a satisfactory amount of interest taken by the Members and Associates of the Society in the management of its affairs. Many gentlemen present had travelled long distances in order to attend this meeting, and during nearly five hours the topics mentioned in the Annual Report were discussed with unflagging energy and, except in respect to one subject, with a practically unanimous endorsement of the action of the outgoing Council. In commencing the proceedings the President departed somewhat from the usual custom, and, instead of delivering a formal address, he gave an able exposition of and running commentary upon the different subjects mentioned in the Report. In order to save time and prevent unnecessary confusion of topics it was agreed that all reference to the subject of the clauses in the draft Bill relating to the penalty for selling patent medicines containing poisons without proper labelling, upon which Mr. SANDFORD had given notice of his intention to propose a resolution, should be deferred until the report of the Council had been disposed of. After the adoption of the Report had been moved by the President and seconded by the Vice-President, an amendment was moved by Mr. VIZER, but as the discussion which followed was necessarily discursive it may be convenient to follow pretty closely the order adopted by the Chairman in treating the principal topics.

In the first place the President referred to the subject of the finances of the Society, and especially to the decision as to changing the mode of investment of part of the capital of the Society by laying it out in freehold ground rents. In defence of this change he argued that corporations, not being hampered, like individuals, with the necessity for realizing the largest possible returns during the limit of a lifetime, should consider what was best for the future welfare of the body, and he hinted that the time might come when, as one result of the new departure, what has recently been termed "unearned increment" might render it possible to carry on the business of the Society without calling on the members for subscriptions. Mr. FRAZER, however, pleaded the "canniness" of a Scotchman as not allowing him to view the change in quite so favourable a light, and Mr. SANDFORD protested strongly against the innovation, which he foresaw would involve an army of collectors and, perhaps, of decorators.

Another subject upon which the President enlarged, and to which several subsequent speakers referred, was the revision of the Pharmacopœia. After detailing the steps taken by the Council to utilize the opportunity afforded by the introduction into Parliament of the Medical Acts Amendment Bill, he pointed out that the question to be discussed was not the appointment of editors and assistants, or the conduct of individuals, but whether pharmacists should not have the legal right of being represented on the Pharmacopœia Committee by members of their own body competent to see that experts and others did not make suggestions that were impracticable for British pharmacists. With the exception of Mr. FRAZER, who looks upon the Pharmacopœia as simply the physicians' prescription book, this view was indorsed heartily by every speaker who referred to the subject. Mr. GILES, especially, in an able speech, pointed out that in 1809, when the apothecaries had not yet attained the legal recognition as medical practitioners afterwards accorded to them by the Act of 1815, they were represented on the committee that drew up the London Pharmacopœia. At the time of the passing of the Medical Act of 1858 apothecaries had already ceased to represent pharmacy proper, but pharmacists were then too recently organized to put forward an effective claim to take their place on the Pharmacopœia Committee. Now, however, that the Pharmaceutical Society has been in existence more than forty years this disability has ceased, and to stop short of attaining this position he considered would be a dereliction of duty towards the republic of pharmacy. That the Society does not yet enjoy a more satisfactory recognition in respect to the revision of the Pharmacopœia Mr. GILES attributed to the lowering of its *personnel* from various causes, and also to the calibre of the Council of to-day not being equal to what it was or ought to be, an expression of opinion that roused a considerable amount of dissent. As will be seen by the report on p. 963 the subject of Pharmacopœia revision had already been under the consideration of the Council that morning, on the occasion of the receipt of a printed memorandum, enclosed in a transferred note from the Registrar of the Medical Council. We understand that similar applications for suggestions have been received by many pharmaceutical associations and individual pharmacists in different parts of the country, and we presume that as soon as a Pharmacopœia committee is constituted in which pharmacy is properly represented they will willingly render it all the assistance that lies in their power.

Another point in the Report that requires to be mentioned, because it formed the subject of an amendment, is the epitome of the curriculum scheme. Mr. VIZER moved that the third and fourth recommendations should be modified by reducing from three to two years the time to be spent in a pharmacy after passing the Preliminary examination before going up for the first part of the qualifying examination, shortening the interval between the two parts of the qualifying examination from twelve to six months, and allowing the student to pass through a portion of his curriculum during the period of his apprenticeship. The object of the amendment was to enable a person to become registered, if he so desired, within three years of passing the Preliminary examination; but it obtained scarcely any support, and, as pointed out by Mr. MARTINDALE, if the person had commenced his pharmaceutical career before he was eighteen years of age, he would still have to wait until he was twenty-one before he could become registered. Indeed there were some decided expressions of opinion that a compulsory apprenticeship of four or even five years would not be too long. Mr. BLAND entered a vigorous protest against the institution of a curriculum and the encyclopædic character of the syllabus, as being out of proportion with any privileges enjoyed by the registered chemist and druggist. From Scotland, too, there came an objection to the enforcement of the passing of the Preliminary examination before apprenticeship, Mr. PATERSON alleging that it would exclude a class of lads from whom a large number of apprentices are now drawn in that country. The feeling of the meeting was, however, manifestly in favour of the recommendations of the Council, and after rejecting Mr. VIZER's amendment, and another to the effect that no change in the educational arrangements should at present be made, the Report was adopted *nem. con.*

Mr. SANDFORD then moved the resolution of which he had given notice, expressing the objection of the meeting to the provisions in the fourth, fifth and sixth clauses of the draft Bill, under which the seller would be rendered liable for payment of any penalty for a sale of a patent medicine containing a scheduled poison. Mr. SANDFORD maintained that the action for the recovery of the penalty should lie directly against the proprietor or importer of the article, and enlarged upon the hardship of imposing upon the seller responsibilities in respect to the sale of preparations of the composition of which he knew nothing. On the other hand, the President described the difficulties that would attend attempts to proceed directly against proprietors who might not reside in the country, or importers, and pointed out that the right of recovery, which the retail seller would have against the person from whom he bought the goods, would make the wholesale dealer very careful to satisfy himself as to the nature of a proprietary article before introducing it to the retailer. Mr. SANDFORD's arguments, however, found favour with the meeting, and notwithstanding a suggestion to refer the subject for re-consideration to the incoming Council, the motion was carried by a small majority.

We have the pleasure of being able to state that the two *réunions* which have now become almost an integral part of the Annual Meeting of the Pharmaceutical Society have this year been even more than usually successful. At the Dinner of the Members of the Pharmaceutical Society and their friends, at Willis's Rooms, on Tuesday last, the company numbered about two hundred and twenty, and included pharmacists from all parts of the country. Among the guests were the Right Hon. the Lord Mayor, Mr. Alderman and Sheriff De Keyser, Mr. Sheriff Savory, the President of the Society of Chemical Industry (Sir F. Abel), the President of the Medical Society (Sir Joseph Fayrer), the President of the Metropolitan Branch of the British Medical Association (Dr. T. Bridgwater), the President of the Clinical Society (Dr. Andrew Clark), the President of the Obstetrical Society (Dr. Gervis), the President of the Odontological Society (Dr. Walker), the President of the Harveian Society (Dr. E. Symes Thompson), the President of the Institute of Chemistry (Professor Odling), the Master of the Society of Apothecaries, Dr. Farquharson, M.P., W. McCullogh Torrens, Esq., M.P., Professor Allman, W. T. Thiselton Dyer, Esq., Dr. Langdon Down, Wyndham Cottle, Esq., and Dr. T. Stretch Dowse.

* * *

On Wednesday evening, by the kind permission of the Lords of the Committee of Council on Education, the Annual Conversazione of the Pharmaceutical Society was held in the South Kensington Museum. Upwards of two thousand five hundred ladies and gentlemen responded on this occasion to the invitation of the President and Council, amongst whom were the Right Honourable the Lord Mayor and the Lady Mayoress, Mr. Alderman and Sheriff De Keyser and Mrs. De Keyser, and Mr. Sheriff Savory and Mrs. Savory. The company were received in the Architectural Court by the President and Mrs. Carteighe, the Vice-President and Mrs. Atkins, the Treasurer and Mrs. Robbins, and the other Members of the Council, most of whom were accompanied by ladies.

* * *

We understand that several communications have been addressed to the Secretary in reference to the circular issued on behalf of the Pharmacopœia Committee of the Medical General Council, asking for information on the subject. From the nature of these communications, and some of the replies that have already been addressed to the Medical Council, there is good reason to believe that those most capable of rendering the assistance asked for consider that the request should have been made through the medium of the Pharmaceutical Society. Indeed, as a fair expression of the feeling on the subject, we may refer to a letter from Mr. T. B. Groves, of Weymouth, who says he will be very pleased to render all the assistance in his power towards perfecting the new edition of the British Pharmacopœia, "when requested by the pharmaceutical authority, *i.e.*, the Pharmaceutical Society of Great Britain," of which he is a member.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, May 23, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. SAMUEL RALPH ATKINS, VICE-PRESIDENT.

Present—Messrs. Andrews, Borland, Bottle, Butt, Churchill, Gostling, Greenish, Hampson, Hills, Radley, Richardson, Robbins, Savage, Schacht, Symes and Williams.

Portrait of Mr. Squire.

The President drew attention to a portrait of Mr. Peter Squire, which had been kindly presented to the Society by Mr. J. E. Mayall, and on his motion, seconded by the Vice-President, a cordial vote of thanks was passed to Mr. Mayall for his gift.

Pharmacopœia Revision.

The President read the following circular which had been addressed to the President and Council. He also mentioned that a similar application had been addressed to him individually, and he understood that a considerable number had been issued to pharmaceutical associations and individual pharmacists throughout the country.

"General Medical Council Office,
"299, Oxford Street, London, W.
"*May* 18th, 1883.

"Sir,—I am directed to forward you the enclosed 'memorandum' in reference to a new edition of the 'British Pharmacopœia' and to express the hope that you will, at your early convenience, favour me with an answer to be submitted to the Pharmacopœia Committee.

"I am, Sir,
"Your obedient servant,
"W. J. C. Miller,
"*Registrar.*

"The President of the
"Pharmaceutical Society of Great Britain."

"General Council of Medical Education and
"Registration of the United Kingdom,
"299, Oxford Street, London, W.
"*May* 18, 1883.

"*Memorandum.*

"The General Medical Council, having decided on issuing a new edition of the British Pharmacopœia, have appointed a Committee to make the necessary arrangemenns for carrying this object into effect under the direction of the Council.

"In the performance of this duty the Committee are desirous of enlisting the co-operation of the several medical and pharmaceutical authorities, and of such persons as may be able to furnish useful information, with the view of rendering the work as complete and accurate as possible. In furtherance of this object the Committee invite, and will be happy to receive such suggestions as may be made to them by the above named authorities, and to give these suggestions their most attentive consideration.

(Signed) "Richard Quain, M.D.,
"*Chairman of the Pharmacopœia Committee.*

"To the President and Council of the
"Pharmaceutical Society of Great Britain."

The consideration of a reply to this circular was deferred.

Several former Members, Associates and Apprentices were restored to their status in the Society on payment of the current yea 's subscription and a fine.

A copy of the following Memorial to the Privy Council on the subject of Pharmacopœia Revision was laid on the table:—

"*Memorial of the Council of the Pharmaceutical Society of Great Britain to Her Majesty's Privy Council.*

"Medical Acts Amendment Bill.

"The Council of the Pharmaceutical Society of Great Britain begs to call the attention of the Privy Council to the provisions of this Act relating to the preparation and revision of the British Pharmacopœia (clauses 60 to 63, page 35 of the Bill).

"According to the provisions of the Bill, this work is to be published under the direction of the Medical Council.

"For the purpose of compiling and revising the Pharmacopœia previous to its publication, it has always been found necessary to appoint a special Pharmacopœia Committee.

"In this country, hitherto, that Committee has consisted solely of members of the Medical Council, assisted by professional experts, whereas in all other European countries, the constitution of that Committee is fixed by law, and in every case it includes a considerable number of pharmaceutical chemists. In the United States of America, pharmaceutical chemists form a majority of the Committee of Revision.

"The decision as to what drugs or medicines shall be introduced into or expunged from the Pharmacopœia rests with the medical members of the Committee, and the responsibility as to the working out of the chemistry and pharmacy of the preparations, and the manner in which they should be made, rests with the pharmaceutical members.

"The Council of this Society considers that this or some such method should be followed in this country, and laid down in the Bill now in the House of Commons It is supported in this view by many members of the medical profession and by the medical press generally. Moreover, inasmuch as by the Pharmacy Act, 1868, and the Sale of Food and Drugs Act, the Pharmacopœia is taken as the standard of purity and strength of such drugs and medicines as are contained therein, it seems desirable and equitable in the public interest that the practical experience of pharmaceutical chemists should be made available on the said Committee.

"Since the time when the apothecaries commenced to practise medicine, pharmacy has been more and more neglected by medical practitioners and the medical licensing bodies; whereas the Pharmaceutical Society of Great Britain, since its incorporation by Royal Charter in 1843, has occupied the position abandoned by the Apothecaries, and continuously directed its efforts to the improvement and extension of those special branches of knowledge on which pharmacy proper is based. In 1852, Parliament recognized the public ultility of the Society's exertions by passing the Pharmacy Act, 1852, on the ground that it is expedient for the safety of the public that persons exercising the business or calling of pharmaceutical chemists should possess a competent practical knowledge of pharmaceutical and general chemistry and other branches of useful knowledge.

"Since the value of the Pharmacopœia as a legal standard depends very much on the loyalty with which pharmaceutical chemists and chemists and druggists conform to its instructions, it seems politic to associate members of the pharmaceutical body with the representatives of the medical profession on the Committee.

"The Council of the Pharmaceutical Society of Great Britain therefore ventures to suggest that a clause to the following effect be inserted in the Bill after clause 63:—

"'For the purpose of compiling the said Pharmacopœia there shall be established a Pharmacopœia Committee consisting of six medical practitioners, to be nominated by the Medical Council, and five pharmaceutical chemists, four to be nominated by the Council of the Pharmaceutical Society of Great Britain (one of the four to be resident in Scotland) and one by the Council of the Pharmaceutical Society of Ireland.'"

The Council then adjourned to the Annual General Meeting.

FORTY-SECOND ANNUAL GENERAL MEETING.

The Forty-second Annual General Meeting of the Members and Associates in Business of the Society was held on Wednesday, the 23rd inst.

The PRESIDENT took the chair at twelve o'clock.

The SECRETARY having read the notice convening the meeting, it was agreed that the Report should be taken as read.

THE ANNUAL REPORT.

From the financial statement it will be seen that the income of the Society for the year 1882 exceeded the expenditure by £1297 3*s.* 1*d.* The gross receipts from subscribing members, associates, and apprentices are somewhat less than in the previous year, the deficiency being principally due to a reduction in the number of members, while the income from the class of associates shows a steady and progressive increase. Examination fees have produced a slightly larger revenue than during the year 1881. On the Journal account, after paying all the expenses involved in the production of the Journal, a balance remains in favour of the Society of £417 5*s.* 5*d.*

The propriety of changing the investments of the Society's capital has from time to time engaged the attention of the Council, and at the meeting in March last it was resolved that a sum not exceeding three-fourths of the invested capital should be re-invested, as occasion may offer, in freehold ground rents or freehold land. Having regard to the exceptionally high price of Government stock at the present time and the desirability of choosing a form of investment in which a fair average interest is obtainable and an increased value of the capital can in course of time be secured, the Council believes that this change will conduce to the permanent welfare of the Society.

The number of candidates for examination during the year 1882 was in excess of that of the previous year by seventy-three. The number of "Minor" candidates was precisely the same, while for the "Major" the numbers show a decrease of four, for the "Modified" a decrease of five, and for the "Preliminary" an increase of eighty-two.

With the object of rendering the Preliminary examination as satisfactory as possible to all classes of candidates, the Council, acting on recommendations received from the Boards of Examiners, passed a resolution at its meeting in December embracing the following new regulations:—

"That in future the time allowed for the Preliminary examination be four and a half hours, in two periods of three hours and one hour and a half, with an interval of one hour between the two portions of the examinations.

"That the three hours be devoted to Arithmetic and Latin, and the one hour and a half to English.

"That in Latin the present regulation requiring translation into English of a paragraph from the first book of Cæsar (De Bello Gallico) be extended by the addition of Virgil—first book of the Æneid.

"That in each examination paper a passage from both of the authors be given, but that a candidate shall be required to translate one only of such passages.

"That this regulation shall come into force in January, 1884."

The *Library* continues to receive the attention which its importance demands. No less than five hundred books and pamphlets have been added during the year 1882 and it is gratifying to be able to report that there have been upwards of a thousand more readers than in the preceding year.

The *Museum* has been enriched during the year by several important additions. From the Botanical Gardens, at Ceylon, a fine collection of medicinal plants has been received. A number of interesting drugs from Madagascar have also been received through Dr. Parker. From the Colonial Office a valuable collection of the cinchona barks grown in Jamaica has been received, with notes and a catalogue compiled by Mr. Morris, the director of the plantations in that island. From Madras the finest and most complete collection hitherto made of Indian grown barks and species of cinchona cultivated in the Nilgiris has been sent by order of the Secretary of State for India. The collection is accompanied by a catalogue, with notes compiled by Surgeon-Major Bidie, by whom the collection was made.

The *Evening Meetings* during the session have attracted a larger number of members than usual and the numerous and important papers read have excited general interest. It is gratifying to observe that the younger members take a large part in the various discussions and materially assist in sustaining the character and tone of these meetings.

Infringements of the Pharmacy Act, 1868, were, reported during 1882, to the number of one hundred and fifty-five. In the large majority of cases in which it was found necessary to institute legal proceedings, the penalties were paid before the hearing, a few only having been carried into court. The amount recovered is duly entered in the financial statement.

It will be remembered that in the Report of the Council presented at the last Annual Meeting, it was stated that the Council had, for reasons mentioned in that Report, recommended by resolution that certain articles should be added to Part II. of Schedule A. of the Pharmacy Act, 1868. The Privy Council, on whom rests the responsibility of confirming such resolutions, informed the Council by letter, at the end of July, that "pending the consideration of the expediency of further legislation with reference to the sale of poisons it was not desirable to add to the restrictions on the sale of the acids and other articles referred to in the resolution." The Privy Council, however, approved the resolution so far as it affects nux vomica and its preparations, which have accordingly become poisons within the meaning of the Act and are included in the second part of the schedule thereto.

It was also mentioned in the last Report that it had been arranged at an interview between a deputation of the Council and the Home Secretary to send a written statement of suggestions for the amendment of the law for the further consideration of the Secretary of State. A statement of the views of the Council on the subject was accordingly sent to the Home Office, and about the same time reports from the College of Physicians, College of Surgeons, Institute of Chemistry and Society of Apothecaries were addressed by his request to the Secretary of State. These various reports were subsequently passed over to the Privy Council Office and on due consideration that department after consulting with your President decided that it is desirable that there should be further legislation. With that object a letter was sent in November last requesting the Council to submit its views in regard to the sale of poisons for the consideration of the Lords of the Council in the form of a draft Bill amending the existing law.

As a consequence the Council has prepared and submitted a draft Bill embodying its views, and this Bill is now engaging the attention of the Government. The general approval which the Bill has received at the hands of the members and the trade at large encourages the Council to hope that the Government may see fit to introduce it into Parliament with such amendments as further consideration may render necessary.

It ought not, however, to be forgotten that in order that any Pharmacy Acts Amendment Bill shall become *law*, it is essential that the members of the Society and the trade at large be thoroughly united in the support of the measure both *in* and *out* of Parliament.

The introduction into Parliament of a Medical Acts Amendment Bill has naturally excited some interest amongst those who practise pharmacy. This Bill does not propose to interfere in any way with the legitimate exercise of the business of chemists and druggists; but one of the duties imposed upon the Medical Council is the production and publication from time to time of the British Pharmacopœia. Your Council has resolved that it is desirable that pharmacists should be represented on the Pharmacopœia Committee, and is taking steps with a view to have the clauses referring to this subject amended in committee when the Bill is under consideration in the House of Commons.

The relation of pharmaceutical education to examination formed an important paragraph in the last Report. As, however, the conclusions arrived at up to the issue of that Report were scarcely so matured as to render it practicable for any scheme based upon them to be satisfactorily carried out, the Council in July appointed a Special Committee to consider the best method of giving effect to the resolutions on the subject previously adopted. This Committee presented its report, which was received and adopted by the Council, in March last. That report included, among other suggestions, the following important recommendations, which the Council believes to be eminently calculated to advance pharmacy as well as to conduce to the best interests of the public:—

"1st. Every candidate for qualification to practise pharmacy must pass the Preliminary examination of the Pharmaceutical Society, or one of the examinations the certificates of which are accepted in lieu thereof, and be registered as a Pharmaceutical Student.

"2nd. The pharmaceutical student must then enter the pharmacy of a pharmaceutical chemist, or a registered chemist and druggist who keeps an open shop, as an apprentice or pupil, or in some other capacity as a learner; and be so employed for three years.

Note.—During these three years he may or may not, at discretion, attend one or more of the courses of lectures that form part of the "curriculum" approved by the Council in April, 1882 (*Pharm. Journ.*, April 15, 1882, p. 846).

"3rd. After the expiration of the three years' shop experience, the pharmaceutical student is eligible to offer himself for the *first portion* of the qualifying examination on production of evidence of registration as a pharmaceutical student and of having been employed for three years subsequent to such registration in the shop of a pharmaceutical chemist or a registered chemist and druggist.

"This *first portion* of the qualifying examination to be a written one and to include the following subjects:—Prescriptions, Pharmacy and Theoretical Chemistry.

"This *first portion* of the qualifying examination to be conducted in London, Edinburgh, and such a number of centres in the provinces as will allow the superintendence of each examination by a member of the Board of Examiners.

"4th. An interval of not less than *one year* must elapse between the date of passing the *first portion* of the qualifying examination and the date of entering for the *second portion* of that examination. During that interval the above-named "curriculum" *must be completed.*

"5th. On entering for the *second and final portion* of the qualifying examination, the pharmaceutical student must produce evidence of being twenty-one years of age and of having fulfilled the conditions mentioned in the previous paragraph.

"This *second and final portion* of the qualifying examination to be practical and "*vivâ voce*," and to include the following subjects:—Practical Dispensing, Botany, Materia Medica and Chemistry.

"This *second and final portion* of the qualifying examination to be conducted in London and Edinburgh only.

The Benevolent Fund has been augmented by three legacies of £100 each, under the wills of the late Robert Howden, of London, Arthur Lloyd, of London, and Charles James Pearson, of Swansea, and shows in addition an increase in donations and subscriptions of over £700. This very satisfactory result in regard to subscriptions is mainly due to the zeal and perseverance with which the claims of the Fund have been urged by the local secretaries. Their services in this and other matters affecting the interests of the Society are highly appreciated by the Council and deserve recognition from the members at large.

The annual publication of a local list of subscriptions and donations was commenced in February last in the *Pharmaceutical Journal*. This will, it is hoped, materially assist the local secretaries and others in advocating the claims of the Fund amongst those who have not hitherto had their attention called to the pressing claims for relief which the Council receives every month from persons in all parts of the country.

With the view of associating with the Society distinguished pharmacists and others residing per-

Receipts.

FINANCIAL STATEMENT FOR THE

	£ s. d.	£ s. d.
Balance January 1st, 1882:—In Treasurer's hands	2679 3 9	
In Secretary's hands	16 13 2	
In Honorary Treasurer's hands (Scotland)	30 1 8	
		2725 18 7
Life Members' Fund:—Interest		87 16 11
Interest on Investments		614 0 2
Subscriptions:—1645 Members, Pharmaceutical Chemists	1727 5 0	
777 „ Chemists and Druggists	815 17 0	
1108 Associates in Business	1163 8 0	
824 Associates not in Business	432 12 0	
1037 Apprentices or Students	544 8 6	
15 Entrance Fees	31 10 0	
	4715 0 6	
Fines upon restoration to the Society	37 5 9	
		4752 6 3
Examination Fees:—1359 Preliminary Examination Fees	2430 6 0	
8 Modified „	8 8 0	
692 Minor „	1895 13 0	
109 Major „	426 9 0	
		4760 16 0
Journal:—Advertisements	4588 2 3	
Sales	491 7 4	
		5079 9 7
Registration Fees:—15 Fees for Restoration to the Register	15 15 0	
7 Registration Fees as Chemists and Druggists	36 15 0	
		52 10 0
Register:—Sales to the Government	146 15 0	
Sundry Sales	13 15 0	
		160 10 0
Calendar:—Sundry Sales		17 11 0
Penalties and Costs for infringements of the Pharmacy Acts		86 8 8
		£18,337 7 2

YEAR ENDING DECEMBER 31st, 1882.

Expenditure.

			£ s. d.	£ s. d.
Annuity—Dr. Redwood				100 0 0
Carriage of Books to or from the Library, and other parcels				24 17 0
Certificates of Death				17 12 0
Conversazione			204 1 7	
Pharmaceutical Meetings			52 4 0	
				256 5 7
Examiners, Boards of—	*England and Wales.*	*Scotland.*		
Fees to Examiners	1307 5 0	189 0 0		
Fees to Superintendents—Preliminary Examination	148 1 0	21 0 0		
Hire of rooms for conducting Preliminary Examination	42 0 0	4 5 8		
Travelling Expenses	231 6 10	6 5 0		
Refreshments for Examiners	86 13 8	5 14 4		
Apparatus, Drugs, Chemicals, for Examinations and sundry charges in connection therewith	85 2 4	7 2 8		
	1900 8 10	233 7 8		
(*England and Wales*)		1900 8 10		
			2133 16 6	
Fees to the College of Preceptors			133 7 0	
				2267 3 6
Fixtures and Fittings				11 19 1
Furniture				37 2 3
House Expenses:—Gas, Water, Coal, Cleaning Materials, &c.				251 0 8
International Pharmaceutical Congress:—Production and Editing of Reports			26 5 0	
Binding the Volumes of the Report			12 10 0	
				38 15 0
Journal:—Editor and Sub-Editor's Salaries			575 0 0	
Paper			1108 2 7	
Printing			1974 18 9	
Publishers' Commission			571 0 3	
Contributions and Engraving			312 9 9	
Reporting			77 9 0	
Attending Conference Meeting at Southampton			10 0 0	
Parliamentary Reports and Sundry Charges			33 3 10	
				4662 4 2
Laboratory:—Professor of Practical Chemistry—Endowment of Chair			100 0 0	
Prize Medals and Certificates			5 2 6	
				105 2 6
Law Costs				169 3 5
Lectures:—Professor of Chemistry and Pharmacy—Endowment of Chair			100 0 0	
Professor of Botany and Materia Medica—Endowment of Chair			100 0 0	
Subscription to Royal Botanic Gardens			21 0 0	
Prize Medals, Certificates, etc.			12 10 0	
				233 10 0
Library:—Librarian's Salary			216 13 4	
Purchase of Books, etc.			157 2 8	
Attending Library Association Meeting			10 10 0	
				384 6 0
Museum:—Curator's Salary			250 0 0	
Assistant's Salary			78 0 0	
Specimens, Bottles and Sundries			39 15 7	
				367 15 7
Branch of the Society in Scotland:—Secretary—Salary			150 0 0	
Rent, Taxes and Insurance			98 2 9	
Miscellaneous Expenses			39 13 7	
				287 16 4
Postage:—General			240 7 3	
Journal (Cost of transmission to Members, Associates and Apprentices)			674 5 6	
				914 12 9
Register, Printing and Publication of				167 4 9
Repairs and Alterations (including painting inside of Building)				805 17 7
Rent, Taxes, and Insurance of Plate Glass			407 1 8	
Insurance on the Premises and Contents—7 years' Premium			283 10 0	
				690 11 8
Returned Subscriptions to Associates				11 18 0
Stationery, Engraving, Printing, and Office Expenses			250 1 8	
Publication of the Society's Calendar			111 2 0	
				361 3 8
Salaries:—Secretary and Registrar			550 0 0	
Assistant Secretary			300 0 0	
Clerks and Servants			811 17 0	
				1661 17 [illegible]
Cost of Materials supplied to the Bell Scholars				10 0 0
Herbarium and Council Medals				8 12 6
Sundries				0 11 6
Travelling Expenses—Country Members of Council				411 12 0
Refreshments for Council				45 11 0
Balance, December 31st, 1882:—London and Westminster Bank on Deposit			2000 0 0	
In Treasurer's hands			1862 11 8	
In Secretary's hands			75 12 8	
In Honorary Treasurer's hands (Scotland)			84 17 4	
				4023 1 8
				£18,337 7 2

BENEVOLENT FUND, 1882.

Dr.

		£	s.	d.	£	s.	d.
21 Annuitants, each received £35		735	0	0			
1 Annuitant received:—2 quarters at £30		15	0	0			
2 quarters at £35		17	10	0			
14 Annuitants, each received £30		420	0	0			
					1187	10	0
CASUAL GRANTS.							
A former Member, London	age 63	15	0	0			
Ditto London	,, 63	10	0	0			
Ditto Brighton . . .	,, 65	10	0	0			
Ditto London	,, 71	15	0	0			
Ditto London	,, 62	10	0	0			
Ditto Ryde	,, 65	20	0	0			
Ditto London	,, 69	10	0	0			
Ditto Leamington . .	,, 68	15	0	0			
Widow of a former Member, Holywell	,, 52	10	0	0			
Ditto Oxford .	,, 63	10	0	0			
Ditto Devizes .	,, 61	10	0	0			
Ditto Norwood	,, 64	15	0	0			
Ditto London .	,, 67	10	0	0			
Ditto Torquay	,, 61	10	0	0			
Ditto Parkgate	,, 59	10	0	0			
Ditto Sidmouth	,, 65	15	0	0			
Ditto Whittlesea	,, 46	5	0	0			
Ditto London .	,, 42	5	0	0			
Widow of a Member, London . . .	,, 57	20	0	0			
Widow of a Life Member, Dulwich .	,, 50	10	0	0			
Orphans of a late Member, London .	,,12&7	25	0	0			
A former Associate in Business, Penygroes	,, 38	10	0	0			
Widow of a former Associate, London	,, 52	10	0	0			
A Pharmaceutical Chemist, Liverpool	,, 41	5	0	0			
A Registered Chemist and Druggist, Liverpool . . .	,, 67	10	0	0			
Ditto Bridgwater . .	,, 60	5	0	0			
Ditto Warrington . .	,, 70	10	0	0			
Ditto Glasgow	,, 56	10	0	0			
Ditto Edinburgh . . .	,, 68	10	0	0			
Ditto Sheffield . . .	,, 50	5	0	0			
Ditto London	,, 72	10	0	0			
Widow of Reg. C. & D., Devizes . .	,, 36	10	0	0			
Ditto Birmingham .	,, 40	6	0	0			
Ditto Manchester .	,, 42	10	0	0			
Ditto London. . .	,, 60	10	0	0			
Ditto Ashbourne .	,, 72	10	0	0			
Ditto Brigg . . .	,, 45	10	0	0			
Ditto Teignmouth .	,, 34	10	0	0			
Ditto London . .	,, 60	5	0	0			
Ditto Liverpool . .	,, 65	10	0	0			
Ditto Clay Cross .	,, 36	5	0	0			
Ditto London. . .	,, 68	5	0	0			
Widow of an Annuitant, Wells . .	,, 46	5	0	0			
					441	0	0
Secretary's Casual Fund					20	0	0
First payment from the Robbins Fund . .					5	0	0
Printing and Stationery, etc.		54	12	2			
Postage		40	18	9			
					95	10	11
Purchase of £100 Consols					100	2	6
Purchase of £60 South Metropolitan Gas Stock (Robbins' Gift)					106	16	0
Commission on purchase					1	6	0
London and Westminster Bank—On Deposit					500	0	0
Balance in Treasurer's hands, Dec. 31st, 1882.					599	13	7
Balance in Secretary's hands, Dec. 31st, 1882.					1	0	9
					£3057	19	9

Cr.

	£	s.	d.	£	s.	d.
Balance in Treasurer's hands, Jan. 1st, 1882				235	4	6
Ditto in Secretary's hands, Ditto				2	17	8
Dividends on Invested Capital				563	5	2
Donations	388	1	0			
Subscriptions	1568	11	5			
				1956	12	5
Legacies:—						
Howden, Robert, London	100	0	0			
Lloyd, Arthur, London	100	0	0			
Pearson, Charles James, Swansea . .	100	0	0			
				300	0	0
				£3057	19	9

We, the undersigned Auditors, have examined the accounts of the Pharmaceutical Society, as presented in the Financial Statement and Benevolent Fund Account, and find them correct. We also find that there was standing to the account of the Society at the Bank of England, and in the hands of the Society's Bankers, on the 31st December, 1882, the following Stocks, viz.:—

		£	s.	d.	£	s.	d.
General Fund	New 3 per Cents.	20,500	0	0			
Life Members' Fund	New 3 per Cents.	3,000	0	0			
					23,500	0	0
Pereira Memorial Fund . . .	Consols	100	0	0			
Bell Memorial Fund	Consols	2,050	0	0			
Hanbury Memorial Fund . .	Consols	400	0	0			
Benevolent Fund	Consols	18,600	0	0			
					21,150	0	0
do. (Robbins Fund)	South Metropolitan Gas Stock . .				60	0	0
Secretary's Casual Relief Fund. . . .	Consols				105	0	0
Hills Prize Fund	Russian Bonds				300	0	0

W. HODGKINSON
F. HARWOOD LESCHER
S. LLOYD STACEY
HENRY AYSCOUGH THOMPSON
W. MANNING WATTS
} *Auditors.*

February 28th, 1883.

manently outside the United Kingdom, the Council has decided to recommend the members at an early convenient opportunity to pass a new bye-law to enable it to elect such persons as *corresponding members.* It is desirable that the interest which so many of these eminent men take in pharmacy should be enhanced by official recognition on the part of the Society, in the same manner as the labours and and services of British pharmacists are recognized by Continental and American Associations.

In concluding this Report the Council has to regret the loss, among other valued members of the Society, of Alfred Allchin, S. U. Jones, of Leamington, Robert Howden and Matthew Pound. Mr. Allchin was for many years associated with the Executive of the Society, first as a demonstrator in the Society's laboratory and afterwards as an examiner, and had endeared himself to all those with whom he came in contact. Mr. S. U. Jones, Mr. Howden and Mr. Pound were each well known to, and regretted by, a wide circle of friends. They did not fail to avail themselves of every opportunity for advancing the interests of the Society and earning the goodwill of their brother pharmacists.

The President, in moving the adoption of the Report, said the first paragraph dealt with the finances, and, as usual, they expected to be criticized on that point, but probably not so severely as if they were in a position of having to declare a dividend. He did not propose to say much about the annual receipts and expenses, but would pass to the second paragraph, which referred to the propriety of changing the investments of the Society. It was well known to many of the older members that from time to time this question had been discussed, and during his tenure of office the Council had decided at length that it was desirable to change a portion both of the Benevolent Fund and General Fund investments and to invest the money in freehold ground rents or land. The object contemplated was, on the one hand, to get a higher rate of interest, with ample security, and on the other, to provide for increased stability in the future. When the Society's capital was very small, it was natural and convenient to invest in Government stock, but having regard to the present high price of stock and the possibility that there might be a conversion, as was now being carried out in France, it was desirable that corporate bodies like themselves, having large funds to deal with, should consider what was best for the future welfare of the body. It seemed to the Council wise to invest in such a way that they might sooner or later, perhaps in fifty or sixty years, be able to carry on the business of the Society without calling for subscriptions at all. If they could do that without imposing any additional burden on the pharmacists of the present generation they would all agree that the Council was wise in thus dealing with the Society's capital. It was well known that it was difficult to get more than 3 per cent. for investments in Government funds, but on freehold ground rents it was possible, as a rule, to get 4 per cent. Their information, gathered from all sources and based on actual observation during the last two months, showed that a freehold ground rent was worth actually 4 per cent. when the reversion was tolerably distant. One of the reasons why these investments were fairly good for corporate bodies was that they did not die. Individuals died, and ground rents were slightly inconvenient for trustees of deceased persons to deal with; therefore it was that persons in that position generally invested in Government securities; but corporate bodies, like themselves, might very fairly invest in ground rents without the possibility of having to sell out and divide at any particular time. With regard to the number of candidates who presented themselves for examination, the clause spoke for itself. It seemed pretty clear that the number presenting themselves was still very large, though he deeply deplored that so many were turned back. They must all regret the waste of time on the part of so many candidates which this disclosed. Of course, it was the duty of the examiners, representing the Government of the country, to reject men who were not competent to perform the duties to be placed in their hands; but, at the same time they could not but think how much better it would be if by better training beforehand, the Board of Examiners were able to certify that a much larger percentage of each batch of candidates was fit to be entrusted with this important duty. The Preliminary examination had received some consideration with a view to giving a wider range and greater latitude in the Latin subjects. He need not refer further to that point, but it was, of course, very important that the Preliminary examination of men who were to be future pharmacists should be fairly good, and although the process was an improving one, so far as his experience went, it was not improving so rapidly as they could wish. It was a fact that many of the candidates had been placed in a difficulty when having to deal with three subjects in so short a time as three hours, and it was therefore proposed that after next year the candidate should be examined for an hour and a half in Latin, then in arithmetic for another hour and a half, and after luncheon another hour and a half would be devoted to English. In that way it was thought that many boys, who did the first portion pretty well but said they had not time for the English, would be assisted in giving the examiners a better idea of their capacity. The Library and Museum continued to make satisfactory progress, as was stated in the Report. They were indebted to a number of members, to gentlemen outside the Society, and various Government departments for gifts not only to the Library but to the Museum. He might also remind members that they had the nucleus of a very excellent library in Edinburgh and he was sure there were many members who had old works on pharmacy and medicine, who would perhaps like to present them to the Society, but hesitated to do so because they knew that in London they had a complete collection of such works. In the Society's library in Edinburgh, they were not very strong in ancient works on pharmacy or science. A considerable number of infringements of the Pharmacy Act had been reported during the year, and in many cases the offender had paid the fine and had not gone into court at all. Sometimes he went on doing wrong after he had paid one fine and had to pay a second fine, so that there was some difficulty even by the enforcement of fines in preventing individuals from breaking the law. Nevertheless, if the members of the Society knew how many hours the Council spent in considering these matters they would be more considerate than they sometimes were in the remarks which they made on this topic. It was not possible to publish all they knew in various cases of infringement, nor was it possible for the Secretary to write to every local secretary who gave information, stating the reasons which actuated the Council in either moving or not moving in reported cases; but they might all be assured when he told them that the members of the Council every month devoted the best part of Tuesday evening to considering cases which were sent up to them, and that every case was thoroughly sifted on its merits. On the question of poisons the next paragraph referred to the report presented at the last meeting. It was then proposed that certain strong acids should be placed in part 2 of the schedule, but the Privy Council did not see its way to adopt that resolution; in writing on the subject they said "pending the expediency of further legislation they did not see their way to confirm the resolution. As was mentioned in the Report, the Government had said that some sort of legislation was necessary, and the Council of the Society, acting at the request of the Privy Council, had prepared a Bill which had been before the members for some time. He should suggest that any discussion on that Bill should be deferred until Mr. Sandford proposed his resolution. But he was anxious to impress on the members the fact that this Bill was put into the hands of the Privy Council to be brought forward as a Government measure; it was not a Bill which the Society proposed to bring into Parliament as a private measure, and, therefore, some of the provisions were drafted in such a manner as to meet the views of important Government officials, who had considered various matters connected with the working of the present law, and who thought some deviation from the law as it had hitherto been was desirable. In saying this he did not wish to divest either himself or the Council of any responsibility in the matter, but it was important that this should be borne in mind. What might be done hereafter it was not for him to say. The Government might decline to introduce the Bill into Parliament, or they might suggest amendments; but when that time came, when they got a definite statement of the views of the Government, they would take care to deal with the Bill so as to adopt, as far as they could, the amendments which were practicable and for the general good. The introduction of the Medical Act Amendment Bill was also referred to in the Report, and the Council had thought it desirable, besides the letter which he was instructed to write some weeks ago to the Lord President of the Council, to send a memorial to Mr. Mundella, setting forth the views of the Society's Council, and which he believed would be the views of most pharmacists, as to what they thought would be a proper way of dealing with Pharmacopœia revision. In connection with this subject it was not necessary or desirable to criticize the action of individuals. The question was really a public one: how far pharmacists should be appointed on a Committee for revising the Pharmacopœia. The question of what experts should be appointed, whether as editors or assistants, was outside the question. The sole question for them was, were they not reasonable in asking that there should be competent pharmacists on the Committee to see that the experts and others did not make suggestions which were impracticable and unworkable. He felt sure that the more the subject was brought before the medical profession, the more certainly would they adopt, by a large majority, the view that there should be educated representative pharmacists on that Committee. Pharmaceutical education occupied a long paragraph, in which was inserted an abstract from the report of the Committee, who had spent a long time in considering the subject. On this Mr. Vizer had given notice of a slight amendment. He did not propose to say anything upon it until he heard Mr. Vizer's views; but he semed to agree with the Committee, as far as he understood, up to a certain point, but would allow the candidate to come up for the first portion of a technical examination two years after he had been in the shop. Perhaps Mr. Vizer would be able to convince the members that that was an advantage, but up to the present time he and his colleagues had thought three years were essential and a great advantage to the candidate himself. The Benevolent Fund had made satisfactory progress during the year, the members at large, the local secretaries and the officers of the Society spread over Great Britain had worked very well for it, and there was a hope that they might be able to stir up not only those connected with the Society, but a large number of others who were on the Register, and who did not see the importance of this Fund to all chemists and druggists. He might say the great majority of applications for relief were from registered chemists and druggists who had never been connected with the Society at all. The Society was truly catholic in its distribution of this Fund; it looked on the whole trade as being part of one body corporate when applying for assistance, and, therefore, it had some claim to ask those who were outside to give more support to the Fund. The last paragraph but one referred to the election of corresponding members, and that might require a little explanation. The Bye-laws at the present time only contemplated the election of a certain class of non-paying members, called honorary members, but the Council was anxious to have power to appoint distinguished men who assisted in various ways, to the position of corresponding members. Many comparatively young members of the Society who had made a position for themselves in the world of pharmacy or science were recognized in this way by Continental and American associations, and it seemed desirable that the Council should be able to do the same thing in return. In the last paragraph, the Council had to regret the loss of some of the members who had died during the year. Of course there were many others who had passed away, and who had done good work in their time, but who had not held office, and as to whose position and labours they were not officially informed. They were quite aware that there were a number of men in quiet nooks and corners of the country who were doing very good work in pharmacy, but whose names never appeared in public. Their work was none the less appreciated; but it was essential in this official Report to confine it, in order not to be misunderstood, to the mention of those who had held office and taken part in the various public works connected with pharmacy. He would conclude by moving—

"That the Annual Report of the Council now read be received and adopted, and printed in the Society's Journal and Transactions."

The Vice-President seconded the resolution, and said he would reserve the right of making any remarks till later, if necessary.

Mr. Vizer (Brighton) then moved the following amendment, of which he had given notice:—

"That the Report be adopted, etc., with the exception of the third and fourth recommendations of the Special Committee in relation to pharmaceutical education and examination, in respect to which the following alterations are considered desirable:—That in Recommendation No. 3, the term of *two* years should be substituted for *three* years; in Recommendation No. 4, "six months" should be substituted for "one year"; and that the syllabus of the proposed Curriculum should be so altered as to enable a student to pursue the necessary studies during the three years' apprenticeship if so desired."

His object in moving this resolution was strictly with a view of endeavouring to assist the Council in bringing about such a curriculum as would be a boon. Many present knew that his views had always been in favour of raising the standard of education, and they all owed to the President and Council a debt of gratitude for the extreme care which had been taken in bringing forward this scheme, but there were certain points in it which he he could not help feeling needed a little adjustment. With regard to the first recommendation, that every candidate should pass a preliminary examination, that seemed to him a *sine quâ non.* The second recommendation was that three years' apprenticeship should be served, and that also he fully endorsed. But when they came to three, where a hard and fast line was drawn without any allowance being made for differences of young men's educational powers, opportunities, and privileges, it seemed to him likely to prevent young men utilizing their time to the greatest advantage. It stated that at the expiration of three years a student is eligible to offer himself for the first portion of the examination, and then the fourth clause was that an interval of not less than one year must elapse between the date of passing the first portion of the qualifying examination and the date of entering on the second portion. Now it seemed to him exceedingly hard that a young man entering a business should be compelled to pass three years before he had any possibility of passing the examination, and that after he had spent three years another twelve months should have to be spent in preparing and going through a certain course of lectures and practical chemistry which possibly he might have had an opportunity of pursuing during his apprenticeship. If a young man had extra abilities or advantages, and if his master did his duty by him, by the expiration of two years he ought to be thoroughly prepared to pass the first portion of such an examination, and at the end of the next year, by a little extra application, he believed there would be no difficulty in many instances in his coming up at the end of his apprenticeship and passing the full examination. To say that a young man must, notwithstanding, still remain a student for another year would be exceedingly hard both on the student and on his master, and anything which could be done to remove that difficulty seemed desirable. His amendment was drawn with a view to meet that. It was said that this was done in order to forward the interests of the public, but he would venture to ask, how far was this borne out by daily experience? Was it absolutely necessary for the interests of the public that this extra time should be spent beyond a legitimate apprenticeship? Both of the Government visitors stated most distinctly that it was not necessary. (Mr. Vizer here read extracts from the reports of the Government visitors as confirming of his views.) It was not found either that the medical profession required anything further than was at present imposed. As a rule medical men in their respective towns did not support and recommend those chemists and druggists who possessed the pharmaceutical diploma. Again, did the public demand it? The answer was when they looked round they saw that the public did not appreciate examined men in comparison with the amateur shopkeepers who employed registered men as their assistants. All this proved to demonstration that it was not desirable to lay a heavier burden on students than was absolutely necessary; but on the other hand, they should endeavour if possible to enable them to pass the examinations as easily as was practicable. These regulations were introduced with the idea of doing away with cramming, and no one could abhor that more than he did, but it seemed to him that this would rather encourage it. Both master and student would naturally argue if the apprentice was necessarily to go through twelve months' curriculum at the school, was it worth while to forego his services during his apprenticeship? The master would make the most he could of him, and at the end of the time the student would come up and endeavour to cram up the technical knowledge required; on the other hand, as he proposed, both master and apprentice would be interested in making the utmost they could of their time, in order that the student, if possible, might pass his examination before the expiration of his apprenticeship. He, therefore, asked the meeting to take the subject carefully into consideration.

Mr. Wheeler seconded the amendment.

Mr. Whittle thought it was a wise decision of the Council to invest in freehold ground rents, but he hoped they would not invest in land, which was rather speculative. They might also turn their attention to railway debentures and preference stocks, which often paid 4 per cent. and sometimes more. The President had suggested that they should say but little about the Pharmacopœia, but he was quite certain that every assistant and every chemist had for years felt it of the greatest importance that they should be represented on the Pharmacopœia Committee, and they felt very strongly the action of the Professors in not communicating with the Council on this matter. They knew the Medical Council could not do this work by themselves, and felt it very strange that the Professors should have acted in the way they had. Mr. Vizer had not convinced him at all; he thought three years was quite short enough, and it was only by an increase of education that they could advance their status at all. They could only go to Parliament on the plea of having a superior qualification, and two years was not long enough, and even if a few were capable of passing at that time the extra year would do them no harm.

Mr. Allen said, this question which Mr. Vizer had brought forward was one he felt great interest in, especially as it was not so very long since he had himself been a student. The recent regulations had altered to a certain extent the character of the trade. The three years' qualification which was now insisted upon was not required immediately after the passing of the Pharmacy Act, in 1868; but since its introduction, three years' apprenticeships were the order of the day, and a large number of young men came to London from the country, who had served that time. It was a question for those present, how far the three years' apprenticeship had qualified these young men to serve as junior assistants. As a rule, these young men came to London and took the proper course of obtaining situations as improvers in some London pharmacy, and, after a time, entered the

School of Pharmacy and so went through some form of curriculum, and by-and-by qualified as members of the trade. When he was apprenticed, the ordinary rule was five years, or occasionally four, and he must say he thought the five years' apprenticeship turned out a better class of men than the three years' term did. Young men now came to London after three years' apprenticeship, went straight into the school and in four months qualified to pass the Minor; they were then scarcely content to take the position of a junior, and if this amendment were passed he feared that two years' apprenticeship would be the rule. He was one who, unfortunately never went through any form of curriculum, and he now looked back with regret to think that he was unfortunate enough to qualify for his examination without doing so, and sometimes wished he had time even now to attend the regular courses of lectures. It was really a question whether two years' apprenticeship was sufficient.

Mr. VIZER said he did not advocate a two years' apprenticeship.

The PRESIDENT said Mr. Allen's observation was quite fair; his argument being that, inasmuch as during the past seven years, when the three years' regulations had been in force, the term of apprenticeship had been diminished to three years; so if Mr. Vizer's proposal were adopted there might be a disposition to shorten that period to two years.

Mr. MARTINDALE thought the meeting would fail to see the force of Mr. Vizer's argument. In any case a man could not pass the second portion of the examination until he was twenty-one, and if he was apprenticed at sixteen four years might be passed in a practical pharmacy and there would still be a year left for the curriculum.

Mr. URWICK thought three years was quite short enough; if anything, too short. He did not think that young men who had passed through short periods of apprenticeship, when they came to London, made such good assistants as those who came to London in old times, and certainly two years would be much too short. With regard to twelve months' interval between the two portions of the examination, he agreed with Mr. Vizer.

Mr. RIMMINGTON said three years might be enough for some, but not a bit too much, and four years was not too much for any young man to master the details of a chemist's shop. He might be very clever and pass any examination, he might be a great genius, but he was not a shopman and could not manage a business. His experience was that most sensible parents would not like their sons to be out of their apprenticeship before they were twenty years of age. He had for some years taken apprentices for four years, sometimes four and a half, and would not take them for less. The success of conducting a chemist's shop did not depend altogether on scientific knowledge; in fact, there was a great deal more of practical science required than of exact science.

Mr. BLAND said he should for many reasons have prepared to remain silent, were he not convinced that a crisis had now arrived in which their interests as pharmacists were seriously imperilled, and which might involve disaster and even ruin to the Society. Looking back to the objects of the Society when it was founded, two were mentioned, first, the protection of chemists from the outward attack of their enemies, whose name was legion, and secondly, the establishment of a School of Pharmacy, which should furnish a succession of able and competent men for the discharge of the functions of their office. With regard to the latter object they were entitled to say that the pharmacist of the present day was a far superior man to the average chemist and druggist of forty years ago. It was clear and undeniable that the articles supplied to the public in the shape of drugs and medicinal preparations were far superior to those generally obtainable then. There were few places on the Continent, where scientific pharmacy had been cultivated to the highest extent, where the practical duties were better performed than they were in England. But with regard to the other object contemplated by the originators of the Society, he must say that he thought it had resulted in a miserable failure. They had an Act of Parliament passed for their protection, and to give them a legal status, whatever that might mean. What had been the result? If they looked to the leaders in the profession, the old historical houses which they often heard of, did they not find that a number of those houses had come down from the lofty position which they once occupied, and had taken up the weapons of Professor Holloway and Professor Chlorodyne Browne. Was their status any better? If they looked to the position of the rank and file, they had an actual and legal title which other men could not encroach upon, but as far as his experience went, nine hundred and ninety-nine out of every thousand of the public did not know or care a button about the meaning of the words "pharmaceutical chemist." What was the protection of the Act of Parliament? They were placed under the most severe restriction as to their qualification, and as to the sale of poisons; there was a poison clause which everybody who looked into the matter knew could not be strictly and literally carried out. He could easily conceive that gentlemen living in the West End might find it easy to comply with it, but he would mention a case which would show it was not so easy. Near him there was a large firm employing, perhaps, two hundred men, who constantly required to use cyanide of potassium in their business; they sent for it on a printed order, signed by a clerk, whose name and handwriting he knew perfectly well. The Act said he must have the signature of the person in his register. But the boy or man who came for the article was not the purchaser; the master was the purchaser; and if he were to send the messenger back to say that one of those gentlemen must himself come and sign the poison book, any one could imagine what the consequence would be. The Pharmacy Act put them under all sorts of restrictions, and yet it allowed all manner of interlopers to come and filch away 90 per cent. of their legitimate trade. With regard to the preparation of a new Pharmacopœia, in process of time of course the British Pharmacopœia had become somewhat antiquated, and it was necessary that a new edition should be issued. Although there were a few medical men who had had some experience of the theoretical part of pharmacy, and there might be many pharmacists who were ignorant of what they ought to know, he did not hesitate to say, taking them all round, that they knew more of pharmacy than medical men did. Then why should a body of men who knew more of the matter than anybody else be left out in the cold? Suppose the Government thought a new treatise on the practice of medicine should be published, and certain laws laid down on the diagnosis and treatment of disease, and after stating what they wanted, sent and imposed on the Council of the Pharmaceutical Society the preparation of such a book. Would not medical men soon cry out about that, even if the Pharmaceutical Society were told that they might, if they thought desirable, call in for consultation one or two persons from some of the universities, or even ask one or two eminent physicians for their assistance, but only on condition that they should come round and offer it at the back door? Yet that would be a very apt parallel to what was now taking place. Something had been said about the influence of the Pharmaceutical Society with the Government; but it appeared to him that although the Privy Council had on certain occasions asked the opinions of the Council on certain matters, that had been done more for the purpose of snubbing the Council than from any desire to get real assistance. There were representative scientific men capable of giving advice in the matter, under whose auspices they might hope for a better Pharmacopœia than could be obtained without them; but if that assistance was not to be rendered in a fair and straightforward manner, he should recommend every pharmacist to stand aloof, to let the medical men do it by themselves, and see what sort of a book they could turn out. Then when it came out, they would look at it and tell them what they thought of it. There was another matter on which he held opinions which he feared would not be quite in accordance with the Council, and with those of many members present, and this was on this question of the curriculum. He believed that if this were passed and became law, it would be a heavy blow, and great discouragement to the profession of pharmacy. He took this so-called curriculum, and found a syllabus of lectures to be gone through by the student, which occupied simply in cataloguing the names of the subjects two pages of the Journal. The idea was that a student would generally master those subjects in one, two or three years, but instead of that a lifetime would be scarcely sufficient. He could point out subjects which had occupied the whole lives of eminent men, and yet they confessed that they had very far from exhausted the subject. Yet here were young men whose faculties were scarcely matured, who had just come from their apprenticeship, where their progress must be very rapid if, in three years, they could acquire a good practical knowledge of a chemist's business, and they were supposed to come and swallow down the whole of these subjects in two or three years. He thought the Council might very much have simplified the matter if they had passed a resolution that no candidate should be permitted to present himself for examination until he had swallowed the last edition of the 'Encyclopædia Britannica,' and was further prepared to undergo an examination in Dioscorides. When he had done that, what was the splendid reward open to him? He was permitted to sell a pennyworth of oxalic acid or white precipitate, and he might even sell a pennyworth of nux vomica if he were prepared to do sixpennyworth of writing about it, and spent another quarter of an hour in instructing his customer as to the necessity of putting his signature in the poison book. He was looking over his poison register the other day, and saw an immense amount of writing, which, if it had been done by some pettifogging lawyer's clerk or deputy registrar of births and deaths, would be paid for in pounds; but he was expected to do all that for nothing and to find his own books. And yet he could truly say that that register had never been of any earthly use to any person whatever. All this made him think that they should be very careful about increasing the burdens on young pharmacists. There was another question which had not often been raised, but was of some importance: What became of the better class of students who were turned out of the School of Pharmacy? Was it not a fact, that failing to find a scope for the scientific attainments which they had reached, they turned to something else which was more remunerative? He could point to a number of men trained in that School whose services were now altogether lost to the profession. He thought, therefore, they should be very careful how they increased the difficulties in the way of entering the profession. One further remark he would make on the syllabus of lectures, and that was, the remarkable omission of any mention of the construction and use of the microscope. Now, if one thing more than another was necessary for an accomplished pharmacist of the present day to be acquainted with it was the use of the microscope.

Mr. Giles said he should like to be permitted to reply to one or two of the observations which had been made, more especially because the last speaker had addressed himself to the really important question which awaited the consideration of the meeting. He began by saying that the prominent objects of the Pharmaceutical Society at its institution were the protection of members of the trade; that he most emphatically denied. It was undoubtedly true that an attack on the trading interest of chemists and druggists was the cause of bringing together a defence association, but that defence association most prominently set forward in its programme that its first object was the elevation of pharmacy. It could scarcely overlook the rights and protection of members, which were associated in a second place in the declaration; but that which they most prominently asserted, and that which gave vitality to their organization, and which had preserved it to this day, in strong contrast to all other organizations which had risen from temporary causes, was that they identified themselves with the elevation of pharmacy. That was the essential policy of the Pharmaceutical Society, though it had sometimes been a little lost sight of. Very often mischief had been done to the interests of the Society by losing sight of that fact, and by showing rather a tendency on the part of some persons to degrade it into a trades union of pharmacists, instead of making it an association for the elevation of pharmacy. Another observation made by Mr. Bland was that he did not understand the meaning of legal status. Now that was a matter of immense importance; it was the only thing which enabled them to put forward a claim to be participators in the compilation of the Pharmacopœia. Would it not be supposed that where a country possessed a recognized body of pharmacists, where it had sanctioned the existence of an institution especially charged with carrying on pharmaceutical affairs, that it would also proceed in natural sequence to refer all pharmaceutical affairs to the care of that body and of that institution, and emphatically first and foremost that in the compilation of the Pharmacopæia it would call in the aid of that body through the operation of that institution? It amounted to a truism to say that that should be so, but as a matter of fact it was not so; and why was it not so? There was no rational answer why it should not be so; but if they asked why it was not so, a little time might usefully be spent in considering it. First of all, pharmacy had very seriously retrogaded in this century, in reference to the relation it held to the Pharmacopœia. In the year 1809 the pharmacists, that is to say, the apothecaries, for there were then no pharmacists except the apothecaries, formed part of a joint committee to frame the Pharmacopœia, together with Fellows of the College of Physicians; but the Society of Apothecaries soon renounced the practice of pharmacy, and directed their attention to other matters, and then chemists and druggists rose up to occupy the place that apothecaries had previously held. But they did not immediately fill it in a satisfactory manner; they did not place themselves in such a position. In fact they had no position; they were a disorganized, disassociated mass of matter; they had no organized unit through which they could make their claim known, and, therefore, they had no claim to be consulted on the matter of the Pharmacopœia. In point of fact, a national work of that character could not with any propriety be placed in the hands of private persons, however qualified they might have been, even if there had been, which there was not, any organization through which their qualifications could have been made known. So they came to 1841 and 1843, when the Society was instituted there was still no change. The duty of preparing the Pharmacopœia remained still in the hands of the College of Physicians until the year 1858, when the Medical Bill was passed, which transferred that function from the College of Physicians to the General Council of Medical Registration and Education. At that time the Pharmaceutical Society was six or seven years old, for it had had a very slight measure of recognition from Parliament in 1852, and it wisely, perhaps, abstained from urging claims which it would not have been in a position to justify; so it happened that the Pharmaceutical Society was still left out in the cold with regard to the Pharmacopœia. But that was some twenty-five years ago. How was it that in 1883 they still found themselves in the same position, with distinct unwillingness on the part of medical bodies to accept official equal co-operation from the pharmacists? That was a question the meeting had to consider. It seemed to him that the Council would be committing an unpardonable breach of duty if they refrained from pressing their claim, whether it were accepted or not, for they should never be parties to being excluded from such a work. The Pharmacopœia was a pharmaceutical laboratory book, and was there any sense in committing it to men who had no knowledge of pharmacy, and excluding from it persons who were bound by law to have that knowledge? The thing was monstrous and absurd. What did Dr. Redwood say at Southampton about the Pharmacopœia? That it was not the business of the compilers of the Pharmacopœia to invent new remedies, but to select and adopt them. Who invented them? The pharmacist; the pharmacist did everything except receive the credit. Were they content to go on any longer in that position? Was it right that the work should be done for the Medical Council, who acknowledged by their acts that they were incompetent to do the things themselves? Why did this state of things exist? He was sorry to say he must assume an unpleasant duty in reference to this question, for he thought the Pharmaceutical Society had something to blame itself for in this matter. The last forty years had certainly been years of enormous progress of pharmacy; all that existed had been developed from nothing in that time, but it was not forty years of uninterrupted progress. There were times of agitation, cavilling and opposition to the legitimate policy of the Society, by which great mischief had been done, and this had had the effect of lowering the *personnel* of the Society. He must say in the presence of the Council, many of whom he knew, and many of whom he did not, that the calibre of the Council was not what it was or ought to be. In saying that he said nothing which should give offence to any one member of the Council. They, on the other hand, should understand better than anybody else how true it was. He believed the fact to be that the Medical Council were not willing to accept into a Committee the individual members who constituted the representatives of the Society at the present day. He said this with great respect individually for those members whom he knew, but was it not the fact that they had not got now, even if they could be found, such men as he remembered on the Council, men like Jacob Bell, Deane, Morson, Savory, Squire, Hanbury, and men of that calibre, who had a mere dead weight of influence and importance which would help the Society very much in its present condition. How was this to be avoided? Good candidates had, he believed, been deterred from some lamentable electioneering tactics which took place some time ago when good men were rejected and men of less note were chosen. They did not come forward, and, therefore, it was not possible for the members of the Society to elect them. But it was possible for the Council to find good men if there were good men, and to create vacancies and bring them in, and he thought they might fairly ask that from the patriotism of the Council. There were no doubt some who had been there so long that they were desirous of retiring if they could find eligible successors, and it was also important that they should have more London members having London influence. However good a gentleman might be, and however much respected in his own locality, gentlemen from the country were not known to the bodies with whom the Society had relations in London. It was a serious matter, as he saw by the statement of accounts, that the travelling expenses during the last twelve months had been £403, which was quite a little annuity, and this charge had been increasing in a geometrical progression ever since the beginning of the Society. For the first period ending in 1850 the travelling expenses were £45; for the years ending 1860 they came up to £90; for the years ending 1870 they came up to £156; for the years ending 1880, £360; and for the last two years it was £403. By all means let this expense be incurred if it was any good; but if instead of being any good it prevented their having on the Council men who had an influence which could not be ignored it was very desirable to have another change and retrace their steps to the condition of things which existed formerly. He had heard of one case of a most eligible member having felt himself kept back from the Council, not because he was not willing to devote his time to it, but because since the new arrangements of reporting the Council proceedings had been introduced, so much time was wasted in talk that he really could not afford to sit it out. Speeches were addressed, not to him or to those that sat around the table, not to the business in hand, but to the constituency outside. He had always disapproved of reporting the Council proceedings. He remembered the argument at the time was that all representative bodies were reported, the proceedings and speeches in Parliament were reported, and so should the proceedings of the Council; but they forgot that that meeting was the parliament; the Council was the government, and the government was not in the habit of reporting their speeches. When he was on the Council for two or three years, one gentleman there possessed undoubtedly important influence, both in the Council and out of it, but if everything which that gentleman (Mr. Hanbury) had uttered during the whole of the meetings he attended had been reported in the Journal it would not have filled one page; at the same time nobody ever sat at that Council Board without feeling the influence of Mr. Hanbury, and when he spoke they perfectly well knew what he meant. The conclusion he came to was that the Medical Council were more willing to have to do with the Professors, whose services they could retain for a certain consideration, than to accept into their Committee the said Professors' masters on equal terms. Very small and mean influences often governed the world, and that kind of thing had a great deal of influence in the present state of the relations between themselves and the medical body. He did not know whether it would be quite in order to refer to a communication which took place between that Council and the Medical Council, but he understood a letter was on one occasion addressed to the Medical Council, which courteously and respectfully asked that the Pharmaceutical Society should be allowed to nominate members to co-operate on the Pharmacopœia Committee. He understood that that communication was treated with the greatest disrespect; its receipt was acknowledged and no further notice was taken of it. He trusted that was forgotten and that better times were coming, and that by conciliation and by approaching the medical bodies courteously and temperately their co-operation might be obtained. But they must not rest there. They had a claim which no body could possibly resist for pharmacy to be represented in connection with the Pharmacopœia. That was universally recognized in every nation throughout the civilized world, and if they submitted to a stigma, which might or might not be deserved, they were responsible for bringing on the republic of pharmacy throughout the world a reproach under which it ought not to suffer.

Mr. Frazer said it was his intention to have sat silent, having inflicted on his friends who chose to read it a pamphlet giving his views; but questions had arisen which were not before him when he penned that pamphlet, and, therefore, he must be excused for saying a few words. He must say that his views with regard to the Pharmacopœia were not in harmony with those expressed by Mr. Giles, or, he believed, with the sense of the meeting. His opinion was that they, as pharmacists, had no legal position in the matter; the pharmacists had no right to interfere with the medical man's prescriptions, and he considered the Pharmacopœia was the medical man's prescription book. The medical man found it convenient to give in one line what he might put in six or a dozen; he might give the formula of every pill and every ointment he prescribed, and then they could not assert any right to interfere with them. That was the principle he went upon, that the medical man was within his right in asserting sole supremacy in saying what the Pharmacopœia should contain. At the same time, he thought, as a matter of policy, it would be wise for the medical men to invite co-operation. Mr. Giles said the apothecaries were antecedents of the Society, and that, originally, apothecaries formed a part of the Pharmacopœia Committee; but, as he understood, the apothecaries of that day were entitled to prescribe, to feel pulses, and to employ the stethoscope, and if that were so, they were not in the position of apothecaries, not being by law allowed to prescribe and take fees for it.

Mr. Giles said he believed at that time apothecaries were not recognized prescribers; but there was a quarrel between the physicians and the apothecaries whether the latter could prescribe, as it was still a quarrel whether chemists might prescribe or not.

Mr. Frazer said Mr. Giles had also remarked that pharmacists brought in new remedies, but they did not put them in the Pharmacopœia; it was not medical men who brought in the new remedies and adopted them. He could not sympathize with Mr. Giles as to the standing of the Council. Going to another point which had been mentioned he thought it was a great mistake to change the investments; in Scotland those investments which of late years had proved most disastrous were in connection with real property, and, therefore, he hoped the Council would be very careful in this matter.

Mr. Long said the question was, How was the Pharmaceutical Society to be constituted? They must have members, and if there were no inducement for members to join, how was it likely they were going to maintain their status? Mr. Giles said they were deteriorating and that the Council was not what it ought to be; but that was the fault of the members, not the fault of the Council. Mr. Frazer thought that if a man had bought a suit of clothes he ought not to be allowed to wear them. He did not believe in monopoly, but he believed in a man's right, and he was very much disgusted to see after all the time they had been trying to benefit the public that anybody could do what they did except call himself a chemist and sell poisons. One of the questions before them that day was the Pharmacy Acts Amendment Bill. It was not the Pharmaceutical Society's Bill. They could not pass an Act or they would pass it exactly according to their own liking; but they had to go to Parliament, and they knew how difficult it was to get even the most legitimate thing passed there on account of the large vested interests which were there represented. The great thing to be done was for pharmacists to look well to themselves. They all ought to belong to the Society, and with regard to this Act they must show they wanted something. The first thing was to decide on what they wanted, and the next thing was to trust the Council. With regard to Mr. Vizer's amendment, some people said education was of no use and some said they were not educated enough. There was no doubt the more educated you were the more prepared you were. Entry into the Society had been greatly facilitated, for when he first joined it membership was only obtainable by examination; shortly afterwards, a new principle was established, that any man who had been in business so many years might divide his examination. Then came the Pharmacy Act of 1868, which established the Minor qualification; and now came another change, under which there was to be one examination which would constitute every one who passed it a pharmaceutical chemist. He did not think they could have too much education; failures resulted from want of preparation, and that could not be obtained without going through the legalized studies. At the same time he thought it would be a good thing if they had an assistants' examination.

Mr. Hampson said he did not feel himself of very much importance on the Council, and was quite willing to give place to Mr. Giles or anybody else who could better fill his place; but he must say that that gentleman had given one piece of bad advice, namely, that the Council should take upon itself the duty of interposing in an irregular manner with the constitution of the Council. He believed the safest method was the straightforward one; that men ought to sit on the Council who were sent by the suffrages of the members, and that any deviation of the kind suggested, if followed, would simply lead to very baneful results. There would be no confidence left in the Council; little as there appeared to be in Mr. Giles's mind at present, there would be a great deal less, if it became a hole and corner business transacted in some chosen spot in London. He heartily supported his views with respect to their position with reference to the national Pharmacopœia, and he believed the reason they had not attained that position was that they had not had the opportunity. Medical Bills did not come in every year; there were occasional opportunities and he hoped they had seized this opportunity to properly represent the position of the Society. But after all it did not depend so much on this much mistrusted Council, but on the members at large. The Council, good, bad, or indifferent, had only a certain power; but if every member of the Society exercised his legitimate influence with his member of Parliament the thing would be perfectly easy, because their case was absolutely perfect. They had a claim which could be resisted very little longer.

Mr. Mackenzie said he was very far from endorsing a good deal of what Mr. Giles had said. The Society included Scotland, but Mr. Giles' remarks did not apply to Scotland, because there were druggists in existence in Edinburgh two hundred years ago. Though he was not there as a defender of the Council, and might differ from them in some respects, he thought Mr. Giles' attack was most unwarranted, and that his remarks were not pertinent to the question before the meeting, because whatever the Council was, it was what the Society made it. The members of the Society looked to the members of the Council to do their duty, and if they found they were not doing what they wanted, they knew what to do when the voting papers came round.

Mr. Paterson (Aberdeen) thought the educational portion of the report had not received the attention it deserved. Speaking from a part of the country where a large number of apprentices were grown for the benefit of their English friends, he wished to say a few words upon this subject. He most decidedly objected to the first proposition that every man should pass the Preliminary examination before he was entitled to enter his apprenticeship. He did not know what it might be in England, though he always understood that there education was rather behind that in Scotland, but in many country districts there—and they were legislating not only for the cities but for the country also—secondary education was not obtainable, and until a lad had served an apprenticeship under a chemist he was not in a position to get the classical education he required to pass the examination. It would be a great hardship to preclude lads in that position from entering on their apprenticeship. He preferred to take boys from the country even without a classical education, and that they should get it when with him, to having them from the towns, for as a rule they applied themselves better to the business. Again, there were many young men who came into the business in an inferior position, who, by their intelligence, raised themselves and were able to obtain a classical education and become chemists and druggists. There were many members of the Society who had come in as errand boys, with no intention of following out the calling, but who were now very good pharmacists indeed, and had passsd the examinations very creditably. These regulations would put a needless block in the way of such persons in the future, and he thought that if the requisite knowledge were insisted upon before the diploma was conferred, that was all which could fairly be required. In Scotland the period of apprenticeship was generally five years, never less than four, and if that were to be continued and students were allowed to take the examination when most convenient to themselves, there would be less cramming and more thorough knowledge. The education required should be given during apprenticeship, and each master ought to feel himself bound to see that his apprentice got his education while under his charge. But where were they to get this education? If the Pharmaceutical Society, when it obtained this power from Government, had set itself to give educational facilities in the provinces, they would have had some reason to speak on this matter; but he held they had none. They had concentrated their whole efforts on the central establishment in London and had done nothing for the provinces, and therefore he did not think they were entitled to talk as they did about the deplorable fact of so many young men coming up unprepared. It seemed to him they were themselves greatly to blame for not having encouraged apprentices to acquire their education. If in connection with the Science and Art Department, the Pharmaceutical Society had set itself to promote pharmaceutical education in the provinces, they would not have had this deplorable condition of things, where so many young men were turned back, and they would have had a much better educated class of assistants. They cried out against cramming: but the whole system had led to cramming. In many country districts it was impossible to get teachers paid except in connection with the Science and Art Department. Some of the great London companies were doing a great work in the country by offering prizes and paying teachers to conduct classes in particular branches of study in which they were interested, and it seemed to him that the Pharmaceutical Society might set itself to something of the kind, so as to diffuse education throughout the country; and if they did not the same cry would always be coming forward about cramming, and about imperfectly educated assistants and apprentices. It might be possible for the sons of the gentlemen around him to spend five or ten months in study, but that was perfectly impossible for the great mass of the people—in Scotland at any rate—who joined the trade; and the class from whom they got apprentices could not afford to pay for the education which was now required, unless they could get it on the spot when serving their apprenticeship. The feeling in Scotland was that all this was being done that they might draw cheap assistants to London. He should therefore move, when in order, that there should be no change in the matter of education at present; that apprentices should be allowed to get their education in any way, and come up for their examination as heretofore. The first paragraph in the regulations would impose a great injustice on those who had entered the business, because according to this a lad who had just come out of his apprenticeship, and had not passed the Preliminary, would have to do so, and then spend three years more in a chemist's shop before passing the examination.

The President said there would be four years before the regulation would affect those who were now in the trade.

Mr. Lomas said one of the objects of the Society was education. That being the case, boys should not be taken as errand boys, thinking they were going to become sufficiently able to pass the examination. All those who were to become pharmacists should receive a good general education before entering on their apprenticeship.

Mr. Broad thought what had been said by Mr. Paterson with regard to boys entering on their apprenticeship without passing the Preliminary was most illogical. He said an errand boy might be educated by his master to pass his examination; then he would become a master, and how could he educate his apprentices? It was an utterly absurd idea. The Pharmacopœia revision was a point which he felt very strongly on, and he could not agree with Mr. Frazer that it should be entirely in the physician's hands. If the physician wrote a prescription the pharmacist had no right to interfere; but if he wrote, as physicians used to do, and sometimes did now, so and so *secundum artem*, it required the pharmacist to interpret that and to practically make the Pharmacopœia, because the Pharmacopœia really was the mode of preparing these preparations. If physicians wished for a certain preparation of nux vomica, pharmacists told them how to prepare it. With regard to Mr. Giles' remarks about the Council, he was sorry to say that some pharmacists he knew were not content with the calibre of the present Council. Several of them said they did not care about the Society, which was not managed as it used to be, and therefore he thought Mr. Giles was perfectly justified. Mr. Bland attacked the old Pharmacy Act; but he thought it was not to be complained of so much if it were carried out in its entirety, and he should like to see some one appointed by the Society to go round the various districts and see that the Act was properly carried out.

Mr. Cross (Shrewsbury) said after the remarks made on this amendment by several speakers, and notably by Mr. Giles, he felt that having come some one hundred and fifty miles he ought not to go back without expressing an opinion. He was not vain enough to suppose that he could add much to the force of the eloquence which had been directed against some portions of Mr. Giles' speech, but he was a distinct believer in representation, and he felt that unless they came up from the country periodically to confer with their friends in London, pharmacy would degenerate into a very hole and corner sort of business. It seemed to him most inopportune, when they were concentrating their whole energies on improving the regulations for educating students, that they should be told that after forty years of education the educated men were selecting worse men for the Council than their predecessors did. He believed every member, if he considered the immense amount of work which devolved on the members of the Council, would say that they deserved their heartfelt thanks, and would not accept the statement that some of them were men who were not fit to be associated with medical men. With regard to the publication of the reports in the Journal, it would be most unfortunate to those who resided in the country if they had not an opportunity of reading from time to time what took place in the Council. Mr. Giles said a large sum, which was annually increasing, was spent in the travelling expenses of country members, and intimated that the money was thrown away, but that he must contradict. The more they got the influence of various parts of the country brought to bear on the question of pharmacy, the better the legislation would be for pharmacy as a whole, for it did not exist only in London. In conclusion, he believed that if the country chemists took more political action in pharmaceutical matters they would have fewer of these bickerings which Mr. Giles had referred to.

Mr. Ellinor (Sheffield) said if it was said that London members should form a larger proportion of a Council he believed the country members would object, and would cease to subscribe; and if, as he believed was the case, the country members subscribed a great deal more than the London members, it must be conceded that they should have the privilege of sending members to the Council. They all knew it was a great convenience to have a sufficient number of London members, in fact, the Society could not be worked without, because emergencies cropped up which could only be attended to by London members. As to their liability, it depended on those who sent them to select suitable members, and he had no fault to find with the present Council. Coming to the question of the Pharmacopœia he thought its compilation should be in the hands both of medical men and pharmacists, and nothing less should satisfy them, because if they had pains and penalties imposed on them, if it was a contract, and the parties named in the contract should be fairly represented. The Pharmacopœia was not a physician's prescription book in the sense Mr. Frazer gave it; it was really a guide and a standard, and therefore it was not the production of one man or the invention of one individual practitioner, it was a number of formulæ compiled for the guidance both of pharmacy and medicine, and both branches should be equally represented on the Committee which prepared it. He thought there should be one pharmacist from Scotland and Ireland, and four appointed by the Council, and if six members of the medical profession were joined with them, that would form a committee which would work well. The senior member for Sheffield had charge of the Medical Bill, and it was his intention to appeal to him and put this very vividly before him; and having met Mr. Mundella many times he knew his plan of reasoning, and should have great pleasure in going before him, because he knew he should receive the courtesy of a man of intelligence who was desirous of doing that which would be best for all concerned. As regards apprenticeships, if Mr. Paterson was desirous of taking in these youths, let them have their two years' classical education before they became apprentices. The difference would then be solved. The Science and Art Department lectures were not suitable for pharmacists. It had been found in Sheffield and other large centres that their students would not go to them, because they were of no use to them. He considered that in all large centres there should be schools established, and it should be made the aim of young men to qualify themselves in a sufficient number to give lectures on these scientific subjects. If they were properly qualified they ought to be qualified to teach. The plan had been tried in Sheffield, but failed owing to the want of a sufficient number of students. Lectures had been organized and some members had given lectures, and even provided specimens and materials without charge; but unfortunately the students did not come forward in such numbers as they ought to have done, and even those who received the benefits and were materially aided in their preparation to pass the examinations, though they had afterwards commenced business in the town, had not even joined the Society. This was a thing which was much to be regretted, and was not creditable to the parties concerned. Every one connected with pharmacy ought to be a member of the Society, as the door of membership was now open to them. He hoped the country associations would be better supported by different members in the trade, for it was disheartening to find that in large centres only a few members could be got together when an interesting paper was to be read. They all knew of the case of the citrate of caffeine poisoning, and he should like to ask how far the Adulteration Act interfered with the operation of the Pharmacy Act and the discretion of chemists. The chemist who dispensed that citrate of caffeine was told by the medical man that he ought to have known better than to have given it; but if he had done otherwise in dispensing that prescription, would what he supplied have been of the nature and substance of the article demanded? He had written to the editor of the *Lancet* to ask this question. The reply he had was that his letter would be published in the following number, but it was not published, and he still remained without this important information, which he hoped to have obtained from such a high authority, whether the responsibility which rested on the chemist was or was not interfered with by the Adulteration Act. They had had prescriptions written by medical men taken to an analyst, in order to test the chemist. If a chemist were to be tested by a prescription containing a large dose of poison, say 20 grains of iodide of potassium, when they knew that 2½ grains would sometimes produce very serious effects, and they could not get any information who had written the prescription or what it was for, were they to use their discretion or not? And if they were compelled to dispense it as it was written and any mistake arose, who would be responsible?

Mr. Howard Hall said he rose principally because Mr. Giles had cast some unfounded aspersions, as he considered, on the outgoing Council. He thought they had every reason to be satisfied with the report, which was one of the most encouraging they had had for several years. The income was not only larger by £194 than last year, but it showed a considerable increase on the year 1880, whilst the expenditure also showed a great saving. He was sorry to see the decrease in the number of pharmaceutical chemists, which was a very serious fact which had been alluded to at former meetings, and if it went on the time must come when there would be none left. The number of those who passed the Minor examination showed an increase which was gratifying, and so were the figures in connection with the Journal, which showed a profit of upwards of £400. The question with regard to the surplus was, What did the Council intend to do with it? Could they not improve the character of the Journal? Why should they not improve the character of the Journal? Why should they not spend £100 or £200 more in original contributions and in engravings? Why should they look to America and other foreign countries for matter for the Journal, and why should there be so much reprint from kindred publications? He would ask those who managed it to try and make it a truly representative organ. The travelling expenses of country members had been referred to, and he would ask why should not country members pay the expenses of their representatives in coming up to attend the Council meetings?

Mr. G. W. Sandford asked whether the proposal to change the investments of the Society included the property of the Benevolent Fund.

The President said, Yes; both the Benevolent Fund and the General Fund.

Mr. Sandford said he entirely disapproved of the change, and thought it would not benefit the Society financially; they would have to set up a staff of collectors, clerks, and decorators, and probably get less return for their capital in the end than at present. He remembered perfectly well that this subject was discussed in Council whilst he was a member of it over and over again, and was always decided in the negative. There were great difficulties in the way; in the first place, by the Charter they could not invest more than sufficient to yield a certain income in property, and they could not at any time sell or dispose of that property without calling a general meeting of the Society. He feared these difficulties had been scarcely calculated on in coming to this resolution; he should make no motion about it, but he felt it his duty to leave a protest on the records of the Society that he thought it bad on principle and most unwise. With regard to the question of pupilage he was quite of opinion that a preliminary examination should be passed before any youth was taken into a pharmacy at all, but he wished to know whether the regulation meant that he must spend three years in one special shop; the words would seem to imply that he must enter upon his apprenticeship immediately after passing the Preliminary examination, though that perhaps was not intended, and also that he should pass the three years in one shop.

The President said that was not the intention.

Mr. Stacey entirely endorsed Mr. Sandford's view with regard to the proposal to alter the investments. He would not detain the meeting further on the education clauses, though there were many points he might raise a serious objection to. He thought the scheme was incomplete and wanted more consideration, and was sorry it had come forward in this report in the form it had. He should, therefore, have been glad if these two parts of the report could have been referred to the incoming Council. When Mr. Paterson referred to the first and second clauses in the educational part of the report, the President corrected him in his reading, but it seemed to him very clear that the young man was to pass his Preliminary examination before he could take up his apprenticeship, or become a pharmaceutical student. Mr.

Martindale had referred to youths being apprenticed at sixteen, and having four years before they need go through the curriculum, but he thought he had lost sight of the possibility of a parent wishing his son, who might have attained the age of eighteen, nineteen, or even twenty, to become a pharmaceutical chemist, and he thought it would be a pity to throw any difficulty in the way of those coming forward later in life.

Mr. HUMPAGE said he very much respected the opinion of Mr. Sandford, but with regard to the change in the investments, it appeared to him that when they had twenty-one men on the Council, men of intelligence and judgment who had the interest of the Society at heart, he could not suppose they would do anything unjust, and, therefore, when they came forward and said it was their intention to do so and so, he must confess, individually, he felt more confidence in what they proposed than in what outsiders might think. With respect to apprenticeship, he was decidedly of opinion that three years was not too long; in fact, it was not long enough. It was said that young men of genius were prevented from qualifying themselves and going into business early; but he had never known an exception to this rule, that when a young man had been able to pass the examination young, and go into business at an early period, he regretted afterwards he had not waited a few years longer, therefore anything which tended to defer the time of entering business was rather an advantage than otherwise.

Mr. RICHARDSON said he wished to say one word in answer to the cruel remarks of Mr. Giles—

Mr. GILES said he had not said a word which reflected on a single member of the Council. He was himself a member of the Council in 1853, and thought he was entitled to be there; but it would have been a deplorable thing if the Council had consisted of twenty-one R. W. Giles's. All he had said was, that whatever the claims of any one individual to represent any one locality might be, it was a pity that the calibre of the Council did not, as a rule, stand as high as it did twenty-five years ago.

Mr. RICHARDSON said it was a great pity that Mr. Giles should have retired from the Council at all; he was sure its calibre would be sustained by his eminent presence, if he would return to it. He should be very sorry to sit there as an exhausted volcano, and to have such strictures passed on their efforts to represent the great body of pharmacy, and he did take exception to Mr. Giles's dictum as to the members of the Council being selected exclusively from the London members of the trade. The country members constantly complained that they were not properly represented, and the town members did not thoroughly understand the method of conducting business which their country brethren had to go through.

The VICE-PRESIDENT said he would not say much with regard to what Mr. Giles had said as to the composition of the Council. He had now made a further explanation which did not, however, much affect the matter. Of course he did not say anything with regard to any particular member. He had too much respect for Mr. Giles's reasoning powers, as well as for his knowledge of the history of pharmacy, to question much that he had said, but he did take exception to his view of the position of the Council. No doubt in those glorious old days of the past, to which they were always poetically referring, there was the grand array of heroes to which he referred, but as he belonged to the unknown class, he could very fairly point to the President, and was quite ready to compare him with any man who had gone before. If there was a good all round man, not simply a scientific man, but one capable of representing the Society anywhere and with anyone, it was the President. It would be a great pity if the question of town and country were ever raised with regard to representation. Both great sections of pharmacists had their fair claim to representation, and he thought the present condition of things was relatively perfect. Those in the country felt that they owed a debt of gratitude to the London members, some of whom, like the President, were almost entirely absorbed with the work of the Society. There was often work which required prompt, immediate and urgent action, which must be taken in hand before members could be summoned from the country. The country pharmacists were fairly represented in quantity, whatever might be said about the quality, and the London members were most ably represented. He emphatically disclaimed the idea that the Society did not originally contemplate the protection of the trade. There were three things set forth at the foundation of the Society; and they were all included in the charter; education came first and a long way in advance of any other, but then came the protection which every incorporated body did contemplate, and, thirdly, benevolence. The two great points in the Report seemed to be these: Pharmacopœia revision, on which there seemed very little difference of opinion; but he wished to express his view very distinctly that they should ask for nothing less than a co-ordinate power in the preparation of the Pharmacopœia. He did not mean a departure from the existing lines by certain individuals eminent men being asked to assist, or that the Medical Council should come and ask them as a Council for assistance, although that would be a great gain, but they wanted the Legislature to enact in some Bill that in the preparation of the Pharmacopœia pharmacists should have a co-ordinate power. With regard to the curriculum, so much had been already said that he would only add that their object as a Council was not to place additional difficulties in the way of students entering the calling. The fundamental thought was this, to facilitate the progress of all duly qualified young men, and it was because they had seen so large a percentage of failures arising from want of due preparation that this scheme was devised. They could not legislate for exceptional cases or for genius, but for average men. Some charges had been made by previous speakers against the Society for not fostering provincial associations and providing the means of pharmaceutical education in the country; but as long as he could remember, one of the great things which had been constantly urged in the Journal and talked about in the Council meetings was the fostering of such associations. They had always said, let the schools be formed and they shall receive assistance, and that was what they said now. There were a few very valuable and flourishing organizations in the country, but not so many as he should like to see.

Mr. Vizer's amendment was then put to the meeting and lost by an overwhelming majority.

Mr. PATERSON then moved the following amendment:—

"That no change in the examinations be made at present."

When speaking before, the President said that the rights of present apprentices would be respected, but he would call his attention to the last note in the transactions of the Journal of March 10, 1883, which seemed to indicate that those at present in the business, unless they passed the Preliminary before the end of the present year, would have to do so, and then under this regulation go back for three years' apprenticeship, which would be a great hardship and ought not to be inflicted on anyone. He did not object to the educational standard at which they were aiming, and all he wanted was they should not shut the door against possible candidates without any good being effected. When he spoke of errand boys, he did not mean that they were to take every errand boy and make him a chemist; but if an errand boy showed exceptional ability and perseverance, why should he not be allowed to go on and pass his examination without requiring him to spend a length of time, which people in his circumstances could very ill afford. With regard to provincial education, in Aberdeen a fully equipped school of pharmacy was started and they applied for a grant from the Society, the result of which was they were offered the liberal donation of a loan of £10 worth of glass instruments to be returned in the same condition three years afterwards. Under the Endowed Schools Act they had been able to get over all the difficulties; they had a large and growing technical school, and at the request of the Association the college had taken up the matter of pharmaceutical education and was giving both the classical and technical education necessary for chemists. He therefore spoke in no sense as seeking anything for Aberdeen, because they were thoroughly provided with the means of education, and he therefore felt more freedom in speaking for those parts of the country which did not enjoy the same privileges. It was a great hardship on lads who were not in the same position to get the education necessary that they should be put to the trouble and expense which this proposed curriculum would impose upon them. Mr. Ellinor said the instruction given by the Science and Art Department was not suitable for their students; this he was quite aware of, but why should it not be made suitable? A plan had been suggested which would meet the difficulty, namely, that those who came up to London and completed their studies should return to the country and give lectures, receiving from the Science and Art Department that remuneration which they would not otherwise obtain. He wanted to see education brought to the doors of the young men as far as practicable, and when that was done, he saw no reason why examinations should not also be held locally. In Aberdeen, doctors could receive their diploma, and he did not see why medical men should be sent out to prescribe and at the same time their apprentices could not be qualified to dispense their prescriptions.

Mr. Candy seconded the amendment.

Mr. Whittle did not think it expedient to have errand boys turned into chemists. He believed what these gentlemen wanted was cheap labour.

The President said this question had been thoroughly discussed over and over again for several years, and he would therefore now put the amendment.

The amendment was put and lost, and the original motion adopting the Report of the Council was then carried almost unanimously.

Mr. Sandford then moved the following resolution of which he had given notice, namely:

"That in the opinion of this meeting certain provisions set forth in the proposed Bill to regulate the Sale of Poisons and alter and amend the Pharmacy Acts require alteration, especially clauses 4 and 5, which render retail vendors of patent or proprietary medicines who have not and cannot have any control over the required labelling of such medicines liable to prosecution for insufficient labelling, for which offence the proprietors only should be and can be made responsible."

It might seem that having been so long associated with his friends on the Council, to which association he looked back with great pleasure, that he should be very chary in finding fault with anything they had done; but he felt that he had a duty to the Society as well as to his old friends on the Council, and if members joined him in this protest against what he considered a most unjust proposition, the Council would be relieved from a great burden, because if the thing passed as they proposed it, it would be a perpetual blister, and a very ill reflection on those who framed the measure. The President had said that the Bill had been framed somewhat in obedience to the wishes of the Government. No doubt it was framed at the request of the Government, but it was framed by their own Council, and while it should be framed to fully protect the public from all harm which might arise from neglect, it should be so framed as not to inflict on chemists and druggists, whom he might call innocent persons, a great hardship. The first objection brought forward to his proposal was the necessity for proving the purchase; but the necessity for proving the purchase of a patent medicine did not exist as it did in the case of an ordinary poison, inasmuch as patent medicines were not purchased for criminal purposes. They did sometimes inflict mischief by careless use, and sometimes he was afraid they were used as intoxicants, at all events they got a character of that kind, and it was on that particular point the Government were anxious to have restriction. He remembered a case in which a prosecution was instituted, in the matter of Hunter's chloral, for instance. Another objection put forward was that chemists in selling poisons should be treated as grocers and all other people were in the sale of adulterated articles, but he submitted that the two cases were entirely different. The man who sold adulterated mustard or jalap was supposed to be a man educated for his business and to know when he handled his mustard or jalap what he was handling. Therefore, if a qualified man sold an ounce of jalap which was adulterated he became *particeps criminis*, and should be punished accordingly; but not so with a patent medicine which was sealed up. If he opened the packet he destroyed the seal, and therefore he had no means of knowing whether it was labelled "poison" or not, and in many cases there were no means of knowing whether the article contained poison or not. If this Poison Bill were passed for patent medicines there would be a greater tendency than ever to send out patent medicines containing poisons without a label of that kind, because the word "poison" would to a great extent hinder the sale of a patent medicine, and therefore chemists would be placed in more direct danger, since if the maker did not describe it as poisonous, they did not know that it was so and could not open it and examine it. He regarded the seller of a patent medicine simply as a postman delivering a sealed letter. Then they were told that the retailer must be immediately attacked, because it was difficult to get at the proprietor. He said it was not; every patent or proprietary medicine had on it the name of the proprietor, and if you could not get at the proprietor of the medicine, how were they, who had been fined, to get at him to be reimbursed. They were to be fined £5 for selling a patent medicine improperly labelled, and their names would be sent forth to the world as having been convicted of an offence, which was not pleasant. They would know amongst themselves that it was no offence, but the world outside would not know it. The sixth clause provided that they could recover from the person from whom they bought, either from any intermediate seller, or from the proprietor, and this would lead to a nice little crop of law suits. Then again, they were to recover from the proprietor the amount expended in the penalty and costs; but he should like to ask what would be done in such a case as this. If he committed a first offence in the selling of Hunter's chloral, he would be fined £5; a month after he might commit another offence by selling somebody else's patent medicine improperly labelled; that would be a second offence, for which he might be fined £10. But would the proprietor of the second medicine have to reimburse him his £10 and the expenses he had been put to in the matter; it would certainly be a great hardship on him if it were so. If he could canvass the Council individually he believed they would agree with him that this clause should be struck out. It was perfectly easy; he had a clause written which would make it easy at once to attack the proprietor. He knew there was something said about patent medicines or proprietary medicines brought from abroad, but he would provide for that by enacting that every maker of a patent or proprietary medicine in Great Britain or Ireland should mark it with his name and address and the word "poison" or "dangerous," or whatever was required, and he would have the same requirement on every importer of foreign medicines of the same character. There were one or two other blemishes in the Bill, but this was the most important, and he thought it would be best to confine themselves to this point first.

Mr. Urwick seconded the motion.

Mr. Mackenzie was delighted to see the position taken up by Mr. Sandford, and had great pleasure in supporting it, for he had objected to this all along as being most unfair. He believed the clause would never pass the House of Commons in its present form, but he hoped every individual would bring his personal influence to bear to get all that was good in the Bill and expunge that which was objectionable. If it were passed as at present it would be a constant source of irritation. Whatever went to Parliament it should really do what it represented, and he remembered a case where a Bill was turned out because it did not correspond with its title. Was it right that sulphuric acid should come under the class of things no longer to be labelled "poison," but only "poisonous"? It would look like changing the meaning of words, and that was a precedent which ought not to go from that Society.

The President said he would appeal to the meeting if it were at all likely that twenty-one members of Council would deliberately tie their hands by any proposition unless there were good grounds for it. He had before him the clauses which Mr. Sandford referred to, about importers and so on, and he seemed to think it was a very easy matter. But not having so much perception gained by long experience as Mr. Sandford, he failed to see how the clauses he had drawn would meet the case. If the sale of poisonous patent medicines were to be restricted to registered persons these clauses would not meet the case. If they did not want any responsibility whatever they must leave the patent medicine poison question altogether; but they desired that the sale should be restricted to registered persons, and they had had requests from other bodies that they should be so restricted. If this were so some responsibility must be thrown on the seller. Why should the chemist and druggist be allowed to sell these things without any responsibility at all? It was out of harmony with all previous legislation. It might be desirable not to touch the patent medicines containing poisons, but the subject was not one to be dealt with off hand in that way. With regard to the penalties, Mr. Sandford certainly had a case. A cumulative penalty might probably prove inconvenient and could easily be struck out. But some of them had had experience in working out the provisions of the existing law, and knew how difficult it was to carry out the Act satisfactorily. Their object was to draw clauses which when passed should work. But supposing Mr. Sandford disapproved of their action with regard to all poisons and became a disconsolate member of the drug trade and retired to Boulogne, what was there to prevent his inundating the whole of this country with poisonous patent medicines through an assistant at Folkestone having his name, "George Webb Sandford, Boulogne-sur-Mer," on every package? He was the proprietor, and how was he to be approached. You could not summon a man who lived at Boulogne, because he was out of the jurisdiction. It was the commonest thing for men who owned proprietary medicines which were not allowed to be imported into a foreign country to go there, make them, and put a label on the article with their proper domicile, and persons anxious to create a trade in poisonous patent medicines would adopt some such plan for evading the law. It was because they were advised that they could not satisfactorily deal with such cases and further reasons that this dreadful clause six was put in the Bill. It seemed very hard that when a man sold a patent medicine improperly labelled he should be fined; but he thought it necessary that pharmacists should exercise judgment even in connection with these patent medicines, if they claimed to have the exclusive right to sell them. While he objected to anything which would tend to involve anyone in law suits, they knew that the patent laws could only be worked on the basis that the person who sold the article which was infringed was made liable. No doubt in this case the damage to the reputation of a chemist was greater than that to an ordinary tradesman who infringed a patent, and he was willing to meet Mr. Sandford as far as possible; but he could not see his way to draft a clause which would meet all the difficulties which would crop up. He, therefore, asked members to place confidence in the Council and not to run away with the notion that they were to be sacrificed for a mere whim. As regards importation, Mr. Sandford said the importer should have his name on the medicine; but who was the importer? Every one in the room might, at some time, import a foreign patent medicine, but he did not consider himself the importer. Mr. Sandford would, no doubt, consider that one particular person was the sole importer of any particular article; but that would never be so in the present condition of trade. Some men would send to New York or Philadelphia and give their orders direct, while others would obtain the medicine through Barclay's, or some other wholesale house. The practical working of it would be that whenever a man bought a new patent medicine about which he had the slightest suspicion, he should ask whether it contained poison, and the large patent medicine houses would decline to touch anything which contained poison unless it were declared so, in order that they might be protected, and it would be for the good of the public that it should be so.

Mr. Hampson asked if Mr. Sandford would be satisfied if this clause were remitted to the Council for re-consideration. There would then be an opportunity of reviewing the matter, and if it could be amended with the help of Mr. Sandford, they would all be glad to do so. The view presented by the President was quite as strong as that presented by Mr. Sandford, and he believed those who prepared these articles would find it to their interest to conform to the law, whatever it might be.

Mr. Long said the difficulty would be this, he might be asked for a box of Snook's Pills or Thompson's Elixir and supply it; then the next day he might hear that the person had died, and that might be the first he knew that the article contained poison. It was a pig in a poke altogether. He did not see why they should have a Bill which put a yoke on their own necks. If they knew an article was poisonous they would conform to the regulations. Supposing a manufacturer forgot to label a bottle by accident, the chemist would be liable to a £5 penalty.

Mr. Johnson asked if this Bill were carried would the Pharmaceutical Society undertake to define what patent medicines required the name and address of the seller, otherwise they would not find out until after an accident happened whether it contained poison or not.

The President said there were various ways in which the Society might protect the members, and it would, no doubt, be willing to do so.

A Member asked if it was not possible to make manufacturers register the contents of their medicines.

The President said that might be possible, but then there would be the difficulty with importations.

Mr. Christopher Wheeler said there were numbers of things constantly coming out which were not patent medicines, but only nostrums covered by a Government stamp. If it was the duty of anybody to put on the poisonous label it should be the manufacturer. They should not put the saddle on the wrong horse if they could help it. He believed there was no such thing in the country as a patent medicine; they were all secret nostrums, and the maker of the nostrum, if it were dangerous, should be compelled to label it.

Mr. Urwick asked if a medical man prescribed Fellows' Syrup, would it be necessary to mark it poison.

The President said not when it formed part of a prescription. If they sold an original bottle of any preparation containing poison without a label, it was a question whether, under the existing law, they were not liable to be fined.

Mr. JOHNSON said he had had a prescription simply "one bottle of Fellows' Syrup"; how was that to be dealt with?

The PRESIDENT said his opinion was that in such a case if the preparation contained poison that it should be labelled.

Mr. ALLEN said if they were to ask for legislation sanctioning the making and vending by unqualified men of poisonous preparations, they were going altogether from their position.

Mr. HUMPAGE thought the matter had better be referred back to the Council with the assistance of Mr. Sandford.

Mr. SANDFORD said, seeing what the Council had done in the matter, he was not inclined to leave it in that way. It had with its eyes open committed a great blunder, and proposed inflicting a great hardship on the trade. This was not a proposition by the Government, it was the proposition of the Council itself, and they should not leave the room without an expression of opinion that it was disapproved of. The President had spoken of an Englishman going to France, and then sending his patent medicine to England, but it then became at once an imported article.

The PRESIDENT said that was not the case he put, but of an Englishman making the preparation in England, but residing in France.

Mr. SANDFORD said that would be a very exceptional case. They were asked if they were not to give some equivalent. An equivalent for what? for confiding to the qualified body the sale of those patent medicines which contained poison, not patent medicines generally, but simply those which were dangerous. Was that to be an equivalent for subjecting themselves to such penalties and disgrace as might be brought upon them by this clause? It was altogether unreasonable. He had prepared a clause that would take the place of clauses 4, 5 and 6, and be just as much protection to the public, whilst it would not expose chemists and druggists to what they were now threatened with. He hoped the members would support his motion.

Mr. SCHACHT asked whether the resolution, if adopted, was to be a direction to the Council to make a new clause in accordance with the motion.

The PRESIDENT said it would be the opinion expressed by the meeting that it was desirable the clause should be amended. They could not do more than that.

Mr. SCHACHT asked if the next General Meeting might not think it rather hard if they were told that the resolution could not be carried out. Yet that was really the position. The matter had been very carefully considered and the Council did not see the possibility of doing what was desired.

Mr. WILLIAMS said he should not have spoken, but for what had fallen from Mr. Schacht. But he must now be allowed to say that throughout he had been in opposition to the majority of the Council on this point. He thought Mr. Sandford's proposal was the right and reasonable one.

Mr. HAMPSON said that he would move an amendment—

"That the clause be remitted to the incoming Council for further consideration."

Mr. SANDFORD thought it was unfair to move an amendment after he had replied.

The PRESIDENT said it was quite in order to move an amendment before the resolution was put.

Mr. HAMPSON said his amendment was very much in harmony with Mr. Sandford's proposition. The clause had not been framed without considerable care, and very full legal opinion had been obtained. He was quite sure the incoming Council would bear in mind the strong expression of opinion which had been given against the clause as it stood, but he was quite prepared to go into the whole question again.

Mr. REES seconded the amendment. He thought the resolution would only have the effect of facilitating the general sale of patent medicines wholesale by everybody. If everybody were allowed to sell poison in the form of patent medicine, why not sell it in the form of a vermin killer? That was why it was proposed to restrict it solely to chemists. He thought the dilemma which it was said they would fall into was purely imaginary. If the proprietor of a patent medicine was made to pay one fine he would take good care not to incur the penalty a second time.

Mr. SANDFORD said they knew the next Council would be almost identical with the present, and he was not prepared to leave it to the next Council without a strong vote on the part of the meeting, as a message to the Council to the effect that they would in every way oppose a Bill containing such a proposition if it were placed before Parliament.

The amendment was then put to the meeting and lost, the votes being 46 in favour of it, and 49 against.

The resolution as moved by Mr. Sandford was then put and carried.

Mr. SANDFORD said there were one or two other clauses in the Bill which required notice. In the clause referring to persons having more than one shop, he would strike out the word "branch," and insist on every man who kept more than one shop having a qualified assistant in each. You could not tell which was the branch shop and which was the parent shop. The proprietor must leave his shop to go to the branch, and it might become a question which was the branch shop and which was the other. One other point was that clause 3 did not go sufficiently far; it was framed after the trial and conviction of Lamson, and it was thought desirable to prevent such offences in future. The clause as it stood might perhaps bring a murderer to justice, but it would not prevent a murder. What they wanted was certain power, which some exercised already, to prevent the sale of certain potent drugs on personal application to men pretending to be doctors. He did not in any way wish to affect wholesale dealing in the ordinary acceptation of the term. To give an instance, a man came into his shop not long ago and ordered a very strong preparation of morphia. He happened to see the prescription, and asked to see the person who had ordered it; he was told the man had written the prescription on the counter, and was going to call for it. He told the assistant not to let him have it, and when the person called he told him he could not sell such a medicine as that to a stranger; the reply was, why did they take the order? He said because it was thought he was a medical man, which he at once disclaimed, and that was just the difficulty. Some people did not like to offend an apparently respectable man, and therefore he would give them the same kind of authority as they had for selling the articles in Part 1 of the Schedule, namely, requiring personal knowledge or introduction. He thought it would be a great relief to chemists generally if they had that kind of authority for refusing to sell to a stranger two grains of aconitine or strychnine; he would not interfere with morphia or opium, because it would sometimes be very inconvenient. The clause for keeping orders for twelve months would still remain in force. He was told that this might be a great hardship on a medical man who was called into a country town, and wanted to give a patient aconitine. Such a thing would scarcely ever happen, and if it did, the medical man would have been summoned by someone in the town who would be known to some chemist, and would vouch for the medical man who wanted the article.

Mr. MARTINDALE agreed that the word "branch" might be omitted, but he thought the last proposal would be impracticable. Would Mr. Sandford apply it to hypodermic injections. He thought they ought not to make laws to meet particular cases; the end desired would be much better met by requiring medical men to write their orders on a printed form, giving their name and address, so that the chemist might know who was the prescriber. He knew it was a rule of the College of Physicians that a physician should not sign his name in full to a prescription, but he thought the rule was very absurd, and that the public safety should override such regulations.

Mr. SCHACHT, referring to the resolution already passed, said he did not feel at all pleased at the prospect of having to alter the clause in accordance with the instructions the meeting had given, because, as far as he could see, it could not be altered. He would suggest that the meeting should appoint a small committee to confer with the Council to see whether it could be done, his opinion being they would find, on investigation, that it could not. What was the offence which was to be punished? The offence was the retailing of the poison, and that was not committed by the manufacturer.

Mr. SANDFORD said it was out of order to raise the question again.

Mr. SCHACHT said he thought it was quite regular in order to carry it out that a committee should be appointed.

Mr. UMNEY seconded the proposal; it would be very unwise to come to any hurried conclusion in the matter, and it would be far better to appoint a sub-committee consisting of three gentlemen, to confer with the Council.

Mr. SANDFORD said his resolution was that the clause, as drawn, should not be carried out to make the retailer responsible; there was no difficulty whatever about it, and no occasion to appoint a committee. It would be quite useless to appoint three gentlemen to meet twenty-one.

The PRESIDENT said he agreed with Mr. Schacht's proposition, but he thought perhaps it would be better not to press it.

Mr. SCHACHT said he thought such a committee ought to be appointed, and he would move that the Committee consist of Messrs. Sandford, Umney and Martindale.

Mr. SYMES asked Mr. Schacht to withdraw the resolution; almost everyone present had discussed the matter, the Council was fully in possession of the opinion of the meeting, and would no doubt do its utmost, notwithstanding what had been said about the impossibility, to bring the clauses to which attention had been drawn as far as possible into conformity with Mr. Sandford's wishes. He rather regretted that while Mr. Sandford would release the trade from one difficulty he should try to saddle them with two more, because such a regulation as he had just suggested would be of no use unless surrounded by pains and penalties.

Mr. FRAZER wished Mr. Schacht would withdraw the motion.

Mr. SCHACHT said though a great many opinions had been expressed in favour of Mr. Sandford's resolution, the view on the other side had only been put forward by the President, and though he might accord in what had been said, the whole of the case had not been stated. He therefore thought it better to have a small committee, who should have an interview with the Council and hear what could be said on the other side.

Mr. SANDFORD said he could not sit on the committee, as he did not now reside in London.

Mr. GILES said supposing the committee were formed, and were to come to a new conclusion, how was the resolution to be carried out.

Mr. WILLIAMS asked to whom the committee were to report.

The VICE-PRESIDENT said he was quite sure the incoming Council would respect the opinions which had been expressed. It was always an unpopular suggestion to make that the *vox populi* at a public meeting was not always the *vox Dei*, but such might be the case. He had no particular affection for the clause, and was quite willing to go into the whole matter again; but if having done so, the Council failed to alter its deliberate opinion, he feared some members might think it had played them false.

Mr. EKIN was afraid the Council would be rather open to that imputation; the vote was very close, and on that ground he would urge that the Committee should be appointed, and also to save the Council from any imputation of falseness. Certain members of the Council said it could not be done, whilst Mr. Sandford said it could; if, therefore, a committee were appointed to confer, it would save the Council from the responsibility of refusing to carry out the resolution.

Mr. STACEY said the resolution had been passed, and he thought it was the duty of the Council to carry it out. He was sure the Society would not feel that confidence in the Council which they ought if the Council imposed such burdens upon them as that they should pay for other people's faults.

Mr. HAMPSON said that supposing after consulting their legal adviser and taking counsel's opinion they were told that a clause such as Mr. Sandford desired could not be framed, what should be done then?

Mr. SANDFORD said he should laugh at any counsel's opinion to such an effect. This clause was nothing but one for the multiplication of law suits.

Mr. CANDY asked if Mr. Sandford could make an alternative proposition. The resolution had been carried only by a narrow majority, but if it represented the sense of the meeting, the meeting ought to take some steps to assist in carrying it out.

The motion for the appointment of a committee was then put and negatived.

Scrutineers of the voting papers were then appointed.

The Registrar laid on the table the various Registers as required by the Act of Parliament.

Mr. SANDFORD moved a vote of thanks to the President and Council, who he was sure had worked most heartily for the good of the Society during the past year.

Mr. GILES seconded the motion, which was carried unanimously.

The meeting was then adjourned until Friday, the 25th inst., at twelve o'clock, to receive the report of the Scrutineers.

ADJOURNED GENERAL MEETING.

Friday, May 25, 1883.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

The adjourned meeting for receiving the report of the Scrutineers was held on Friday, May 25.

Mr. HOPKIN, as Chairman of the Scrutineers, in presenting the report, remarked that although the number of voting papers received this year was slightly in excess of that of last year, nearly two-thirds of the Members and Associates in Business had failed to exercise their right of voting in the election of Members of Council.

The SECRETARY stated that failures to return voting papers were about equally distributed among the three classes of Pharmaceutical Chemist and Chemist and Druggist Members and Associates in Business.

The following is the—

SCRUTINEERS' REPORT.

We, the undersigned scrutineers, appointed at the Forty-second Annual General Meeting of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us, and report the following:—

Voting papers reported by the Secretary to have been issued	3662	
Voting papers received	1370	
Voting papers issued but not returned . .		2292
Voting papers received		1370
Voting papers disallowed:—		
Informal	18	
Received by post too late	47	
	—	65
Voting papers registered		1305

Result of the Poll.

Bottle	1199	Radley	1077
Symes	1193	Butt	1053
Hampson	1183	Richardson	1036
Atkins	1178	Andrews	1016
Savage	1172	Borland	965
Woolley	1137		
Carteighe	1130	Baldock	689
Hills	1103	Young	630
Robbins	1103		

W. K. Hopkin, *Chairman.*

Charles J. Mead	T. Howard Hall.
Robt. Rowe.	Robt. Saml. Bathe.
T. E. Greenish.	Chas. B. Allen.
Jno. T. Tupholme.	Alfd. E. Tanner.
Wm. Matthews.	Edwd. B. Stamp.
Wm. F. Gadd.	George S. Taylor.
W. Murton Holmes.	W. H. Symons.
J. S. Ward.	Henry Mathews.
I. Bourdas.	William Gulliver.

The New Council.

The Chairman then declared that the following gentlemen would constitute the Council for the ensuing year:—

Andrews, Frederick, 34, Leinster Terrace, Hyde Park, W.

Atkins, Samuel Ralph, Market Place, Salisbury.

Borland, John, 7, King Street, Kilmarnock.

Bottle, Alexander, 37, Townwall Street, Dover.

Butt, Edward Northway, 13, Curzon Street, Mayfair, W.

Carteighe, Michael, 180, New Bond Street, W.

Churchill, Walter John, 46, New Street, Birmingham.

Gostling, Thomas Preston, Market Hill, Diss.

Greenish, Thomas, 20, New Street, Dorset Square, N.W.

Hampson, Robert, 205, St. John Street Road, E.C.

Hills, Walter, 225, Oxford Street, W.

Radley, William Valentine, 42, Hampton Road, Southport.

Richardson, J. G. F., Elmfield, Stoneygate, Leicester.

Robbins, John, 147, Oxford Street, W.

Savage, William Dawson, 4, Park Road East, Brighton.

Schacht, George F., 52, Royal York Crescent, Clifton, Bristol.

Squire, Peter Wyatt, 413, Oxford Street, W.

Symes, Charles, 14, Hardman Street, Liverpool.

Williams, John, 16, Cross Street, Hatton Garden, E.C.

Woolley, George Stephen, 69, Market Street, Manchester.

Young, James Robertson, 17, North Bridge, Edinburgh.

Auditors.

There being only the requisite number of candidates (five) for the office of Auditors, the Chairman declared the following duly elected for the ensuing twelve months:—

Hodgkinson, William, 198, Upper Whitecross Street, E.C.

Lescher, Frank H., 60, Bartholomew Close, E.C.

Stacey, S. Lloyd, 300, High Holborn, W.C.

Thompson, Henry A., 22, Worship Street, E.C.

Watts, William H., 32, Lower Whitecross Street, E.C.

Chemists and Druggists' Trade Association of Great Britain.

The seventh annual meeting of this Association was held on Tuesday last. The proceedings commenced with the meeting of the Executive Committee at 11, when the chair was taken by Mr. R. Hampson. He announced with regret that Mr. Haydon, the Secretary, was unable to be present from illness.

The Report which had been printed was taken as read.

The Annual Report.

The Report commenced by stating that acting under the instructions of your Committee, the Solicitor and Secretary had considered numerous cases of illegal trading in poisons. Proceedings had been taken during the past year by the Association, under the 17th section of the Pharmacy Act, against nine persons residing in London, Halifax, Nottingham, Northampton, and Hyde, for having sold poisons improperly labelled, the evidence for which was obtained by the Assistant-Secretary. A fine was in each case inflicted by the magistrates, varying in amount from one shilling to five pounds. The proceedings at the hearing of these cases were fully reported in the trade journals. The Secretary had also reported several cases of illegal trading under the 15th section of the Act to the Secretary and Registrar of the Pharmaceutical Society, in one of which a fine of £5 was inflicted.

Two cases of prosecution under the Sale of Food and Drugs Act had come under the notice of the Committee during the past year. In one, a member of the Association was prosecuted for having sold, to the prejudice of the purchaser, two ounces of mustard which was not of the nature, substance, and quality of the article demanded. It was ascertained that the inspector had asked for mustard, and had been supplied with Colman's mustard condiment, no label being affixed to the packet sold; it was, therefore, decided not to defend the case. In the second case a member was summoned to appear before the Longton magistrates for having sold lime water not of the nature, substance, and quality of the article demanded by the purchaser. From information obtained, and acting on the recommendation of the Analytical Referee of the Association, who had analysed a sealed sample of the lime water in question, the Law and Parliamentary Committee declined to defend. These had been the only prosecutions under this statute which had been submitted to the Association since the issue of the last report, but it was claimed that the prompt action of the Association in defending every legitimate case that had from time to time arisen, had tended to stamp out the frivolous, though very annoying, proceedings under the Act which were so frequent in the early days of its existence.

A member of the Association residing at Handsworth, Staffordshire, had been proceeded against, under the Weights and Measures Act, for having certain weights in his possession which were below the standard, and a grant of one guinea had been made towards the expenses of defending on the grounds that the usual notice of the intention of the inspector to examine the weights of traders residing in the defendant's district had not been given. A merely nominal fine was inflicted by the Bench.

A member of the Association having been threatened with an action by the proprietors of Jenner's Liver Mixture, for having made use of the title "Liver Mixture," the Committee had ordered the Solicitor to defend on the grounds that the words "liver mixture" have been for many years in common use in the trade, and that it is not advisable in the interest of the members that any person or firm should establish a monopoly over such common trade terms. No writ had, however, been issued and it was concluded that the proprietors of the trade mark now deemed it inexpedient to appeal to the law.

A member of the Association having been threatened with an action for damages for having improperly and unskilfully treated the cut finger of a child, the Executive had arrived at the decision that the chemist had not in any way exceeded the legitimate bounds of his business, and therefore instructed the Solicitor to defend the case if proceedings were commenced. Up to the date of the Report no writ had been issued.

The Committee had carefully considered the Pharmacy Act Amendment Bill, 1883, prepared and printed by the Pharmaceutical Council, and the following suggested amendments had been transmitted to the Secretary of the Pharmaceutical Society, viz:—

Clause 2.—"That the whole of this clause be erased, and that the articles in the special schedule referred to in the clause be added to part 2 of Schedule A, to the Pharmacy Act."

Clause 4.—"Insert the word 'and' after the word 'contained' in the twenty-eighth line, and the words 'the name of the poison contained therein' after the word 'medicine' in the thirty-first line."

Clause 9.—"Add the words following at the end of the clause, viz.:—Notwithstanding the provisions of Section 16 of the Pharmacy Act, 1868, or of this Act, it shall not be lawful for any executors, administrators, or trustees of a deceased pharmaceutical chemist, or chemist and druggist, to continue the business of such pharmaceutical chemist, or chemist and druggist, for a longer period than three years, unless by permission of the Council of the Pharmaceutical Society of Great Britain."

Insert in the Bill a clause to the following effect:—

"Every person registered, or who shall be registered under the provisions of the Pharmacy Act, 1852, or of the Pharmacy Act, 1868, as a chemist and druggist, and who shall be in business on his own account, shall be exempt from serving on all juries and inquests whatsoever."

A committee had also been appointed to take such steps as might be deemed desirable to carry out the wishes of the Executive in amending the Bill. Whilst offering these suggestions to amend the Bill, the Executive expressed an earnest hope that on the introduction of the Bill into Parliament the whole trade would cordially unite in supporting it, so that it may obtain the sanction of the Legislature.

After referring to the Medical Act Amendment Bill now before Parliament, the Report mentioned the meeting of the London members of the trade, held in December last, the proceedings of which were reported at the time in this Journal.

In accordance with the request expressed at the last meeting of the General Committee held in London, the Executive had appointed local secretaries in all towns in England or Wales containing six or more registered chemists and druggists. A list of the names of these gentlemen appeared as an annex to the Report. The appointment of local secretaries in Scotland had been postponed until the Committee of the Scottish Branch had made recommendations for these posts, and the appointment of local secretaries to the Metropolitan districts had been relegated to the London Committee.

The Committee of the Scottish Branch of the Association in July last having ascertained that an application was about to be made by the Edinburgh University Court to Her Majesty in Council, for powers to make attendance at this University in practical classes in physiology, pathology and materia medica imperative, and that the instruction accepted as equivalent to a course of practical materia medica be apprenticeship for not less than two years in compounding and dispensing drugs under a registered medical practitioner, or a member of the Pharmaceutical Society of Great Britain, and as this ordinance would have precluded chemists and druggists, who were not members of the Pharmaceutical Society, from educating such students in materia medica, it prepared a memorial on the subject and transmitted to the Secretary of the Court. The Faculty of Medicine in reply stated it had been recommended that apprenticeship should be restricted to a member of the Pharmaceutical Society of Great Britain, because the fact of such membership afforded a guarantee that an education had been undergone which rendered the members of that Society, in many respects, qualified to give such instruction to their apprentices as a University might be justified in recognizing, whilst the education of registered chemists and druggists was of the most varying description, and the title failed to afford a guarantee of equal value to the title of Member of the Pharmaceutical Society of Great Britain. At the same time, taking into consideration the fact that the alternative qualification of apprenticeship to a pharmacist would affect only a limited number of students, and that the class of students so affected would generally be one whose pecuniary resources were limited, the Faculty of Medicine would be willing to coincide in the suggestion of the Chemists and Druggists' Trade Association and the University Court considered it desirable to adopt it.

Two cases had occurred in which members had been threatened with prosecution by the Board of Inland Revenue for having sold as "finish," methylated spirit, said to contain an insufficient quantity of gum resin, although the sellers maintained that the spirit, when sold, met the requirements of the general order of the Board in that particular. The Executive proposed, at an early date, to take into consideration the advisability of urging the Board to issue an additional order, making it compulsory on the excise officers to leave with the seller of spirit a portion of the finish, etc., purchased, as a protection to him in the event of errors being made by the officials who subsequently deal with the spirit.

The Report then referred to the death, after a protracted illness, of Mr. S. Urwick Jones, the first President of the Association, who occupied the chair three years in succession, and of Mr. T. B. Stead, a member of the Committee. It also stated that Mr. Alfred Wright had been appointed assistant-secretary, *vice* Mr. G. R. Templeman, resigned.

In conclusion, the Report stated that the total number of Members on the Register of the Association at the present time is 3851. The financial statement which is annexed shows that 2743 annual subscriptions and donations to the amount of £63 4*s*. 6*d*. have been received during the current year, being a considerable decrease in the amount of donations from the previous year. From this it will be seen that 1108 members are in arrear with their subscriptions.

The Financial Statement.

The Financial Statement from 15th April, 1881, to 16th April, 1883, was as follows:—

Receipts.

		£ *s*. *d*.	£ *s*. *d*.
Balance brought forward from last Account, viz.:—			
Balance at Lloyds' Banking Company, Limited, Deposit Account		859 13 2	
Ditto in hands of Treasurer		11 19 4	
		871 12 6	
Deduct Balance due to Bankers on Current Account.	415 19 8		
Law Costs, unpaid	41 15 8		
		457 15 4	
			413 17 2
2743 Subscriptions at 5*s*. each			685 15 0
Donations			63 4 6
			£1,162 16 8

Payments.

		£ s. d.	£ s. d.
Advertisements			4 16 0
Auditors' Charges			18 18 0
Bank Interest and Commission charged on Current Account, less Interest allowed on Deposit Account			0 15 5
Canvassing Expenses			5 12 9
Hire of Rooms for Public Meetings			7 15 0
Law Costs, viz.:—			
Solicitor's Charges		51 11 0	
Ditto Travelling Expenses		24 14 8	
Witnesses' Charges and Expenses		41 17 8	
			118 3 4
Office Expenses, viz.:—			
Cleaning		2 3 0	
Gas		2 18 7	
Rates and Taxes		5 3 6	
Rent		26 0 0	
			36 5 1
Postages			94 4 1
Reporting			25 1 6
Salaries, viz.:—			
Secretary		150 0 0	
Assistant Secretary		137 0 0	
Clerk		47 19 0	
			334 19 0
Stationery and Printing			97 18 10
Sundries			15 2 0
Travelling Expenses, viz.:—			
Executive Committee		107 8 3	
Secretary		28 17 0	
Assistant Secretary		7 13 0	
			143 18 3
			903 9 3
Balance carried forward to next Account, viz.:			
Balance at Lloyds' Banking Company, Limited, Deposit Account		479 12 9	
Ditto in hands of Treasurer		18 1 0	
		497 13 9	
Deduct Balance due to Bankers on Current Account	211 16 10		
Law Costs, unpaid	26 9 6		
		238 6 4	259 7 5
			£1,162 16 8

Mr. Urwick (London) moved that the Report be adopted. He said there had been fewer cases than usual of prosecution, but he hoped this would not lead to any lukewarmness on the part of the members.

Mr. Green (Woolwich) seconded the motion.

Mr. Barclay remarked that the Executive were always glad to have their work criticized, but he considered it a very pleasing feature in the Report that the number of cases had been so few in which proceedings had to be taken; it was not because cases had been neglected, but there was much less illegal trading now than when the Society was founded. There were four cases now outstanding, but they had only recently been reported.

Mr. Harrison (Vice-President) regretted to see that the finances were by no means in a satisfactory state; in fact, if they went on for another year in the same way they would come to the end of their tether and have to stop. The question was, what was to be done, and there seemed to be only two courses open, either to advance the rate of subscription or increase the number of members. He had always thought that the amount of subscription should be kept if possible at the old figure, because they wanted moral strength, which could only be obtained by numbers. The only other course seemed to be for every member in his own locality to seek out those who were not yet members and induce them to become so. This might be done by showing them what the Association had done. Seven years ago, when the Association was started there were threatened prosecutions almost every week, either by public analysts or medical societies, and everyone was wondering whose turn would come next. The Association, however, had gone on quietly doing its work, until now there were very few such cases, and no better test could be given of the success of the organization. A great general had said that the best guarantee of peace was to be well prepared for war, and to a certain extent that was no doubt true. If they wished not to be molested either from above or below they must be prepared to show a united and powerful front. He hoped, therefore, that every member would do his utmost to avoid the financial collapse with which they were threatened.

Mr. Parker (Nottingham) suggested that the Secretary should visit the various towns and call meetings with the view of getting new members.

Mr. Jervis (Sheffield) said that had been done and did not prove remarkably successful.

Mr. Green (Woolwich) hoped the subscription would not be raised. Everyone in Woolwich belonging to the trade had joined the Association simply through his calling upon them.

Mr. Williams (Manchester) thought it would be an advantage if the subscription were not fixed at 5*s.* Many could well afford to give more, and at such a time as this they ought to feel it their duty to do so.

Mr. Symes (Liverpool) was opposed to any increase in the subscription. The great difficulty was the lethargy of the trade, as shown by the number who were now in arrears; but if any increase were made in the subscription, many would hail it as an excuse for withdrawing altogether. He did not agree with Mr. Williams's suggestion that the subscription should be indefinite, because there was a donation list open. He was quite sure the advantages of the society were worth more than 5*s.* a year to the smallest tradesman in the country. An idea had occurred to him, which he would mention, though he had not thoroughly matured it. Many who subscribed 5*s.* and gave a guinea as a donation hardly felt that they had a right to the services of the Association if they were attacked; but perhaps an insurance fund might be started, by which a man paying five guineas a year would be entitled to defence by the Society. Some might say that this would be offering a premium to carelessness, but he did not see how it could act in that way, for whatever the pecuniary result there would always be a stigma on a man who had acted carelessly.

Mr. Mackenzie (Edinburgh) did not think the idea just thrown out would be of any assistance in getting them out of their present difficulties. The members were practically insured now, as the Executive took up every *bonâ fide* case; but he did not think this fact was sufficiently utilized in convassing for new members. He thought it would be well to adopt the suggestion of having the subscription 5*s.* and upwards, and let it be thoroughly understood that unless more money were forthcoming either the prosecution or defence of cases would have to be abandoned.

Mr. Cross (Shrewsbury) agreed with the last speaker. He thought the funds had suffered from the collectors having two columns to fill up, one for subscriptions and another for donations. This year, especially, it should be made plain to all their constituents that it was absolutely essential that those who could afford it should give more than the minimum. He thought the members of the Executive in their different districts ought to call the trade together and put before them the financial state of the Association and ask them whether it was to go on doing the work it had been doing, or cease altogether, for it certainly must cease altogether unless it had further support. He felt sure, in his locality, although there were no particularly burning questions to be discussed, it would be sufficient for them to see that there was the probability of a Pharmacy Bill to make chemists immediately feel that now was their opportunity to have such a thing well discussed before it became law. An Act of Parliament was not simply a charter giving more liberty, but was also a fetter on their freedom of action, and it would be a very serious thing if at such a juncture the Association should cease to exist. He had every confidence in the Pharmaceutical Council, but there was an element which the members of a trade association ought never to lose sight of. It was not to be supposed that the Pharmaceutical Council could have that knowledge of the wants of the trade as a trading community which was necessary to pass such an Act as he had referred to.

Mr. Mason (Liverpool) opposed the idea of having subscriptions of different amounts, and thought they should rely more on the action of the local secretaries. He also doubted whether it was advisable to always hold the annual meeting in London. He would suggest that it might be held at the time of the Pharmaceutical Conference; for instance it might be held at Southport this year. He should also oppose any suggestion to raise the subscriptions.

Mr. Paterson (Aberdeen) thought it was a good suggestion that the Secretary should go from time to time to various centres and hold meetings; he would then hear if there were any local grievances to be redressed and whether the Association could without much expense devote a little time and energy to such particular localities.

Mr. Jervis said he should object to what Mr. Paterson proposed. It had already been tried. He remembered when Mr. Haydon came to Sheffield and the visit was well advertised there were about six chemists came to the meeting, who were all subscribers already. It would require a great deal of money to send the Secretary down to Scotland, and they had not the money to spend.

Mr. Harrison thought it would be better if the Secretary prepared a list of the towns where the Association was numerically weak and communicate with a member of the General Committee in those districts and ask him to call a meeting of the trade with the view of discussing trade matters and increasing the number of members.

Mr. Mackenzie thought it would be more useful to visit gentlemen individually.

Mr. Cross said there were different classes of people; some were most affected by meetings, others by personal interviews, and he suggested they should combine the two.

Mr. Bell (Hull) said he should object to the subscriptions being raised. Five shillings was a fair sum, and if when the Association was started it had been fixed at a higher rate it would not now have been in existence. It had done an immense deal of good, and they should all do the best they could to get in more money. If the resolution were passed, asking the local secretaries to call meetings in the various towns, it might be one means of getting more members and further subscriptions; but if the Secretary were sent it would cause a great deal of expense. When he came to Hull there was a good meeting, but very few new members were made.

Mr. Urwick said he often called on chemists in any town he happened to be in, and generally mentioned the Association, and had found good results from it.

Mr. Barclay said some valuable suggestions had been made, but the most important of these was to go into the country and holding meetings. Although Mr. Jervis had not much faith in that mode, having taken considerable part in the formation of the Association itself, he felt sure that if the thing were taken up by the Executive a great deal of good might be done. Mr. Williams's suggestion was also worth attention; he felt sure from the donation list there would be many who would be willing to subscribe a guinea, but he should be sorry to raise the subscription.

The President, in putting the motion, said they had now arrived at a point when it was absolutely necessary for those interested in the maintenance of the Society to put their shoulders to the wheel, and make sure that the vehicle was not stopped in its progress. He believed that the Society had done immense good, and that it was absolutely desirable that it should continue to exist. There was always a large amount of apathy in the minds of chemists and druggists; but it was not confined to them by any means. The Executive when re-constituted would have to face this matter, and consider the various suggestions which had been made. Perhaps it would be a happy thing if some analyst would give them a tickling up; but irrespective of any outside attack of that sort, the common self-interest of the trade ought to be sufficient to hold them together. He could not make up his mind at the moment as to the propriety of the various proposals, particularly with regard to the amount of subscriptions being optional, instead of a separate donation list. He did not see much difference between the two, but he thought they might appeal with confidence to all those who could afford to give more to support the society better.

The motion was then put and carried unanimously.

Mr. Urwick and Mr. Paterson were appointed scrutineers of the voting list for the members of the Executive Committee to be recommended to the general meeting.

The General Meeting.

The President having taken the chair, the notice was read by the Assistant Secretary.

The report was agreed to be taken as read.

Mr. Harrison (Vice-President) having referred with regret to the absence of the Secretary, and expressed a hope that he would soon recover his wonted health, proposed the adoption of the Report. One very satisfactory feature was that the work the Association had been called upon to do during the year had been exceedingly small, and there could be no better test of the efficiency of the Association than the fact that there was so little work for them to do. The state of things was very different now to what it was seven years ago. The immunity from persecution which they now enjoyed was, he believed, entirely owing to the action of the Association. It would be noticed, too, that in one or two cases which had been brought forward the prompt action of the Society had prevented their going further; it was one thing to attack an individual and another to attack a powerful Association; and he might remark also that the Executive had been very careful never to undertake a defence unless there were good grounds for doing so. One feature in the Report which was not so gratifying and which deserved most careful attention was the financial position. The expenditure was exceeding the income by a considerable sum, and unless they had a larger income during the coming year by that time next year they would probably find themselves without any funds at all. The expenditure was really of so trifling a character that it was not creditable to so large and fairly affluent a body to allow an Association like that to languish for want of funds. It being granted that there was work to do, and that it did the work, the munitions of war ought to be freely forthcoming. He might say, however, that the Executive had always been bold enough to defend a case, whatever the state of the funds might be, and he believed at any time if there were a serious call on their funds the trade would respond liberally to any demand made upon them. At the same time he would urge that it was not good, either for associations or individuals, to be always just on the border line; they liked to have something to stand by, so that in case of emergency it should not be necessary to make a special appeal. He believed it would be a disastrous policy to attempt to increase the rate of subscriptions, and the only other method was to endeavour to increase the number of members, and he hoped every gentleman in the room that day would make up his mind that there should be no chemist in his district not a member who should not be appealed to directly with a view to inducing him to become one. Nothing of very startling importance had occurred during the year; there had been no burning questions, but at the last moment there was a poison question, on which there was difference of opinion. He referred to the proposed amendment of the Pharmacy Act. This had received the attention of the late Executive, and certain amendments had been proposed, which, it was believed, would make the Bill of some little use to the trade at large. The more he looked at it the more he was convinced that in its present form it would be of very little use indeed. The principle of the Act of 1868 was briefly that no man who had not proved his qualification for the sale of poisons should be allowed to sell them, and certain articles were enumerated, and restrictions put upon their sale. He did not think the principle of that Act had ever been attacked; it had received the sanction of the Legislature and of the public. The Act itself failed to give effect to the principle which it contained, and hence, from time to time, they had been called upon to make amendments and improvements, and the time seemed now fairly to have come for doing so. Instead of amending the Act by giving full effect to the principle which it contained, an entirely new principle was introduced, and with all due deference, the principle enunciated in this amending Act was altogether destructive of the principle of the former one; in fact, it might be called a Pharmacy Act Annihilation Bill. He believed the placing of a variety of strong acids under the name of 'poisonous' substances was a great mistake. Certain bodies were called 'poisons,' and certain others of a much stronger character were only of a 'poisonous' nature. Now an Act of Parliament, whatever else it did, should have some regard to common sense and the ordinary meaning of language, but in the present case he believed the term was grossly misleading, and would lead to innumerable blunders. The proposed Bill contained a clause that any patent medicine containing poison should only be sold by a registered chemist and druggist, and be labelled with the word "poison," the name of the poison contained in it, and the name and address of the seller. This was reasonable and proper, but it also enacted that when it left the hands of the makers it should be properly labelled so that all the seller had to do was to hand it over to the purchaser in the state in which he received it. No great skill was required for this unless the purchaser required some advice as to the taking of it. But with regard to poisonous substances, men more or less illiterate might deal with them who had no knowledge of what these substances were, but would be allowed to sell them indiscriminately provided they labelled them "poisonous," and put their name and address upon them. He considered this a gross injustice. There was much more skill required in the sale of these poisonous substances than in the sale of patent medicines. He did not say, do the one and leave the other, but place them both in the hands of the chemist, and if that were not possible leave the law as it was. If Parliament would not place the sale of these things in qualified hands let Parliament take the responsibility, but he did not think they ought to go to Parliament and say it would be safe for any person to deal in such things. It was one thing to accept a proposal like that if it came from Parliament, and quite a different thing to suggest that such a thing should be done. One other matter referred to in the report was adopting a memorial to the Inland Revenue authorities, with reference to the sale of methylated finish. At present, anyone from the Inland Revenue Office could purchase methylated finish and send it to Somerset House for analysis, and if the chemists there said it did not contain the proper quantity of gum the seller was liable to a fine. A case of this kind came under his notice a short time ago, in which the vendor said distinctly that he had put in the full quantity of resin, but he had no means of knowing that the precise article which he sold had been analysed. It was proposed, therefore, to send a memorial suggesting that the method followed under the Adulteration Act should be adopted here, and that when a purchase was made for the purpose of analysis it should be divided into three portions, and sealed up, one of which should be retained by the vendor, which would be a protection to him. He concluded by urging on all members to do their utmost to increase the adherents to the Association.

Mr. Green (Woolwich) seconded the motion. He felt it would be very injudicious to raise the amount of subscription, and he also disagreed with the idea which had been thrown out that morning that there should be a minimum subscription of 5*s.* If that were put forward he believed they would lose one-third of the present members. Many who now gave 5*s.* if they were aware that other members gave 10*s.* or £1 would not be disposed to subscribe so much and would not give at all. The number of members depended on the individual action of the Secretary and the local members.

Mr. Wilkinson (Manchester), referring to the Pharmacy Act Amendment Bill, said it was not generally understood that this Bill was the result of a compromise between the Pharmaceutical Society and the Government. The Society, as they all knew, was very anxious to include every article referred to in the list of scheduled poisons, but the Government refused to hear of anything of the kind. Those articles which were called poisonous were very largely used and sold by persons not in the trade, and it would be quite impossible to restrict their sale to members of the trade. He thought it was a mistake to put them in the Bill at all, and that they should rather have left that clause entirely out, and said to the Privy Council, if you choose to put this clause in as an amendment, we will accept it. With regard to the methylated finish question, any difficulty with regard to it was easily avoided by a chemist taking out a licence, in which case he would be perfectly safe. With regard to patent medicines it seemed simple to say that these patent medicines should be labelled "poison" and sold only by chemists and druggists; but it was not really so. Probably there was not one present who did not make up a cough medicine which did not contain 5 or 6 drops of laudanum in a dose. Was that to be called poison? if not, where could the line be drawn? He had no objection to the sale of patent medicines being restricted to chemists, but he did not care much about it, and they ought to be very careful in legislating, or they might tie their own hands much more than those of other people.

Mr. Symes was much surprised to find the Vice-President condemning the Pharmacy Act Amendment Bill, which would imply that the chemists and druggists were perfectly satisfied with the state of pharmacy now existing. But he could not take that view, because they had been complaining for a great many years that some different regulations were required, and the only advantage they possessed under the present Act was the monopoly of a few poisons, the sale of which they would rather be without. Now an attempt had been made to improve the state of the present law with regard to pharmacy; whether it would be a failure or success he was not prepared to say, but he certainly thought it was wise to make the attempt. The Vice-President seemed to imply that these few poisons that chemists had not thought worth while selling were everything; that it was very sad to have anybody selling poison who was not a chemist and druggist, although it might be used to a large extent commercially, as Mr. Wilkinson had said. It was a well-known fact that the Government wanted a Poison Bill, but they, the chemists, wanted a Pharmacy Bill, and a compromise had been struck between the two. The original Pharmacy Bill of 1868 was really brought forward as a Poison Bill. The beginning of the title was, "An Act for Regulating the Sale of Poisons," and that was a predominant thing in the mind of the Government at the time, and the same was the case now. The Government would only act in a public point of view, and whatever would benefit the public the Government was willing to accede to. They, on the other hand, believed that if they were to educate the people who were to sell poisons, that was better than putting them under restrictions. Under these circumstances, it seemed to him wise to go as far as they had gone. The new Bill would not, in his mind, destroy in any way the principle involved in the previous Act; it only showed how two persons might look at the same thing from opposite points of view. He could not see how anyone was injured, because these few poisons were left in the hands of those who now sold them.

Mr. Candy thought they all ought to be glad that someone came forward with some attempt to remedy the condition of things, though he was by no means at one with the Pharmaceutical Society in the Bill they had brought forward. It must be borne in mind, however, that the Pharmaceutical Council never professed to act in the interests of the trade, but in the interests of the public, and to a certain extent they were justified in doing so, because, as Mr. Symes said, it was no use going to Parliament with any class interest. To a certain extent he agreed with the Bill if the ninth clause could be passed, but he did not believe that Parliament would ever pass such a clause. He also objected to the educational clause. He did not object to education *per se*, but to people being bound to acquire a certain education, unless subsequently they had some probability of receiving some remuneration for the time, labour and expense they were put to. With regard to these few miserable poisons that had been spoken about, who was it that wanted to sell a lot of oil of vitriol or nitric acid? The profits were slender and the trade was dirty. What they wanted was more of a monopoly in the medicine line, in the dispensing and sale of drugs. Neither did he think that if they passed a law to say that these things should be labelled "poisonous" that they would be. It was not like a small trade. The late Baron Liebig said that the sale of oil of vitrol indicated the civilization of a nation, and that being so, it being used so largely in the manufactures and arts, it was altogether out of their sphere. He did not believe the House of Commons would ever pass the ninth clause, for many of them were members of co-operative stores. With regard to the sale of poisons he thought the responsibility should rest on the proprietor, and not on the vendor. It was all very well to say that a prosecution might not occur, but it was a serious thing to anyone who was prosecuted, especially in small towns where the stigma of it would attach to his name for ever. It was true he had his remedy against the wholesale dealer or the manufacturer, but the subsequent intelligence of his having recovered the penalty from someone else would never reach the public, and they did not want to live in daily fear of prosecution. With regard to methylated finish he thought the remedy was in their own hands, but at the same time what Mr. Harrison had said was perfectly true, that when an analysis was to be made on which a prosecution might be based it was only just that a sample should be left with the vendor. With regard to the question of subscriptions, when any great crisis occurred in the trade, members would come forward with the necessary money; but at present they were sailing in smooth waters, and many members thought more of saving their 5*s*. Besides which, some of them were beginning to think that the Association was very much the double of the Pharmaceutical Society, and that it was no use supporting both, and, therefore, he feared their subscriptions would fall off from year to year, unless something occurred to make them rally round again. He believed there was a sphere for both Societies, and should support both, but at the same time he did not want to see so many of the same faces at both meetings.

Mr. Mackenzie hoped that it would always be kept distinctly before the trade that they were not, and were not likely to become, the double of the Pharmaceutical Society. They had a distinct policy, which was that of trade interests. With regard to this Bill he was prepared to give the Council credit for having done their best, but after all it was only their 'prentice hand, and there was an old adage, "If at first you don't succeed, try again," and he thought it would be for the benefit of the trade if the Bill were withdrawn and they did try their hands again. It seemed to him there was more to condemn it than to justify it. With regard to the prosecutions on the sale of patent medicines it was a great pity there should be such a roundabout process to be gone through by the retailer who was prosecuted in order to set himself right, and he thought the penalty ought to be imposed in the first place on the manufacturer. There was a clause about apprentices which had only been accepted in Scotland on the interpretation of someone who was not responsible for it, and he thought it was very dangerous to accept any such interpretation which was not clearly expressed in the lauguage of the clause. The only consolation he had was that the Bill was so unlikely ever to become law that they need not trouble much about it.

Mr. Long (Notting Hill) said some gentlemen seemed to think that they had only to walk down to Westminster and mention what they wanted to be told, "Oh, yes; it shall be attended to;" but that was a grievous mistake. How far it was advisable to go, what they should ask for, and what they were likely to get, were very different things. How were they likely to succeed in an Act of Parliament when the vital interests of a large body of men were represented by the few gentlemen then present? Mr. Candy objected to seeing the same faces there and at Bloomsbury Square; but he feared that if they lost them at one they would lose them at the other. It was those men who were most alive to their interests professionally and financially who were the backbone of both Societies. He candidly believed that if the Pharmaceutical Society had put its foot down firmly when its rights were being invaded they would be now in a very different position; but they had been so exalted, so honourable, so far above the shop that they never discussed anything but the public advantage. It was no use, however, talking about the Bill; they could only leave it in the hands of the Council, and if they did not believe in the Council they must turn them out and put other men in. As to the advisability of putting the poisonous schedule in, he thought if they stood more on their own rights and were not quite so anxious about the welfare of the public,—not that he wished to injure the public, only he wanted to live,—it would be just as well, and they need not go out of their way to be so extremely careful of the public. He was sorry to hear so many gentlemen had not paid their subscriptions, but he thought the blame must lie at headquarters. He thought if Mr. Haydon would write down to a member of the Committee in places where gentlemen had not paid they would go round and get subscriptions. He had introduced some dozen members, and if he found they did not pay he would endeavour to persuade them to do so, and he could not accept the notion that any of these gentlemen could not find the 5*s*.

Mr. Allen (Kilburn) said there was no doubt a great apathy and want of cohesion in the trade; but this might be partly caused by circumstances, gentlemen being so much confined in their business they were not able to meet together. The meeting was not large, but it was a representative one. He thought it was very important that they should come to some definite conclusion as to what position should be taken up with regard to the Pharmacy Act. He understood that the Executive had to a certain extent endorsed the Bill, but the Vice-President did not agree with the schedule of poisonous articles. It would be a great point to come to some conclusion on this matter, which appeared to him to be the great question of the present time. The poisonous schedule was certainly an innovation, but many believed that this would not detract from their position. He had been accustomed to see large quantities of acid sold whilst living in a mining district, and he should be sorry if pharmacists were mixed up in the sale of these articles. They knew perfectly well that the Privy Council would not accept strong acids as poisons. As far as patent medicines were concerned, if it was thought that the proprietor should be responsible for the label, he should support the amendment, but the time was really come when they should decide whether to support this Bill or not. If they could support it he would ask those who could not exactly agree with it to forego their individual opinions and do what seemed to be for the best of the whole trade.

The President said there had been some difference of view about the Pharmacy Bill, and it was considered desirable that the Executive Committee should send a deputation to the Pharmaceutical Council with regard to it, so that they might discuss these minor points. He need not say how important it was that the trade should be united.

Mr. Whittle was very sorry to see the subscriptions had fallen off in the way they had. He considered every chemist in business ought to feel himself bound to support an association of this kind, because everybody must feel that it had not spent money extravagantly and had done good service to the trade at large. Who could say how many prosecutions there might have been if the Association had not existed? He remembered when there was a two guineas licence for the sale of patent medicines, and some gentlemen complained then that they did not sell two guineas' worth in a year, and after a great deal of agitation they got the licence reduced to 5*s*., and now they found barbers, drapers and stationers all selling patent medicines; and judging by what appeared in the journals, it would seem as if the whole of their trade consisted in patent medicines. What they really wanted was dispensing, and he believed if they could only let the public know how some of it was done, instead of going to the doctor's they would go to the chemist. They did not want to sell strong acids, but at the same time he did not think it was for them to go to Government and propose to move in the matter. Though the Bill was not all he could wish, he thought it was calculated to do some good, and he hoped it would be supported unanimously. The last Bill would have been a much better Bill than it was if it had been backed up by the whole trade.

Mr. Barclay said this was a very important crisis in the history of the trade, and he could not insist too strongly on the sentiment just expressed that it was of the utmost importance to present a united front. Some one had said that the same faces might be seen there and at Bloomsbury Square, and he took it that was the right thing, that the men who felt the responsibility of guiding the trade, or the profession, should exercise the two functions, one of looking after the public and the other of looking after the trade. It was not the business of the Pharmaceutical Society so much to look after the trade side as the professional side, and therefore this Association had sprung into existence and had taken root. Mr. Richard Reynolds at the outset spoke of the Trade Association and the Pharmaceutical Society as being like the old country weathercocks, where the man came out in the stormy weather and the old lady came out in fine weather. He would not say which was to be the old lady, but he thought they ought to work together, and he hoped one of the results of the meeting would be an instruction to the Executive to ask for an interview with the Council of the Pharmaceutical Society so that their differences might be arranged. Differences did exist and it was very well they should. As a trade Association they went further than perhaps the Pharmaceutical Society could see their way to ask from the Government. For instance, he was surprised to find that the jury question had not cropped up, for he expected some inquiry would be made why it was that this Bill did not contain a clause exempting chemists from jury service.

Mr. Allen said the making of all in the trade pharmaceutical chemists in future would eventually exempt everyone from jury service.

The President said this matter was not considered proper for insertion in the Pharmacy Bill at all, and there was a fear that if it was brought forward even pharmaceutical chemists might lose the exemption they now enjoyed.

Mr. Barclay said all this showed the desirability of a conference between the two bodies. Every one must admit there were germs of good in the Bill, and he was very thankful to the Council for having done what they had in the matter. With regard to the question about methylated finish, he was sorry to say there were many who were unable to pay the 10*s*. 6*d*. licence; who did not sell 10*s*. worth of finish in the year. A case had just occurred which led to the introduction of that clause in the report. A chemist was called upon for some finish which he made himself and asserted positively that the proper amount of gum was there, but six weeks afterwards he was called upon and told that the stuff had gone to the Inland Revenue Department, had been analysed, and that there was not the proper quantity of gum in the preparation, and he expected to be summoned. If he had had a sealed sample left behind he would have had his remedy. He could have come to the Trade Association, have had it examined, and if he were right he would have been protected. Another case had occurred in Wales, where a gentleman was asked for spirit of wine and supplied camphorated spirit of wine, telling the purchaser he was not allowed to sell it pure. But he had heard that he was going to be summoned likewise; and the stuff having gone from his hands, he was not in a proper position to defend himself.

Mr. Paterson said if the Bill were to be gone into in detail, the question of education ought to be discussed, and he believed they would have to go much further in that direction before long. Education ought to be brought home to the doors of the young men who were apprenticed to the business, and it was quite possible that arrangements might be made with the Science and Art Department for providing pharmaceutical education in great centres, so that examinations might take place there.

Mr. Harrison, in reply, said in many cases it was a hardship to a chemist to have to pay 10*s*. for a licence to sell spirit, and if he did, he was restricted to selling 1 gallon per day to any one customer; and the same difficulty might arise with regard to that. The real question was, whether a man was to be left at the mercy of any unprincipled person who might buy the spirit. Some little misapprehension had arisen with regard to what he said about the sale of poisonous substances. He did not argue that they should apply to Parliament to restrict the sale of these matters to chemists, but that they should not go to Parliament to ask them to regulate the sale by other people; but if they dealt with them at all, it should be only in one way—in a spirit of loyalty to the former Pharmacy Act. His contention was that they ought not to teach the Government that it was safe for uneducated people to deal with these strong substances. It had been contended that the Government had refused to legislate in the direction he advocated, but all the evidence was that some time ago the Pharmaceutical Society applied to the Privy Council that certain articles should be added to the schedule of poisons, and the reply was that nux vomica should be added, but all the other articles should be left over until a more convenient season, when they might legislate on the whole matter. This convenient season appeared now to have arisen, but it seemed to be taken for granted that the refusal of the Government to do what was asked at one time was a refusal to do it at any time. As the Government accepted the principle of the Act of 1868, he thought it was their duty to keep to that principle and endeavour to strengthen the working of it. With regard to jury service, he had advocated it so many years that he feared it would be only trespassing on the patience of the meeting if he had brought it forward again, but he was as strongly convinced as ever of the justness of the claim. He hoped the different opinions which had been expressed would conduce to levelling down some of the inequalities, and that as a result they might be more unanimous in what they intended to apply for.

The President, before putting the motion, said he had always maintained the view that a seat on the Council did not disqualify him from taking part in any matters with reference to the trade; he still maintained that position, and he hoped he should find his judgment had been correct. With regard to the Pharmacy Bill, he had a somewhat difficult position to fill, inasmuch as on the Pharmaceutical Council he had taken the responsibility of moving its acceptance. He had served for many months on committees which had gone into details of the measure, and had endeavoured to weigh as carefully as possible the divergent views, some of which had been very well presented that day; but looking all round and looking at the intrinsic merits of the Bill, he considered it was an excellent Bill. With regard to the much vexed question of the poisonous schedule, the position was simply this. The Government contemplated bringing in a general measure with reference to poisons, and the question was, were they prepared to have such a measure brought in and pharmaceutical legislation ignored. The Pharmaceutical Council thought it extremely desirable that any interference with the sale of poisons should be included in the Bill, although the method proposed in the Bill was not exactly the method they liked; but the danger was this, such was the feeling of the public mind, that there was a tendency on the part of the Government to legislate with regard to poisons quite apart from all consideration of chemists, and he believed that in accepting the 'poisonous' schedule they had done the right thing, although it might wound the sentimental susceptibilities of some gentlemen. Even in countries where pharmaceutical legislation was much more stringent than in England, even under despotic governments, it was found impossible to restrict the sale of these things to chemists, and he maintained that it was good policy to have included this scheme; but apart from his individual opinion on the matter, their only chance of getting legislation at all was being thoroughly united. If they assumed the attitude of some gentlemen who talked about destroying the Bill because it did not meet their views, they would never have a Bill at all. In legislation of any kind you could never get all you desired; you must move by stages, and if the Bill included a considerable amount of good, the wise policy was to accept it. At the same time, he thought it very desirable that the Executive should have a conference with the Pharmaceutical Council, and if possible come to an amicable and substantial agreement.

The motion for the adoption of the Report was then put and carried unanimously.

The President then moved that the following names, recommended by the General Committee, be accepted as the Executive Committee for the ensuing year:—

Andrews, Frederick, London.	Holdsworth, T. W., Birmingham.
Arblaster, C. J., Birmingham.	ervis, W., Sheffield.
Barclay, Thomas, Birmingham.	Jones, O., Llanwrst.
Barnaby, Henry, Rochester.	Maltby, J., Lincoln.
Bell, C. B., Hull.	Mason, A. H., Liverpool.
Chapman, Henry, Scarborough.	Parker, W. H., Nottingham.
Churchill, W. J., Birmingham.	Southall, William, Birmingham.
Cross, W. G., Shrewsbury.	Symes, Charles, Liverpool.
Ellinor, G., Sheffield.	Walker, G., Coventry.
Hampson, Robert, London.	Williams, F. P., Manchester.
Harrison, John, Sunderland.	Yewdall, E., Leeds.

For Scotland:—Messrs. G. H. Laird, Edinburgh; James Mackenzie, Edinburgh, and James Paterson, Aberdeen.

Messrs. Urwick and Paterson were then appointed scrutineers of the ballot papers for the election of officers.

Mr. Bell moved—

"That it is most desirable that chemists and druggists generally should be united in support of the Pharmacy Bill, it being an instruction to the incoming Executive to arrange an interview with the Pharmaceutical Council to promote that object."

Mr. Williams (Manchester) seconded the resolution, which was carried unanimously.

Mr. Mackenzie then moved—

"That a memorial be presented to the House of Commons in support of the claims of pharmacists to be associated with members of the medical profession in a legally constituted committee for the purpose of preparing the British Pharmacopœia, and that the Executive Committee be requested to take the requisite steps to obtain an amendment in the Medical Bill now before Parliament in furtherance of their claims."

He believed that such a resolution would commend itself to every member of the trade; it was a question of justice and fair play, and he thought it would commend itself also to the common sense of Parliament.

Mr. Allen seconded the motion.

Mr. Holdsworth asked what stage the Bill was in.

The President said the Bill was down for second reading on Thursday. It was the intention of the Pharmaceutical Society to ask some Member of Parliament to move an amendment in the direction of this resolution.

Mr. Holdsworth suggested that a memorial should be sent from that meeting in order to save time.

Mr. Long said there could not be much doubt about the advisability of taking some action in the matter. The Medical Council had proved their incompetency to prepare the book called the Pharmacopœia, and had made such a hash of it that they were obliged to call in experts to assist them. When there was an attack made by the apothecaries on chemists, he communicated with both Members of Parliament for his borough, and one wrote saying he should oppose it, and the other wrote asking for information.

Mr. Mackenzie said this resolution would not prevent the right of any individual member to speak to his own representative on the subject.

Mr. Andrews said this subject was of very great importance, and he had no doubt many gentlemen would take the opportunity of speaking to their members upon it. They might be told that they had already got what they wanted, because their three Professors had been appointed to aid the Medical Council, but his answer was, those gentlemen were not appointed by the Pharmaceutical Society, they were simply paid servants of the Medical Council. They did not wish in any way to share in the profits of the Pharmacopœia, but simply to be recognised as proper persons in conjunction with medical men to frame this book, and in so doing they only asked what was accorded to pharmacists in every other civilized country.

The scrutineers here returned, and it was announced that Mr. Harrison (Sunderland) was elected President, Mr. Cross (Shrewsbury), Vice-President, Mr. Southall, Treasurer, and Mr. Churchill, Hon. Secretary.

Mr. Harrison accordingly took his seat as President. He thanked the meeting for the honour done him. He regretted very deeply that his old friend, Mr. Hampson, had thought proper to retire, for to him it was a matter of great satisfaction to have been his lieutenant, and he should like to have continued in that capacity for another year. Mr. Hampson, however, had thought otherwise, and no doubt for sufficient reasons. He felt very unworthy to follow in the footsteps of his distinguished predecessor, but he would do his best that the work of the Society should not suffer.

Mr. Cross also thanked the meeting for the honour done him, which was to him one of the greatest surprises he ever met with in his life.

The President then proposed a vote of thanks to Mr. Hampson for the very able manner in which he had discharged the duties of his office. This was seconded by Mr. Long, and supported by Mr. Barclay, and carried by acclamation.

Mr. Hampson said he was extremely obliged to the meeting for this kind expression. He should still remain on the Executive and do his best in that position.

The President then read Mr. Mackenzie's motion, altered to meet the views expressed, as follows—

"That a memorial signed by the officers of the Association be presented to the House of Commons in support of the claim of pharmacists to be associated with the members of the medical profession in a legally constituted Committee for the purpose of framing the British Pharmacopœia, and that the Executive be instructed to take such steps as they think desirable to carry out this resolution."

The motion was carried unanimously.

Mr. Jervis said no one present was more glad to see Mr. Harrison in the chair then he was, but he thought the mode of electing the officers was very unsatisfactory, and it would be much better if the President were proposed and seconded.

The President said the rules provided that the officers should be elected by ballot, but not that there should be any nomination. If Mr. Jervis thought it was unsatisfactory, he must give ten days' notice next year of his intention to propose an alteration in the rules.

Mr. Wilson (Grimsby) said the question of prescribing by chemists was so important that he thought some attempt should be made to obtain a definition as to what was illegal, and he hoped the Executive would take the matter into consideration. He begged to move—

"That the Executive be requested to take speedy steps in this matter."

The motion was not seconded.

Mr. Paterson thought, with regard to the previous resolution, it would be well if some steps were taken to let members of Parliament know that there was a movement in the matter.

Mr. Hampson said the Pharmaceutical Society would shortly present petitions, and it would be desirable the Association should do so at the same time.

Mr. Urwick suggested that each town should petition its own member, and if they could get every chemist in the town to write independently it would do more good than 10,000 printed papers.

Mr. Mason suggested that the Secretary should send to each Local Secretary suggesting pressure being brought to bear upon Parliament.

Mr. Long then moved a vote of thanks to Mr. Hampson and Mr. Harrison for their conduct in the chair, which was seconded by Mr. Barclay and carried unanimously.

Provincial Transactions.

BRIGHTON ASSOCIATION OF PHARMACY.

A meeting of the Association was held in the Town Hall on Wednesday evening, May 16, being called to consider the resolution which Mr. Sandford purposed moving at the Annual Meeting of the Pharmaceutical Society.

Mr. W. D. Savage occupied the chair.

Mr. Vizer introduced the subject, strongly condemning clauses 4 and 5 of the proposed Bill to alter and amend the Pharmacy Act, and moved the following resolution: "That in the opinion of this meeting clauses 4 and 5 of the proposed Bill to amend the Pharmacy Act, 1852, by which proprietary medicines containing a poison within the meaning of the Pharmacy Act, 1868, will be required to be labelled 'poison,' and in default thereof that the retail vendor of such proprietary medicine shall be liable to prosecution, will act most injuriously to the interests of such proprietors and throw the responsibility upon retail vendors for an offence over which they have no personal control. This meeting therefore appeals to the Council to erase the said clauses from the proposed Bill."

The motion was seconded by Mr. H. Barton.

After some discussion, in which Messrs. Savage, Cox, Higham, Vizer, Barton and Leigh took part,

Mr. Marshall Leigh moved the following amendment, which was seconded by Mr. Gwatkin:—"That this meeting is of opinion that the original makers or their agents should alone be subject to a penalty for not labelling a patent medicine according to clause 4 of the Bill to amend the Pharmacy Act, 1852."

On being put to the meeting, four voted for the amendment and two for the original motion.

The amendment was therefore declared carried.

A vote of thanks to the Chairman brought the meeting to a close.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, May 17, Dr. W. H. Perkin, President, in the chair.

The following certificates were read for the first time:—

T. H. Coleman, B. Hobbs, B. P. Lascelles, M. F. Purcell, W. R. Reffell, D. Wilson.

It was announced that a ballot for the election of Fellows would be held at the next meeting of the Society, on June 7.

The President then called on Captain W. de W. Abney, F.R.S., to deliver a lecture—

On Photographic Action Studied Spectroscopically.—The lecturer said that he wished all chemists to become photographers, for photography occupied the borderland between chemistry and physics. The days had been long past when black fingers were a necessary concomitant of photography. At the present time there was a vast number of amateur photographers, but there were only a few who studied the scientific aspect of photography; by most experimenters it was looked upon as a servant to be abused rather than used, and the majority were content with working by rule of thumb. The lecturer was firmly impressed with the fact that photographic action is interatomic. He had already shown in a previous paper that throughout the absorption spectra of a series of organic compounds, the absorption due to hydrogen could be recognized; something of the same kind seemed to occur in inorganic chemistry. Probably the first photographic action with which most chemists become acquainted is the blackening of chloride of silver by light. Now if this salt be perfectly dry and perfectly free from organic matter, etc., it will not blacken when exposed to light. Two tubes were exhibited, both of which had been exposed for some time to the action of light; in one the chloride was quite white, in the second the chloride, which was moist, had blackened. The action of developers was then discussed. A picture on iodide of silver paper, which had been previously exposed, was developed before the meeting with gallic acid and solution of silver nitrate. The action of the light is to liberate free iodine, and the developer precipitates metallic silver to form the image. The number of particles acted on by the light must be extremely small. The image can be washed off with nitric acid and a fresh picture taken on the same film. A second image was developed with citrate and oxalate of iron; in this case the metallic silver must have been obtained from the film itself. Some other experiments were shown proving the truth of this statement. Development is not a chemical but a physical action. It was found on photographing the solar spectrum that the amounts of energy in different parts were very varied and irregularly distributed. Recourse was had to the positive pole of the electric arc light; the incandescent light has not sufficient energy, but the positive pole furnishes a spectrum which has sufficient energy and is much more uniform than the solar spectrum. For producing the spectrum, everyone would probably first choose the diffraction grating; but it was found that a perfect grating did not exist, and one grating differed so much from another, owing to minute differences in the ruling, that eventually a glass prism was adopted, as the grating could not be relied on for quantitative work. Films of chloride, bromide and iodide of silver were successively interposed in the beam of the electric lamp, and it was shown that the chloride partially cut off the violet end of the spectrum, the iodide absorbed the whole of the violet, but the bromide cut off part of the blue as well as the violet. An image of the spectrum was then shown on films containing respectively silver chloride, bromide and iodide, and the plates were developed with ferrous oxalate; it was seen that with the chloride but a small portion of the spectrum had acted on the silver salt, and that with the bromide a very much longer image was obtained. The action of sensitizers was next considered; the part played by a sensitizer is the taking up of the chlorine, bromine and iodine set free by the action of light. To demonstrate this action, an image was thrown on to a sensitive plate, and during the exposure, a streak was made across the plate with a solution of sodium sulphite; on developing, a black stripe indicated the position of the sodium sulphite, this salt having rendered the silver salt in its vicinity more sensitive. A sensitizer is useless unless it be close to the salt on which it is to act; so all sensitizers are more or less hygroscopic, or they may act in solution or as vapour. Almost any organic compound acts as a sensitizer. The lecturer then gave instances of coloured sensitizers, and photographs of the spectrum were taken on films coloured with cyanin blue and with eosin, the plates were developed, and the relation between the portion of the spectrum photographed and the portion absorbed by these pigments demonstrated. Thus cyanin blue absorbs the yellow, and the photograph of the spectrum on the film, coloured with cyanin blue, exhibits a band in the yellow where the absorption had been previously seen. It is very remarkable that one salt of silver may act as a sensitizer to another salt of silver. Thus a film, containing bromiodide of silver, photographs much more of the spectrum than two films containing the one bromide and the other iodide. It is easy to destroy the results of photographic action. If a film during exposure be washed with any oxidizing agent, as potassium permanganate or bichromate, dilute nitric acid, peroxide of hydrogen, etc., the image is completely effaced. Thus if plates which are foggy from accidental exposure be dipped in dilute bichromate of potash and well washed, they are restored to their original condition. This bleaching effect was demonstrated by throwing a picture on a sensitive plate and during exposure making a streak with bichromate solution across the plate. On developing this streak was seen to be white. A sensitive plate after exposure to light was soaked in dilute nitric acid containing 1 drop of acid in 8 ounces of water, and then exposed to the spectrum. The tendency of the nitric acid was to oxidize; at the violet end, where the reducing power of the light was at its maximum, this tendency was overcome, but the red end was perfectly white. A method of obtaining a reverse image was demonstrated. A sheet of iodized paper was exposed to light, then immersed in potassium bromide solution, a picture was then thrown on it, on developing it was found to be reversed. An instructive experiment was also shown of an easy means of preventing the bad results of over exposure. An extremely sensitive dry plate was soaked in sodium sulphite solution and exposed for sixty seconds to a bright spectrum. On developing a good picture came out not in the least reversed. So a picture cannot be reversed if some substance is present in the film having a great affinity for oxygen. A beam of light was transmitted through films of the three varieties of silver bromide; the ordinary variety was orange, the film used in the gelatin dry plates a sort of French grey; the film used for photographing the ultra red portion of the spectrum, green

In conclusion, the lecturer said he had endeavoured to point out to the chemists present some of the pitfalls which beset the practice of photography.

The President, in proposing a hearty vote of thanks to Captain Abney, said that all must feel that they had had a great scientific treat; most chemists had dabbled in photography and must have felt how many points required investigation. He hoped that Captain Abney would continue his researches, and he was sure that no one was more able to carry them out to a successful issue.

The vote of thanks was passed by the crowded meeting with acclamation, and the Society adjourned to June 7, when a ballot for the election of Fellows will be held and the following paper read:—"Laboratory Notes, by Dr. Gladstone and Mr. Tribe.—1. On the Action of Light and Heat on Cane and Invert Sugar; 2. On Hydroxylamin; 3. Recovery of Iodine from Organic Iodide Residues; 4. A Residual Phenomenon of the Electrolysis of Oil of Vitriol; 5. On an Alleged Test for Alcohol; 6. Reaction of the Copper Zinc Couple on Nitric Oxide; 7. On the Reducing Action of Spongy Lead."

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Professors and the Pharmacopœia.

Sir,—Mr. Frederick Smith, in his letter in last week's Journal, makes the statement that certain members of Council "would not have said what they did, had Mr. Greenish, in reading what he termed the words of the Report of the Pharmacopœia Committee, read the whole of the words there in which the Medical Council state that they will themselves communicate with the Pharmaceutical Council." Had he himself quoted the precise words to which he alludes this communication would have been rendered unnecessary.

I will, however, give the paragraph in its entirety.

"The Committee, in conclusion, beg to state that it is their intention to apply to the several medical authorities, to the Pharmaceutical and Chemical Societies, and to such persons as may be likely to furnish useful information, with a view of making the work as complete and perfect as possible."

I fail to see that the whole of the words now quoted alters the aspect of the case, but Mr. Smith is entitled to any comfort that he may be able to derive from the publication.

20, *New St., Dorset Sq., Marylebone Rd.* Thomas Greenish.

"Distance lends Enchantment to the View."

Sir,—To save time of the annual meeting I omitted two things fully on my mind, in reference to Mr. Giles's remarks What was the standing of the "dead lions" of twenty-five years ago in the eyes of their contemporaries? Was it a higher one than that now occupied in the eyes of their contemporaries by such men as Messrs. Carteighe, Schacht, Williams, Bottle, Greenish, Squire, Robbins, etc., etc.

I also quite intended to say, that to show my estimate of the *personnel* of the existing Council, and that notwithstanding the difference between their views and my own on so many questions of interest to pharmacists, I have recorded my votes for the entire number (14) of retiring councillors, and I trust, most sincerely, that they will all continue on the Council for the coming year.

Daniel Frazer.

Communications, Letters, etc., have been received from Messrs. Bate, Maben, Landerer, Druce, Watt, Wrighton, Smith, Sinapis, John, Sterlini Oppidum, Cymro, Chrysosplenum, J. H.

"THE MONTH."

Although the proverbial May flowers were very slack in putting in an appearance during the early part of the month, the hot sunny weather of the last two weeks has made up in great measure for the backwardness of the season, the leaves and flowers having burst forth with a rapidity almost like that of a Scandinavian summer. Most of the medicinal plants usually in bloom in May can now be seen at the various Botanical Gardens; *Podophyllum peltatum*, *Carum Carui*, *Iris florentina*, *Polygonum Bistorta*, and many others, may be noticed in their respective natural orders. In the country, the heathy commons and railway banks are decked with the golden broom in the full blaze of its vernal beauty, undimmed by rain or wind. In bogs, where it is hardly safe to tread, one of the most beautiful of our wild plants, the bogbean (*Menyanthes trifoliata*), is putting forth its shortlived blossoms, and the male fern is unrolling its tender green fronds. On the wayside hedges and in cottage gardens the official aconite, *A. Napellus*, and *Vinca major* are coming into flower. Among the rare or less common British plants, *Geranium phœum*, *G. sylvaticum*, *Myrrhis odorata*, *Pinguicula grandiflora*, *Meconopsis cambrica*, *Gymnogramma leptophylla* and *Carex depauperata* may now be looked for. Most of these are now in blossom at Kew, where those who do not know these plants may make their acquaintance under the most favourable circumstances.

The change of colour in various boraginaceous flowers would seem to bear relation to their fertilization. Hermann Muller remarks in *Nature* (May 24, p. 81) that he has observed that insects visit exclusively those which are red or just beginning to change to blue. All the blue flowers which he examined in a locality about 2 yards broad and 20 long, where many hundred flowers of *Pulmonaria* were in all stages of development, proved to be empty of honey, and all which he observed with the aid of a lens had the stigma already supplied with pollen; so that it would appear that, as in *Lantana* and *Ribes aureum*, the change of tint serves as a guide to insects visiting the flower.

At this time of year it is not an uncommon thing to find the stem of *Juniperus Sabina* attacked by a fungus known as *Podisoma Sabinœ*. Hitherto it has been supposed that this fungus, which consists of a mass of teleutospores, immersed in a peculiar glutinous jelly, is a particular stage of development of a fungus found in autumn on pear leaves, called *Rœstelia cancellata*, and that the teleutospores of the savin fungus do not directly give rise to another growth of *Podisoma*, but to the *Rœstelia*. That eminent fungologist, Mr. Worthington G. Smith, states (*Gard. Chron.*, p. 604), on the contrary, that having put some of the *Podisoma* in water to moisten it, he found forty-eight hours afterwards that those teleutospores which had been moistened had germinated and had produced an enormous amount of promycelium and a prodigious number of secondary spores, some of which in their turn had germinated on the surface of the water; while of the portion of *Podisoma* unmoistened not a single teleutospore had germinated.

According to Mr. D. Morris (*Gard. Chron.*, May 12, p. 594) the *Stillingia sebifera*, the tree whose seeds yield the tallow so largely used in China for making candles, is now completely naturalized in the Southern States of America, and forms avenues in all open spaces in the city of New Orleans. It is said to be the only tree that has been found, so far, to stand the tremor or shaking of the ground caused by the continual passing of street cars.

Dr. Pritchard has called attention in the *Lancet* (May 12, p. 851) to the poisonous effects of a plant which is being sold under the name of *Ampelopsis japonica*, and which causes raised patches of inflammation, at first resembling nettle rash, but followed by large blisters, lasting for nearly three weeks, and in some cases returning a second and third time with almost equal severity after intervals of six weeks and two months respectively without fresh contact. This plant has been since identified as the *Rhus Toxicodendron*, which partakes of the poisonous nature of many of the Anacardiaceæ. To the action of this poison some persons are much more sensitive than others.

Another curious case of poisoning by some vegetable poison is recorded in the same Journal (*Lancet*, p. 843), in which the effects produced were doubtfully attributed in part to *Urtica urens* or *U. dioica*, and, indeed, somewhat resembled those attributed by Mr. N. E. Brown to *Laportea gigas* (*Pharm. Journ.*, [3], xiii., 441), an exotic member of the same natural order, and in part to some plant nearly allied to *Artemisia*, judging from the fact that the patient complained that everything seemed green to him.

About four years ago, Mr. Moens, of Java, succeeded in grafting successfully the *Cinchona Ledgeriana* and *C. succirubra*, and these seemed at first to bear out the opinion usually held by horticulturists that there is no transfusion of quality from stock to graft or *vice versâ*. The results of the recent analyses of bark from these two seem to prove, however, that while the bark of the *C. succirubra* is rendered abnormally rich in quinine by its junction with the *Ledgeriana* graft, the bark of the latter is deteriorated, so that it yields chiefly cinchonidine and cinchonine. Such results seem almost to indicate some accidental transposition of the barks before analysis, but if subsequent careful experiments confirm the asserted results, the stock and not the graft will be of the greater importance in the future (*Gard. Chron.*, May 26, p. 666).

Cinchona trees are now being cultivated in the Cape de Verde Islands, especially at St. Antao and St. Thomé, where, according to Professor Henriquez (*Gard. Chronicle*, May 5, p. 568), there are already thousands of plants of *C. succirubra*, *officinalis* and *Ledgeriana*, most of which have been sent from the Botanic Garden at Coimbra. Analyses of the bark of some of the trees have been made and with most satisfactory results. This is interesting, as the cinchona cultivation seems to have been a failure at St. Helena.

The conditions under which an infusion of the seeds of *Abrus precatorius* produce a purulent ophthalmia have been studied by M. de Wecker, who reports that it is due to the presence of a bacillus (*Comptes Rendus*, xcvi., 1440). He has found that if an infusion of jequerity seeds be sterilized, it is no longer capable of setting up the inflammation; but that if the bacillus be removed and cultivated separately, this will provoke the factitious ophthalmia which is the object of the treatment of the eyes with the infusion. M. de Wecker makes the important statement that when these inoculations of the mucus are carried very far, a transmission to the lymphatic glands takes place, causing suppuration and erysipelatous symptoms, as well as a distinctly febrile condition.

In the *Lancet* Dr. P. S. Brito mentions the leaves of the "muringai" as being used in India in the treatment of hydrophobia, and suggests whether some constituent of the leaves may modify or counteract, in short, act as an antidote to the poison contained in the saliva, and asks for statistics and reliable experiments. The botanical name of the tree, which appears to be unknown to him, is *Moringa pterygosperma*, the native name having become the generic one. The tree is commonly known to European residents in India and Ceylon as the horseradish tree, from possessing similar properties to that plant. Its use in hydrophobia is unknown to Dr. Ondaatje, of Ceylon, and it is difficult to see how it could act as an antidote, unless the sulphuretted volatile oil it contains is proved to have a lethal effect on the bacillus of the disease.

Dr. Prosser James writes in the *Medical Press and Circular* (April 25, p. 353), recommending the fluid extract of *Rhamnus Purshiana* as an aperient, a drachm of this preparation being stated to act as freely as a pill or black draught, but like the latter it, unfortunately, has a bitter taste. In catarrh, when the stools are scanty, pale and putty-like, it appears to be of considerable service, acting partly as a cholagogue, while it irritates so slightly that it may be given when the patient is suffering from hæmorrhoids. Otherwise, this new American drug does not seem to possess any advantage over *Rhamnus Frangula*.

Dr. A. Hill Hassall has communicated to the *Lancet* (May 5, p. 765) the results of some experiments, made with various antiseptics, with a view to ascertain their degree of volatility at ordinary temperatures, and how far such substances are really useful in phthisis, when inhaled. He appears to have arrived at some singular results. Phenol was found to be very slightly volatile, and of the small quantity which passed off in vapour, part was lost in the respirator and part absorbed by the mucous membrane of the nose, mouth and fauces. The sputa did not smell of carbolic acid after inhalation, nor could the acid be detected in distilled water through which the expired air was passed. When dissolved in alcohol and chloroform, its volatility was lessened instead of being increased. Creasote was found to be slightly less volatile than carbolic acid, and thymol scarcely volatile at all at ordinary temperatures. Iodine, although very volatile, was found to be altered into an iodide by the saliva and mucus of the mouth and throat. Dr. Hassall concludes from his experiments that the most practical method of causing antiseptics to reach the substance of the lungs is by means of an inhalation chamber. Inasmuch as his experiments were performed at a temperature of about 48° F., the results he has arrived at need confirmation by experiments made with hot water before it can be taken as proved that antiseptics inhaled through an inhaler do not enter the lungs, since it is well known that many substances are volatile in steam which are not so at ordinary temperatures.

According to Dr. P. M. Chapman (*Practitioner*, May, p. 354) distilled water is not always the best vehicle for eye lotions, and a collyrium made with ordinary tap-water is less irritating than one prepared with the purest distilled water. This he accounts for by the fact that the normal lachrymal secretion contains about 1 per cent. of solids, chiefly chloride of sodium, and that water containing no salts approaches less nearly to the natural secretion than a water containing a small percentage. As a practical result of his experiments made from this point of view, he finds that the addition of 2½ grains of chloride of sodium to the ounce of distilled water renders any lotion intended to be of a soothing character much more beneficial.

In a paper read before the Berlin Medical Society (*Pharm. Zeit.*, p. 190) Dr. Levin has recently called attention to the manner of action of santonin. Whilst this substance is practically insoluble in water and dilute acids, it is more or less dissolved by saliva, the juices of the stomach, liver, intestines and pancreas, as well as by fats. All these, except the oily solutions, can be absorbed in the stomach, but the last only in the bowels. Santonin, as usually administered, acts most rapidly upon ascarides which reside in the small intestine, where the greater part is absorbed and takes effect, and does not consequently act upon the more deeply seated worms in the cœcum. Dr. Levin prefers, therefore, to use a solution in oil as being more gradual in its action, and not injuriously affecting the central nervous system. If such a solution be administered in capsules, an addition of a little oleum cinæ is recommended to assist its action.

With respect to the new hypnotic, paraldehyde, Dr. Quinlan reports (*Med. Press*, May 9, p. 401) that he has tried it on himself and others with satisfactory results, it producing quiet dreamless and refreshing sleep. Its action appears to resemble that of chloral hydrate, except that it has no depressing influence on the heart; neither does it interfere with the secretions, except sometimes to increase that of the kidneys. The dose for adults is from thirty to sixty minims, but Dr. Quinlan has not observed whether it becomes gradually tolerated so as to require the dose to be increased. The principal drawback is its persistent and acrid after-taste, which is said to be overcome by the following formula:—

℞	Paraldehydi	♏xxx.
	Aquæ	ad ℥jss.
	Syrupi aurantii	ʒij.
	Spt. chloroformi	♏xxx.

M. fiat haustus. Horâ somni sumend.

If the dose of paraldehyde be larger, the quantity of spirit of chloroform must also be increased. The recumbent position and complete quiet after administration are desirable.

Kairine, or oxychinoline methylhydrate, the new antipyretic introduced by Professor Filhne (see before, p. 444), is the subject of a paper recently read before the Paris Hospital Medical Society by Dr. Hallopeau (*Med. Times and Gaz.*, May 19, p. 574). The hydrochlorate of the base, in doses of 30 to 50 centigrams, given in a fever of moderate intensity every hour or hour and a half, is found to lower the temperature from the first dose, and after the third or fourth dose to bring it to the normal point, or even lower, the reduction being accompanied by profuse sweating, which, however, soon ceases if the normal temperature be maintained by means of fresh doses of the drug. Dr. Hallopeau has come to the conclusion that the action of kairine is more certain, powerful and rapid than that of any other antipyretic in non-poisonous doses.

In the *Practitioner* for March, Dr. Matthew Hay directed attention to the use of nitrite of sodium as a substitute for nitrite of amyl. As the result of careful experiment, he found that although the action of the sodium nitrite did not manifest itself for two or three minutes, yet it completely relieved the pain of angina pectoris, instead of only dulling it, as is the case with nitrite of amyl, and that the action also persisted for a longer period than that of the amyl compound. He also found it less liable than nitroglycerine to produce throbbing pain in the head and giddiness. The only disagreeable effect met with was the eructation of nitrous acid gas when a full dose of the salt was given; but subsequent experiments, published in the May number of the same periodical, tended to show that unless compounds containing nitrous acid give rise to its liberation in the body, no remedial effect is produced in the treatment of angina pectoris, and that, therefore, this effect is favourable rather than otherwise. His experiments further lead to the conclusion that although all nitrites which have been tried on this dreadful disease owe their efficacy to the nitrous acid they contain, yet the nitrite of amyl owes it, in some degree, also to the amylic constituent. The dose of the nitrite of sodium varies from 1 to 4 or 5 grains, according to the purity of the salt. Dr. Hay states that he has had some difficulty in obtaining it pure; even when obtained from a London manufacturing firm of the highest eminence, he was astonished to find that the specimen analysed did not contain more than 33 per cent. of the nitrite. Another specimen, which he procured nearly two years previously, contained only a trace of the nitrite. If quite pure, Dr. Hay thinks that a dose of 2 grains, or even 1 grain, would probably be a sufficient dose. Its purity is, he states, easily estimated by means of a standard solution of permanganate of potassium.

In the *Practitioner* (March, p. 175) Mr. H. T. Butlin recommends the use of chromic acid in syphilitic affections of the tongue and lips and secondary affections of the tonsils and palate. The acid is used in the form of lotion of the strength of 10 grains to 1 ounce of water, the solution being painted on three or four times a day with a camel's hair brush. The application is said to give only a little pain at first.

The use of iodine associated with the sedative alkaloids of opium is advocated by M. Delbovier, in a paper submitted to the Academy of Sciences (*Comptes Rendus*, xcvi., 1412), as a preventive of typhoid fever, and as a remedy of that disease if administered in its early stages. In the latter case it is alleged to control the fever, so that the temperature remains normal and there is an absence of delirium and complications of any kind. When administered later the remedy is not so efficacious, which M. Delbovier appears to attribute to the fact that whilst it is capable of preventing the injurious action of the microbes to which the fever is due, it is ineffective to repair the damage when done. No particulars are given as to the dose or manner of administration.

Another new dressing for wounds has been introduced by Professor Bruns (*Med. Times and Gaz.*, May 26, p. 587) under the name of "wood-wool." The raw material consists of disintegrated fibre of fine-grained wood, such as is used in paper making, the fibre of *Pinus picea* being preferred, as being poorer in resin than the wood of other pines and firs. The ordinary fibre is reduced to a finer state of division by being rubbed through a wire sieve; it is then dried and afterwards saturated with an antiseptic. The antiseptic recommended is $\frac{1}{2}$ per cent. of corrosive sublimate and 10 per cent. of glycerine, this percentage apparently referring to the ratio between these substances and the wood-wool. This wood-wool is said to possess the property of absorbing liquids to the extraordinary extent of taking up twelve times its own weight, so that 10 grains of it when completely saturated weighs 130 grains.

According to M. Izard (*Bull. Soc. Ph. du Sud-Ouest*, vii., 82) a solution of ferrous iodide, which will retain permanently the green colour characteristic of the proto-salts of iron, may be obtained by adding a few drops of alcohol to the preparation as soon as the combination of the iodine with the iron is completed. M. Izard appears to think that the alcohol undergoes dehydrogenation, and that the resulting aldehyde is capable of neutralizing the action of oxygen.

The researches initiated by M. Pasteur upon the alcoholic ferments promise to have an important influence not only upon beer brewing but upon the apparently less artificially conducted process of fermentation that goes on in the production of wine. It seems quite probable that the quality of the wine of any year is as much affected by the particular mould which predominates during the fermentation as by the amount of sunshine or rain during the growth of the grapes or even the passage of a comet through the sky. In Germany it is already the practice to sterilize the must and then to sow it with some selected ferment, a process favourable to the elimination of various "false" ferments (species of *Dematiei*) that are common to the surface of the grape and other fruit, whilst the custom in some southern countries of decanting the must as soon as the first foaming appears may have the same effect. In a recent communication (*Comptes Rendus*, xcvi., 1369) M. Le Bel incidentally remarks that last year none of the grape collection with which he had to do underwent fermentation influenced by what Pasteur considers to be the true wine ferment, *Saccharomyces ellipsoides*, Rees, but was all fermented by *S. pastorianus*. M. Le Bel also states that a natural must yields a larger proportion of the higher alcohols than a solution of sugar fermented with the same ferment. This observation has an important bearing upon the keeping of the "wines" now so largely manufactured from sugar solution in which grape skins have been steeped.

The opinion that the higher alcohols of the ethylic series are more poisonous in proportion as the complexity of the molecule increases has been expressed by various authorities, especially Nothnagel and Rossbach, and this opinion now receives confirmation by a series of experiments published in the *Practitioner* (p. 339) by Drs. Ringer and Sainsbury, who prove (at least, with regard to the heart of the frog) that the different members of the ethylic series have a similarity of action and indicate the probability that the constant chemical difference between these alcohols is corresponded to by a constant physiological difference, each CH_2 group increasing the activity by a definite amount. By their direct action on the tissue of the heart these alcohols are paralysing in their effect from the first without any preceding increase of action. The importance of having alcoholic drinks free from the higher alcohols of the ethylic series is therefore clearly proved.

In the last number of *Archives Italiennes de Biologie* a further account is given of the ptomaines by MM. Guareschi and A. Mosso. From decomposing fibrin they obtained a base having in all probability the formula $C_{10}H_{13}N$, isomeric with tetrahydromethylquinoline of Jackson, a compound having also similar properties to that of the ptomaines. They also obtained a ptomaine from decomposed human brain, which in its physiological effect upon frogs resembled curare, though feebler and more transient in its action. The ptomaine from fibrin had a similar effect to that obtained from brain, the chloroform solution of the former being more powerful than the hydrochlorate. Great care was taken by the experimentalists to ascertain the purity of the alcohol used for extracting the ptomaines and its freedom from poisonous alkaloids. Operating on about 50 litres of alcohol they found in it a small quantity of a base which was either pyridine or closely allied to it. This base is also sometimes found in amylic alcohol in as high proportion as 1 per cent., and being itself toxic, might lead to serious error. Other investigators have also demonstrated the presence in commercial alcohol of a mixture of substances belonging to the picoline series and also of collidine (*Lancet*, May 12, p. 828).

The *Répertoire de Pharmacie* quotes, upon the authority of Dr. Nessler, a recipe for an insecticide which is said to have a great reputation among German horticulturists. It consists of soft soap, 4 parts; extract of tobacco, 6 parts; amylic alcohol, 5 parts; methylic alcohol, 20 parts; water to make 1000 parts. The extract of tobacco is made by boiling together equal parts of roll tobacco and water for half an hour, adding water to make up for what is evaporated. The soft soap is first dissolved in the water with the aid of a gentle heat, and the other ingredients are then added. The mixture requires to be well stirred before it is used, and is applied by means of a brush or a garden syringe fitted with a small rose.

A substance resembling copaiba balsam, but of unknown botanical origin, which, in 1854, was imported under the name of "lagam balsam," from Padang in Sumatra into Rotterdam, where it passed into the hands of Dr. De Vrij, has been closely investigated by Herr Haussner (*Archiv*, xxi., 241). He found that lagam balsam yields upon distillation about one-third of its weight of an essential oil, having the same composition ($C_{20}H_{32}$) as those from gurjun balsam and copaiba balsam. Indeed, lagam balsam appears to differ from gurjun balsam only in an acid resin, which could not be got to crystallize, whilst the acid resin obtained by Werner from gurjun balsam ('Pharmacographia,' 2nd edit., p. 90) was crystallizable and probably had a higher molecular value. Herr Haussner assumes therefore that lagam balsam has a botanical origin similar to gurjun balsam, or wood oil, which is referred to species of *Dipterocarpus*.

The composition of the larch agaric (*Polyporus officinalis*) has been the subject of varying statements, which will now probably be disposed of by an investigation carried out by Herr Jahns. He states (*Archiv*, xxi., 260) that he finds it to yield to hot alcohol: (1) 16 to 18 per cent. of a bibasic triatomic acid (Fleury's "agaricic acid"), homologous with malic acid, being represented by the formula $C_{16}H_{30}O_5 + H_2O$, and which melts at 138° to 139° C.; (2) 3 to 5 per cent. of a neutral body, apparently an alcohol, crystallizing in needles, melting at 271° to 272° and capable of sublimation; (3) 3 to 4 per cent. of a white amorphous body, which separates in a gelatinous form from solutions; and (4) 25 to 30 per cent. of an amorphous red resinous mixture, of acid reaction, easily soluble in alcohol and ether, and having a bitter taste. This mixture contains the active purgative principle of *Polyporus officinalis*, and is the "larch fungus resin" and "red resin" of other authors. Herr Jahns considers agaricic acid, which Fleury represented by the formula $C_{24}H_{44}O_7$ (*Pharm. Journ.*, [3], vi., 862), to be identical with the "laricin" of Martius and essentially the same as the "agaracin" of Schoonbroodt and probably as the "pseudowax" of Trommsdorff. The silver, potassium, sodium, ammonium and barium salts of agaricic acid are described.

Under the name of "cinchocerotin," Herr Kerner sent to the exhibition in Paris in 1859 a substance which had gradually been deposited in some copper tubing during the cooling of an alcoholic decoction of a dried paste of South American flat calisaya bark and milk of lime. It has been recently examined by Herr Helms, who states that the crude brown cinchocerotin yields two different constituents, one easily soluble in alcohol, white and crystalline, and a much smaller quantity of a yellowish-white substance difficultly soluble in alcohol. The crystalline substance, for which he proposes to retain the name "cinchocerotin," melts at 130° C., sublimes with partial decomposition when heated higher, and is freely soluble in ether, chloroform and alcohol, but insoluble when boiled with water, hydrochloric acid, dilute sulphuric acid and acetic acid. Its composition is represented by the formula $C_{27}H_{48}O_2$, but the behaviour of the acid resulting from its oxidation indicates that it has possibly a higher molecular weight. From the results obtained it is evident that cinchocerotin is neither a wax nor a fat, and its properties and occurrence probably place it in the neighbourhood of betulin and cerin.

Professor Flückiger in a note to the *Berichte* (xvi., 1143) points out that he has described a potassium carbonate similar to that investigated by Rammelsberg (*Ber.*, xvi., 273, and before, p. 800) in the *Swiss Journal of Pharmacy* for 1856. It was obtained from an efflorescent mass of crude potash which had been exposed to the air. The salt dissolved in 3 parts of water at 15° C., giving a solution which was not precipitated by the addition of magnesium sulphate. It may be considered as formed upon the type of an acid produced by the abstraction of one molecule of water from three molecules of carbonic acid, thus— $3\,H_2CO_3 - H_2O = H_4C_3O_8$. The potassium salt of this acid would have the formula $K_4C_3O_8$ which agrees with the formula induced from the figures obtained by the analysis of the above salt. This potassium pyrocarbonate, as it may by analogy be called, crystallizes in white needles containing six molecules of water, so that the formula of the crystalline salt would be $K_4C_3O_8 \cdot 6\,H_2O$, or representing it as a compound of one molecule of normal potassium carbonate with two molecules of acid potassium carbonate ($K_2CO_3, 2\,KHCO_3, 3\,H_2O$).

The experiments of Messrs. Heumann and Koechlin (*Ber.*, xvi., 479) had led these observers to state that the vapour density of pyrosulphuryl ($S_2O_5Cl_2$)

is abnormal at a temperature at 184° C.; the theoretical vapour density being 7·4, while at this temperature the vapour density was found to be only 5·84. At higher temperatures the density becomes still less, thus at 212° C. it is 4·77, and at 452° C. 2·58. These authors ascribed this abnormality to the gradual dissociation of the pyrosulphuryl chloride, which is complete at 442° C., thus, $S_2O_5Cl_2 = SO_2 + SO_3 + Cl_2$; that is, 2 volumes of pyrosulphuryl chloride become dissociated into 6 volumes. The substance used in these experiments was prepared by two different methods: first, by the method of Rose by the distillation of sulphuric anhydride with chloride of sulphur; and second, by a method proposed by Heumann and Koechlin, consisting in the distillation of chlorosulphonic acid with phosphoric anhydride. Herr Konowalow (*Ber.*, xvi., 1127) criticizes the work of the above observers, and maintains, in accordance with his former experiments (*Compt. Rend.*, xcvi., 1059), that pure pyrosulphuryl chloride, which has a boiling point of 153° C., does not suffer dissociation at 184° C. or even at 210° C., but has the normal density of 7·4. Konowalow attributes the abnormal vapour densities obtained by Heumann and Koechlin to the employment of impure pyrosulphuryl chloride. He details experiments which show that by the method of Rose it is extremely difficult to obtain the pure substance. By two successive fractional distillations and collection of the portion distilling between 152° and 153° C., pyrosulphuryl chloride was obtained, which gave the vapour density 7·2; that is, it was normal. A similar difficulty was experienced in obtaining pure pyrosulphuryl chloride by the action of phosphoric anhydride upon chlorosulphonic acid. The distillate thus obtained gave extremely abnormal vapour densities in accordance with the experiments of Heumann and Koechlin; but after constantly distilling the mixture and collecting the portion boiling between 152° and 153° C., the distillate gave a vapour density of 7·1. Konowalow shows that it is fallacious to rely, as Heumann and Koechlin did, upon chemical analysis as an indication of the purity of this body. An admixture of chlorosulphonic acid sufficient to give an abnormal vapour density is not revealed by chemical analysis, that is, the results only show an error that would usually be allowed as experimental. The boiling point of the substance is the most trustworthy guide to its purity. Another source of error is also pointed out and experimentally proved by Konowalow. Pyrosulphuryl chloride is decomposed by the least trace of moisture (*Compt. Rend.*, xciv., 217), and consequently, when V. Meyer's method is employed, as it was by Heumann and Koechlin, for determining the vapour density, the apparatus must be filled with dry air before the experiment is commenced. Neglect of this precaution is shown to reduce the normal vapour density to 5·9.

Professor Spring, whose researches upon the formation of chemical compounds by pressure are well known, has obtained (*Ber.*, xvi., 999) a great number of the metallic sulphides by submitting a mixture of the two elements in a fine state of division to a pressure of 6500 atmospheres. In the case of magnesium a polysulphide was obtained, which dissolved in water with a yellow colour, as well as the normal sulphide. Sulphide of zinc was obtained in a form resembling blende, and possessing a crystalline fracture. A polysulphide was also obtained. The sulphides of iron, cadmium, aluminum, bismuth, lead, silver, copper, tin and antimony were in like manner produced. Sulphur and carbon did not combine to form bisulphide of carbon, neither did amorphous phosphorus and sulphur unite. Under ordinary conditions these two latter substances, when heated together, do not combine until the temperature rises above 260° C., and at this temperature the amorphous phosphorus is converted into the yellow variety. Spring's former experiments had shown that in the case of allotropic bodies it is possible to convert, by pressure, the modification having the less specific gravity into the variety having the greater specific gravity, but not *vice versâ*; thus the present result is in harmony with this, for amorphous phosphorus has a higher specific gravity (2·1) than the yellow variety (1·8).

Professor Spring has also discovered (*Ber.*, xvi., 1142) a colloidal condition of copper sulphide, in which state it is easily and completely soluble in water. The substance was prepared by completely precipitating a dilute solution of ammonio-sulphate of copper with sulphuretted hydrogen. The black precipitate was washed by decantation for one week with sulphuretted hydrogen water, and when every trace of ammonium sulphate and sulphydrate had disappeared the copper sulphide began to dissolve, yielding a black solution with a slight green fluorescence. On filtering the dark colour is not removed, and the solution is perfectly clear. The liquid is not decomposed by boiling, and upon evaporation over a water-bath, the sulphide remains as a black varnishy residue. The solution is decomposed on the addition of even a small quantity of saline solution. The precipitated copper sulphide loses this colloidal property after it has been dried in a vacuum at ordinary temperatures. It is a remarkable fact that the dried copper sulphide is not black, but a fine dark green colour, and when exposed to a pressure of 6500 atmospheres, the mass is found to have a dark blue metallic lustre.

A remarkably sensitive double sulphate of iridium and potassium ($Ir_2.3SO_4 + 3K_2SO_4$) has been obtained by M. Boisbaudran by dissolving in water charged with neutral potassium sulphate the product of the treatment of iridic compounds with potassic bisulphate at a dull red heat (*Comptes Rendus*, xcvi., 1406). It is soluble in water or water acidulated with sulphuric acid, but is nearly insoluble in a saturated solution of neutral potassium sulphate. From a hot saturated solution it is deposited upon cooling in transparent green crystalline grains that are without action upon polarized light. The double sulphate is not modified by boiling, if the solution be fairly acid; but when the solution approaches neutrality, or contains a certain quantity of neutral potassium sulphate, the green colour rapidly gives place to a very pale rose tint. At this point the addition of ammonia or potash causes the separation of all the iridium as an oxide, soluble in dilute sulphuric acid with a rich violet colour. In a cold solution of the double salt a slight excess of potash changes the green colour to a pale blue, without any immediate precipitation; but if the liquid be heated, it develops rapidly a magnificent violet tint, and the iridium is quickly precipitated as a beautiful blue violet oxide, forming a violet solution in dilute sulphuric acid. The reactions can be utilized in the recognition of minute quantities of iridium in the presence of gold, platinum, ruthenium and rhodium.

Having succeeded in effecting the liquefaction of oxygen (see before, p. 882), Messrs. Wroblewski and Olszewski turned their attention to nitrogen (*Comptes Rendus*, xcvi., 1225), but this gas even when cooled to $-136°$ C. and submitted to a pressure of 150 atmospheres remained still unliquefied. Upon suddenly removing the pressure, a tumultuous ebullition was perceptible throughout the tube, similar to that observed when a tube containing liquefied carbonic anhydride is plunged into water at a temperature above the critical point of that body. When, however, the pressure was reduced slowly, and care taken not to reduce it below 50 atmospheres, the nitrogen was liquefied completely, forming a colourless and transparent liquid, with a very distinct meniscus, but evaporating very rapidly. In order to maintain the liquid condition for a longer time it will be necessary to reduce the gas to a temperature below the minimum point yet reached. The experimenters, by following the same method, subsequently succeeded also in liquefying carbonic oxide, obtaining it as a colourless liquid, with a distinct meniscus, and they propose to apply it in the liquefaction of other gases.

Dr. Drinkwater (*Analyst*, April) has discovered that the small quantities of selenium present in some samples of commercial sulphuric acid exert a powerful action on mineral oils distilled from shale, the use of acid thus contaminated in refining the crude shale products entailing loss together with deterioration in quality. The author believes that the olefins are chiefly acted on, compounds being formed analogous to sulphovinic acid, and further that this action increases the quantity of tar, of which a portion would be broken up during the subsequent distillation and pass over with the oil, imparting a bad colour to it. The author also states that acid containing selenium cannot be used by brass-wire workers, such acid blackening the wire; and, further, such acid, when boiled with gas liquor to form sulphate of ammonia, is found to give to the solution a dirty brown to black colour.

Professors Ayrton and Perry have contributed an interesting paper "On the Resistance of the Voltaic Arc" (*Phil. Mag.*, May, p. 346). The results obtained showed that at first the difference of potentials necessary to maintain the arc increased rapidly with the distance, and that at a distance of about one-tenth of an inch it was about 60 volts. This increase continued up to one-quarter of an inch distance, after which the difference of potentials necessary became nearly proportional to the increase of distance, being about 54 volts per inch increase. The experimenters plotted these results, and obtained a curve for the increase very like that obtained by Mr. C. F. Varley for the discharge through a vacuum tube, and by Drs. W. de la Rue and Hugo Müller for the connection between the electromotive force and the distance across which it would send a spark. The result of the experiments showed that the difference of potentials between the carbons necessary to produce an arc depends almost entirely on the distance between them, and hardly at all on the strength of the current. Messrs. Ayrton and Perry express an opinion "that in all probability the conduction from particle to particle in a microphone is of the nature of a small electric arc, or rather, perhaps, a convective discharge."

A NEW ALKALOID IN CANNABIS INDICA.

BY MATTHEW HAY, M.D.,

Demonstrator of Practical Materia Medica, University of Edinburgh.

Preliminary Notice.

Cannabis indica, or Indian hemp, is exceptional as a narcotic plant in respect of no alkaloid, possessing the action of the plant, having been as yet separated from it. The so-called cannabine obtained by T. and H. Smith, of Edinburgh, many years ago, and said by them to possess the active and narcotic properties of the cannabis, is certainly not a pure principle, and is, probably, a mixture of resin with varying proportions of the narcotic principle. It possesses almost solely the characters of a resin, and is described by the Smiths as such; but were it the true active part of the plant, it is certainly far removed from all other narcotic principles, inasmuch as none of them is chemically related to the class of resins. One specimen of cannabin which I obtained some time ago from Merck, of Darmstadt, and which, I was given to understand, was prepared exactly according to Smith's process, possessed little or no narcotic action.

A few years ago, Preobraschensky (*Pharm. Zeitsch. f. Russland*, 1876, p. 705) made a chemical examination of a quantity of haschisch which he brought with him from China, whither in 1873 he had accompanied an expedition, and was enabled, according to his own statement, to separate from it a volatile alkaloid, which he held to be identical with nicotine, and which he believed to be the active part of cannabis. This, in view of the distinctive and very different action of cannabis, was somewhat remarkable. It is highly probable, as has been suggested by Dragendorff and Marquiss (*Pharm. Zeitung*, 1877), that the haschisch used by Preobraschensky was mixed with tobacco, which it often is in Eastern countries.

Recently Louis Siebold and Bradbury have reported to the British Pharmaceutical Conference (1881) that, after an elaborate investigation, they have arrived at the conclusion of Dragendorff and Marquiss, and that in the course of their investigation they made the interesting discovery that pure cannabis does actually contain a volatile alkaloid, which does not, however, possess the characters of nicotine. They separated it in very small quantity, obtaining not more than 2 grains from 10 pounds of Indian hemp. They give to it the name of cannabinine. They record no observation as to its physiological action; and they, therefore, leave it doubtful as to whether this volatile alkaloid is the narcotic principle of cannabis.

It is evident from these and many other researches that it is no easy task to arrive at correct conclusions as to the active principle of cannabis indica.

A considerable time ago, I commenced a chemical examination of this drug, at the suggestion of Professor Schmiedeberg, of Strassburg, the results, so far, of which lead me to believe that cannabis indica contains several alkaloids. In a future communication I hope to be able to give an exact description of the distinctive characters and toxic action of each. In the meantime, I shall content myself with the description of one which I have obtained in a considerable degree of purity, and one which, rather remarkably, possesses an action similar to that of strychnia. It is evidently, therefore, quite a secondary alkaloid of the cannabis, and reminds one of the thebaine of opium.

This alkaloid was obtained from a watery infusion of powdered cannabis indica by treating it with a solution of subacetate of lead, and filtering. To the filtrate was added ammonia, and the precipitate removed by filtration. The filtrate, acidulated with sulphuric acid, was now treated with a solution of phospho-wolframic acid in order to precipitate the alkaloids present. The precipitate, which was fairly abundant, was, after the fluid had been removed by filtration and washing with dilute sulphuric acid and pressing, mixed with barium hydrate and water, which formed an insoluble wolframate and set free the alkaloids. The filtrate was now deprived of its excess of barium by means of a stream of carbonic acid gas and again filtered. The filtrate was at a gentle heat evaporated almost to dryness and acidulated with sulphuric acid and treated with absolute alcohol. The sulphate of the alkaloids thus formed was partially soluble in alcohol, partly not. It was from the soluble part that the alkaloid in question was procured. The sulphate was converted into a chloride by treatment with barium hydrate, afterwards with carbonic acid to remove excess of barium, and, finally, with hydrochloric acid to neutralization. The chloride was evaporated and treated with absolute alcohol, in which it in part dissolved. From the solution, by addition of excess of carbonate of soda and frequent shaking with ether, an alkaloid was obtained in the form of colourless needle-like crystals.

The alkaloid was easily soluble in water, soluble also in alcohol, and more slowly soluble in ether and chloroform. It caused tetanus in frogs in exactly the same manner as strychnia, increasing the excitability of the reflex centres of the spinal cord. It did not give a violet colour with sulphuric acid and bichromate of potash. It was, therefore, although similar in action to strychnia, not chemically identical with it. A solution of it in water was precipitated by the various alkaloidal precipitants, platinic chloride, iodide of potassium and mercury, phosphotungstate of soda, phospho-molybdic acid, phospho-wolframic acid, etc.

Although I obtained the alkaloid from 1 kilogram of cannabis, yet the quantity of it was so small, that it was insufficient for an elementary analysis.

To this alkaloid I propose to give the name of tetano-cannabine, as indicative of its action.

MANUFACTURE OF TARTARIC ACID.*

BY L. H. FRIEDBURG, PH.D.

In the United States, tartaric acid is hardly manufactured for its own sake, but its preparation is unavoidably attached to the manufacture of cream of tartar. Here the starting points for tartaric acid are sablons, waste liquids and residues of different kinds, which render an analytical control troublesome, so that, partly because of great dilution, the raw material is treated more or less empirically, after the known and often described methods† with chalk and chloride of calcium or gypsum.

Abroad, the manufacture of tartaric acid is not everywhere a mere appendix to cream of tartar manufacturing, but forms an independent branch of manufacture. In such cases the raw material consists either of argols or of dry sablons, or of lees.

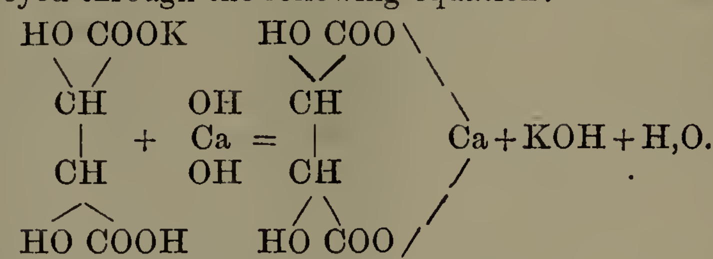
A careful analytical test has to be made before treating either of these mother-substances, and the manufacture has to be carried on with the greatest care, in order to avoid loss.

Until very recently, these tartaric acid factories worked generally after the old plan, as indicated above, viz.:—treatment with chalk and chloride of calcium or gypsum. But it has to be recorded, and I will briefly do so in the following pages, that a very neat and new patented process, which, according to my own experience, is commendable, is now also in use.

This process is based on the decomposition of the mother-substances, as named above, by slaked lime, instead of chalk. This preparation has been hidden in the European patent* under the heading, "Methods of obtaining the Potassium in the form of Hydrate, while making Tartaric Acid out of Argols."

This heading is practically speaking untrue, because, as we shall see later on, the potassium is not finally gained as hydrate, though this is in course of treatment formed, and then transformed into sulphate or chloride.

The chemical process which takes place in decomposing the bitartrate of potash in any mother-substance into tartrate of lime, by means of slaked lime, is very simply conveyed through the following equation:—



The practical difficulty which stood for so long a time in the way of realizing this decomposition for manufacturing purposes was the difficulty of making the products of decomposition easily filterable.

This the patentees have really overcome, and the method of working is smooth, and goes like clock-work.

Slaked lime, freed from coarse pieces, is taken, in necessary quantities, and a milk, not too thin, prepared therefrom.

This is heated to boiling, and argols, etc., in necessary quantity, are very gradually, and in a state of finest powder, introduced into the boiling mass.

The charging finished, boiling has to continue for two hours, the condensing steam being enough to keep the mixture in a concentrated form.

Hydrate of potash and neutral tartrate of lime are formed in this way. The nitrogenous organic impurities of the raw materials are, by the combined action on them of lime and hydrate of potash, decomposed so as to form ammonia gas, which is volatilized with the steam.

Boiling done, which takes place in an iron tank, the mixture is diluted by enough cold water, and then the potash is neutralized by either muriatic or sulphuric acid. The process is finished with the help of litmus paper.

Here the ammoniacal exhalations are to be considered, so as not to disturb the reaction. The decomposition, as described above, takes place under constant stirring by means of an iron stirrer run by machinery.

After the formation of either chloride or sulphate of potash, the mass is still more diluted with cold water, and stands best over night, stirring going on continuously, filtration then taking place the next morning. Here filter presses are used to great advantage.

It is advisable not to use too high pressure, so as to get a soft cake, which can more easily be washed out, in order to get rid of the mineral potash salts.

These latter are either boiled down, as long as the

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* From *Journ. of Amer. Chem. Soc.*, vol. iv., Dec., 1882.

† *Berichte über die Entwickelung der Chem. Industie*, A. W. Hofmann, vol. ii., p. 418, etc.; *Journal of the Society of Arts*, Robert Warington, vol. xxiv., p. 366, etc.

* *Die Chemische Industrie*, Dr. Emil Jacobsen, 1879, pp. 86 and 238; *Berichte d. Deutschen Chemischen Gesellschaft*, 1879, p. 1366.

strength of the solution makes it pay, or they might* be treated with chloride of lime (bleaching powder), and thus transformed into chlorate of potash, which I advise manufacturers to try. The cakes of brown tartrate of lime, which begin to exhale putrid odours by standing too long in a warm place (in summer time six hours' standing often will show this result), have speedily to be decomposed by sulphuric acid. This decomposition takes place in a wooden, lead-lined tank, with heavy wooden stirrer moved by steam.

The decomposition takes place in the cold, and its completion is determined easily by methyl violet test-paper.†

No analysis has to be made here, if good paper is at hand, which allows one to guide the reaction, so as to get the necessary point or the excess of sulphuric acid wished for.

The brown solution of tartaric acid is filtered through filter-presses into wooden receivers. It is not advisable to evaporate this acid down to the point of crystallization, because it contains impurities enough to spoil the mother-liquors at a too early stage. If the course of manufacturing demands a readier transformation of raw material into money, this crude acid solution might be concentrated in the leaden pans to the right concentration for crystallizing or for precipitation by the stirring process.

It is preferable to reprecipitate this acid as tartrate of lime, finishing the reaction with chalk, and using litmus test paper.

The tartrate of lime thus obtained is filtered on a vacuum filter or by centrifugal power. Of course washing takes place, though slightly. This tartrate of lime is crystalline, light greenish-yellow, and keeps perfectly well for any length of time required without decomposing.

It is decomposed in an apparatus similar to the one used for decomposition of the first brown tartrate of lime, by sulphuric acid, in the cold, and the reaction finished with the aid of methyl violet test paper. The filtration of the very white gypsum thus obtained cannot be done through filter presses, but has to take place on a vacuum filter, very thorough washing being required.

The tartaric acid solution thus obtained ought to stand between 12° and 14° B. It is ejected into the lead pans, evaporated at 80° C. to the necessary density by which dissolved gypsum is precipitated, run into the crystallizing boxes, and let stand for crystallization. The crop of brown crystals is redissolved to a liquid of the density 25° B., and treated with bone black which has been purified by muriatic acid (so as not to leave a trace of phosphates) at a medium temperature and under stirring.

The discoloured liquid is run through a filter-press, and thence into special lead pans. It is evaporated down to about 39° to 40° B., and run into lead boxes for crystallization.

The crystallization being a comparatively slow process, this liquid may be run into a proper tank with stirrer, stirred for several hours, thus yielding a crop of small crystals right away.

Either crystals are washed and dried in centrifugals by using steam for washing.

The liquid running off from the first crystallization yields after evaporation another crop of white crystals. Then it becomes a brown mother-liquor.

The mother-liquors of the brown crystals can, under careful attention, be carried along through the sixth or seventh crystallization. Then the predomination of sulphuric acid and impurities does not allow further crystallization.

The mother-liquors at that stage are diluted to a proper density, the greater part of the sulphuric acid removed by the addition of slaked lime milk, and the filtered liquid has then principally to be freed from iron salts and from phosphate of alumina.

The iron is easily expelled by taking care to keep it in the form corresponding to the protoxide, the presence of the phosphate of alumina making it necessary to treat the liquids boiling with milk of lime, thus precipitating phosphate of alumina, and forming an acid tartrate of lime which is soluble. It has to be filtered hot, and is decomposed by an addition of sulphuric acid, thus yielding very pure solution of tartaric acid.

If a transformation of the acid thus gained into bitartrate of potash should be wished for, which hardly would be prudent, the simplest way of arriving at this end would be the following:

The solution is divided into two equal parts, one half saturated by caustic or carbonate of potash, so as to form a neutral tartrate of potash, and then the other half added for the precipitation of the bitartrate.

* In case chloride of potassium was formed.

† *Journal of the Amer. Chem. Soc.*, T. O'Connor Sloane, vol. iv., nos. 1–4, page 31, etc.

CHLORIDE OF ZINC TOW.*

BY EDWARD HIRSCHSOHN, MAG.PHARM.

The employment of tow or oakum,† as a dressing for wounds is quite old. According to Gerdy,‡ tarred tow (oakum) was much used towards the end of the time of Hippocrates. Its antiseptic property was highly recommended, and it found extensive employment in the American war of the rebellion. In 1880, Dr. Weljaminow § reported that tow, which had been treated shortly before application with a 10 per cent. carbolic spray, was used successfully in Dr. Reyher's clinic in St. Petersburg. For some time past, also, dry tow impregnated with chloride of zinc has been used as a cheap substitute for the expensive salicylated cotton in the surgical clinic of Professor von Wahl, in Dorpat. A report on the success of this method of treatment has been made by Dr. Drombowsky,|| the present clinical assistant, who states that the dressing is prepared in the following manner:—

"The tow was picked, carded, and then placed in an oven arranged for sulphur disinfection. After having been exposed for twelve hours to the vapour of sulphur, it could be assumed that any germs absorbed from the air had been destroyed. It was then saturated with an 8 to 10 per cent. solution of chloride of zinc, and the excess of the solution removed by a press, somewhat like that used by bookbinders.¶ The tow was next dried, at ordinary temperature or at a moderate heat, being repeatedly turned over, and was after twenty-four hours sufficiently dry to permit being again carded. Finally, the material was formed into flat cakes of the size of plates, about $1\frac{1}{2}$ inch thick, and transferred to air-tight tin boxes, containing caustic lime, in order to prevent its decomposition by the carbonic acid of the air."

It was now of interest to ascertain, first, whether the process here described furnishes a completely aseptic dressing, and, secondly, whether the percentage of

* From *St. Petersburger Medic. Wochenschrift*, 1882, No. 50. Reprinted from *New Remedies*, April, 1883.

† We have uniformly translated the term "schiffswerg," which the author uses, with "tow," although he specifically states, in a subsequent portion of the paper, that it is prepared from old, condemned *tarred* ropes . . . which have probably lost a good deal of their tar by long exposure. This would, under ordinary circumstances, have to be rendered into English by "oakum;" but the article usually sold here under this name usually contains too much tar to readily absorb aqueous solutions. Tarry oakum is much used for dressing, particularly in this country; but the tow or oakum meant by the author is made from *old* tarred ropes, which have lost their stiffness. And it seems to us that plain tow, which has never been tarred, will answer the purpose even better.—*Ed. New Remedies.*

‡ Dr. Fischer 'Handbuch d. Verbandlehre,' 1878, p. 7.

§ *Centralblatt f. Chirurgie*, 188, No. 41.

|| *St. Petersb. Med. Wochensch.*, 1881, No. 32.

¶ A common clothes-wringer is, in our experience, the best contrivance for such purposes.—*Ed. N. R.*

chloride of zinc contained therein was approximately uniform.

To decide the first-mentioned point, it seemed advisable to use a method already used by former investigators, as Pasteur, Cohn, etc., and lately, also, by Professor Frisch, of Vienna.* This consists in bringing the material to be examined for the presence of vital germs or surviving spores into a medium favourable for their development. But, as it has been shown by the experiments of Billroth,† Kuehn‡ and Boehlendorf,§ that different forms of bacteria do not develop and grow equally in all propagating media, it was necessary to use several of the latter. I selected four of them, namely, the following:—

a. Pasteur's propagating liquid, modified by Buchholz:|| Sugar (candy), 100; nitrate of ammonium, 10; neutral phosphate of potassium, 5; distilled water, 1000 parts.

b. Cohn's propagating liquid, modified by Eidam:¶ Acid phosphate of potassium, 5; sulphate of magnesium, 5; neutral tartrate of ammonium, 10; chloride of calcium, 0·5; distilled water, 1000 parts.

c. Solution of extract of meat, containing 1 per cent. of the extract.

d. Normal urine.

The three first-mentioned liquids were first filtered, boiled from one-half to three-quarters of a hour, and the evaporated water replaced by addition of boiling distilled water. The urine was prepared for use by boiling for half an hour, then filtering, and again boiling the filtrate for half an hour, the lost water being replaced as in the other cases. The prepared liquids were transferred to propagating vessels, consisting of opodeldoc glasses (holding 1½ to 2 ounces), which were closed with tight plugs of cotton. Before the liquids were introduced, the vessels and plugs were heated during one hour to 180° to 200° C. (356°–392° F.), then allowed to cool sufficiently to permit the liquids being poured in, immediately stoppered and transferred to a hatching oven.** The temperature is in the oven varied from 36° to 38° C. (about 96°–101° F.). After the vials had been in the oven for a fortnight, it was found that, with the exception of a few, all of them had remained clear. The turbid ones were removed, and in each of the others 1 gram each of the samples of tow to be examined was introduced, great caution being used to rapidly open and close the vials. To obviate the objection that the mere lifting of the plug might have been sufficient to infect the contents, a few vials, in which the plug had been lifted in the same manner, but without any tow being introduced, were placed with the others in the oven. As criterion to pronounce upon the existence and development of germs in the several liquids, the appearance of a turbidity was relied upon.

Now, since crude tow (oakum) itself had already been in use for a long time as a dressing for wounds, it was of interest to find whether this alone, unprepared, fulfilled the requirements as an antiseptic dressing, although it could be presumed *à priori* that during its long exposure to all sorts of contaminating agents it had become infected.

Results with Unprepared Tow (Oakum).—All trials made with this showed that the tow contained living germs, which became more or less rapidly developed in the propagating fluids.

Results with Sulphurized Tow.—In this case the development of germs was slower than in the preceding cases. Yet after four days all propagating liquids were turbid. The tow had been kept for twenty-four hours exposed to the vapour of burning sulphur. This apparent inability of sulphurous acid gas completely to destroy the vitality of germs is also shown by a series of experiments lately made by the German Imperial Health Department. A better result was obtained by treating the tow with chlorine gas or chlorine water.

Results with Chlorinated Tow.—Tow which had been treated for twelve hours with chlorine gas, or been kept covered for half an hour with officinal chlorine water, then expressed and introduced into the propagating vessels, failed to show the development of any germs, even after standing for months.

Results with Chloride of Zinc Tow prepared by Cold Soaking.—Picked tow was completely saturated with a 10 per cent. solution of chloride of zinc, the excess of liquid pressed out between two small boards, and the tow dried at the ordinary in-door temperature. When completely dry, the tow was carded and then used. Two separate series of experiments were undertaken, each with twelve vials. In both series all the liquids developed fungi, etc., which covered, after three weeks, the whole surface of the liquid. The results showed that a simple treatment of the tow with a 10 per cent. solution of chloride of zinc was insufficient to destroy vital germs. Now, as it is known that the latter can be killed by a temperature of 100° C. (212° F.) and over, a new trial was made, in which the tow was boiled for half an hour in the 10 per cent. solution.

Results of Chloride of Zinc Tow prepared by Boiling.—Four separate series of experiments, each with twelve vials, furnished identical results. No development of fungi, etc., could be noticed in any of the liquids, even after standing for months. On repeating the experiment with a 5 per cent, solution of chloride of zinc, the same result was obtained.

The second point which I desired to determine was, whether the percentage of chloride of zinc in the finished dressing was approximately uniform. For this purpose, Balling's* volumetric method was used, which consists in determining the zinc by means of carbonate of sodium, with phenol-phthalein as an indicator.† I employed a solution of carbonate of sodium of such a strength that 1 cubic-centimetre corresponded to 0·0209 gram of chloride of zinc. The determination was made thus:—5 grams of the air-dry chloride of zinc tow were macerated with 100 c.c. of distilled water, for twenty-four hours, in a closed vessel, under repeated stirring; then 25 c.c. were measured off, diluted with 250 c.c. of boiling distilled water in a flask heated to boiling, a few drops of an alcoholic solution of phenol-phthalein poured in, and the volumetric solution of carbonate of sodium added, until the liquid assumed a distinct rose-colour. The following results were obtained:—

a. Tow, previously carded, boiled with a 10 per cent. solution of chloride of zinc, dried in a room, and then again carded, yielded, in an air-dry condition, 14·83 per cent. of chloride of zinc as a mean between 4 determinations. In another sample 14·58 per cent. were found.

b. Tow treated exactly like the preceding, but with a 5 per cent. solution only, yielded 8·85 (another sample 8·67) per cent. of chloride of zinc.

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* In his paper "Ueber die Desinfection von Seide und Schwämmen zu chirurgischen Zwecken," in *Archiv. f. Klin. Chir.*, vol. 24, 1879, p. 749.

† 'Untersuchungen über die Vegetationsformen der Coccobakterien,' Berlin, 1874, p. 58, 121.

‡ 'Ein Beitrag zur Biologie der Bacterien,' Dissert. Dorpat, 1879.

§ 'Ein Beitrag zur Biologie einiger Schizomyceten,' Dissert. Dorpat, 1880.

|| *Arch. f. experim. Pathol. und Pharmakol.*, iv., 3.

¶ Cohn, 'Beiträge zur Biologie der Pflanzen,' i.

** For this purpose I used a double-walled box made of tinned iron, such as is used for the preparation of Lister's carbolic gauze, and has been described by me in a paper on the preparation of salicylated and benzoated dressings in the *Voyenno-Meditsink. Journ.*, 1880, July number. The box held 250 vials.

* *Chemiker-Zeitung* (1881), No. 23, p. 395.

† Before using the method, I convinced myself that an aqueous extract of crude oakum with carbonate of sodium yielded no precipitate, and that the solution was free from ammoniacal salts, since the presence of the latter, according to Balling, retards the appearance of the end-reaction.

c. Tow treated as under *a*, but dried at 60° to 70° C. (140° to 158° F.), and then carded, yielded, after one day's exposure to the air, 12·86 per cent. of soluble chloride of zinc.

d. Tow treated as under *c*, but prepared with a 5 per cent. solution, yielded 7·01 per cent. of chloride of zinc.

The preceding figures show that the dressings contain practically uniform quantities of the salt. The circumstance that tow soaked in a 10 per cent. solution of the salt retains more than 14 per cent. of the latter, is explained by the fact that it soaks up about one and a half times its weight of the solution. The quantity of the salt in the samples dried at 60° to 70° C. is smaller, which is partly due to the loss caused in the process of carding.

For the purpose of ascertaining the keeping qualities of the dry chloride of zinc tow, a new assay of the samples was made after six months.

a. Samples which had been carded and been kept loosely in filtering paper yielded 11·52 (or 10·33) per cent. $ZnCl_2$, while they had formerly contained 14·75 and 14·38 per cent., respectively.

b. Samples which had been kept, uncarded, in waxed paper, lost scarcely anything; those which originally contained 14·75 and 14·38 per cent. were found to assay 14·70 and 14·31 per cent.

Chloride of zinc tow, therefore, may be kept, practically unaltered, for a considerable time, if wrapped in waxed (or paraffined) paper.

On the basis of the results here described, I propose the following method for preparing this form of dressing, of a strength of about 15 per cent.:—

Preparation of Chloride of Zinc Tow.

Commercial, crude tow is thoroughly carded, then boiled for half an hour with ten or fifteen times its quantity of a 10 per cent. solution of chloride of zinc, in a kettle which can be closely covered. It is then pressed between two hinged boards, and dried in thin layers, at the ordinary in-door temperature. When dry, it is either at once carded, or it may be preserved uncarded in waxed paper.

If the tow is to contain 10 per cent, of chloride of zinc, a 7 per cent. solution of the dry salt is taken; and for a 5 per cent. dressing the strength of the solution is reduced to 3½ per cent.

When thus prepared, and particularly after being several times carded, the prepared tow is quite soft, and advantageously replaces salicylated cotton, owing to its cheapness.

I have also made some experiments to test the antiseptic properties of the dressing thus prepared, compared with those of salicylated cotton and jute. [The tables appended by the author must be omitted here, for want of room; the results are summarized as follows:] 3 grams of the respective kind of dressing were added, each, to 100 c.c. of fresh urine, in vials which were kept open, and at a temperature of 30° to 35° C. (86° to 95° F.). A sample of the urine alone became offensive after four days; two others treated with an 8·5 per cent. and a 14·6 per cent. chloride of zinc oakum, as well as one treated with a 10 per cent. salicylated cotton, were still clear and acid after six days; another containing some 4 per cent. salicylated cotton became turbid after three and offensive after six days; and one sample treated with some 4 per cent. salicylated jute (which had, however, been carelessly kept) became offensive after two days. In another series of experiments, 5 grams of the respective dressings were, each, added to 100 c.c. of already offensive and alkaline urine; the samples containing a 10 per cent. salicylated cotton, and that with an 8·5 per cent. chloride of zinc tow, though at first rendered neutral soon became offensive again; but the sample treated with a 14·6 per cent. chloride of zinc tow turned gradually clear and acid, and remained so at the end of the second day.

These results confirmed the decided antiseptic properties of chloride of zinc, already recognized by most surgeons.

Tow (or oakum) may also be impregnated with other antiseptics, such as carbolic, salicylic and boric acids, iodoform, etc., by slightly modifying the above process, as I have found by preliminary trials. Special directions for their preparation will be published at some future time.

TINCTURA FERRI CITRO-CHLORIDI.*

BY ARTHUR H. STILES.

This is an unofficial compound, to prepare which take of—

Citric acid	℥xviij.
Bicarbonate of sodium	℥xiv.
Solution of chloride of iron	℥xij.
Water	℥ij.
Alcohol sufficient to make	ʒvj.

Heat the water to the boiling point and, having dissolved in it the citric acid, add the bicarbonate of sodium in successive portions, stirring after each addition until effervescence ceases; then add the solution of iron, stirring well, and afterwards, sufficient alcohol to make the mixture measure 6 fluid ounces; lastly filter the solution to remove any foreign matter that may be present, and keep it in well stopped bottles.

In my first experiment, having heated the water to the boiling point and dissolved the acid, I began adding the sodium salt, but, before one-half had been added the solution took the form of a crystalline mass very hard and but slightly soluble.

Thinking that the heat had, by its continued application, driven off a part of the water, in my next trial, after dissolving the acid in the heated water, I removed the solution to a mortar, then adding the bicarbonate of sodium, triturating after each addition. By so doing I obtained a solution of a syrupy consistence, having an acid taste and a very marked reaction on blue litmus, which is an acid citrate of sodium.

Then I added the solution of iron.

The reaction which occurs here is not so easily accounted for. That there is a reaction is very evident, for, before the alcohol is added, the solution obtained by the addition of the solution of iron to that of citrate of sodium is clear, but after it has been added a precipitate is thrown down, which has the appearance of, and answers the tests for chloride of sodium.

As it appears to me, the chloride of sodium is held in solution until the alcohol is added and then, owing to its comparative insolubility in the alcohol, the salt is thrown down as a precipitate.

I have since obtained the same result by reducing the acid to a powder, adding the sodium salt and water, setting the mixture aside until solution is complete, and then adding the other ingredients as before mentioned.

The completed solution is of an emerald green colour, having the specific gravity 1·200, and containing the same amount of solution of chloride of iron as did the tinctura ferri chloridi of the U.S. Pharmacopœia of 1870, and 1·22 parts less than that of 1880.

The advantages of this preparation are its miscibility without discoloration or formation of precipitates, with preparations of barks, all tonics and Fowler's solutions; it has an agreeable taste, that of iron being almost obliterated, and it has no injurious effect on the teeth.

Its medical properties are identical with those of tinctura ferri chloridi. The dose is from 10 to 30 drops.

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* From a thesis presented to the College of Pharmacy of the City of New York, March, 1883. Reprinted from *New Remedies*, April, 1883.

The Pharmaceutical Journal.

SATURDAY, JUNE 2, 1883.

Communications for the Editorial department of the Journal, books for review, etc. should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

ENERGY AND ITS TRANSMISSION.

THE enormous progress made in the science of electricity during the last few years has attracted so much attention to this form of energy and the available means of transmitting it from one place to another, that there has been a tendency to lose sight of other sources of energy and means of transmission which, though more old-fashioned, are scarcely, if at all, less valuable. Professor OSBORNE REYNOLDS has therefore done useful and timely service in giving a little more prominence to this latter part of the general subject in his recent "CANTOR" course of lectures on "The Transmission of Energy," delivered before the Society of Arts.

Energy is, as a rule, only useful to man to the extent that it can be controlled and directed, but, as pointed out by Professor REYNOLDS, it exists to a great extent in an "undirected" condition, although by various devices it is possible to bring it largely under control. "Undirected" energy may be considered to be analogous to an undisciplined mob, which can be directed as a whole only by directing each of its separate constituents. In the case of a mob this can sometimes be accomplished, but in the case of energy, where the constituents are molecules of matter, it cannot in practice be effected. "Directed" energy is more analogous to a trained army, although it may be disciplined only to an extent sufficient to execute one manœuvre with full effect, and if compelled to execute other manœuvres would not carry them out to the fullest advantage. An illustration of this may be found in coal, the total "undirected" energy stored up in one pound of which is estimated to amount to ten to twelve million foot-pounds. Of this quantity it is possible to convert seven to nine million foot-pounds into "directed" energy; but in utilizing this energy in the steam-engine, a great loss is sustained in its passage through the plate of the boiler, and only about one-third, or from two to three million foot-pounds of "directed" energy, enters the boiler. A further loss is sustained in the transmission of this energy from the boiler to the piston, and in some cases only half a million out of the original ten or twelve million foot-pounds reach the piston as "directed" energy, whilst in the highest class of engines yet constructed, the quantity only reaches one and a half million foot-pounds. Thus it will be seen that if steam-engines should be eventually perfected so as to throw upon the piston the whole of the energy which enters the boiler, this will amount to only about one-fourth of the energy stored up in the coal.

In view of the possible eventual scarcity of coal, consequent upon the enormous demand for it as a convenient source of energy, attention has been turned in other directions. The winds have been captured and made to do service to man, and the waters have been intercepted on their way to a lower level and made to pay a toll of work. An enormous store of energy resides also in the waves of the sea, which at the present time are apparently doing no other work than gradually washing away our coasts. It has been already shown, however, that a ship may be propelled by the rocking of the waves on which it floats, and it is probable that before long the ingenuity of man will devise means for extorting a tribute from the ocean. Another source of energy mentioned by the lecturer is the oxidation of organic matter, as in the case of a draught animal fed upon corn. But if corn be used as fodder for horses, instead of coal being used for the production of steam, the cost is ten times as great to produce the same amount of energy. Accordingly, to be equally profitable, the energy obtained from a horse should be ten times as valuable as the same amount of steam-energy, and this, for certain purposes, is true, for although in some cases steam-power can be used equally as well as horse-power, yet in others, in which the energy is required to be brought in closer connection with the work, horse-power has a considerable advantage. With respect to inorganic matter, if we may judge from the enormous amount of energy expended in dissociating the oxides of metals, amounting, in the case of iron and zinc, to nearly two million foot-pounds per pound of metal, if it were possible to apply the energy of such oxidation the metals would become rivals to coal.

The distance through which energy is capable of being transmitted varies according to the medium of transmission. Thus if transmitted by water only about one part in one hundred and twenty thousand of the energy will be lost per mile, whilst if transmitted by railroad the loss will equal one part in twelve thousand; stated roughly, an amount of energy that can be transmitted by canal 120,000 miles would only pass over a railroad 12,000 miles, over a good ordinary road 1000 miles, and without a road 300 miles. There are several artificial methods of transmitting energy: (1) It may be contained in a medium which may itself be carried from place to place as in a watch; (2) By means of shafts; (3) By means of the flow of heat or electricity along material conductors. Although radiation is used both in optics and acoustics, the only example of its use in the transmission of energy is the radiation of coal through a boiler-plate.

Power stored in one form is much more available than power stored in another, and the weight of material required in each form to enable a certain amount of energy to be stored in it varies also. Thus, to store one million foot-pounds in a steel spring involves the use of material weighing about three hundred thousand pounds; compressed air in pipes, representing the same amount, would require seventy-five to two hundred pounds, water compressed in pipes fifty to one hundred and fifty pounds, FAURE's battery about seventy pounds, a locomotive (with coal and water) about fifty pounds, a horse about two hundred pounds, and coal about one and a half pounds. The relative cost is also to be considered, and taking coal as the standard, the methods of compressed air in pipes and FAURE's battery are, roughly speaking, three times as costly.

Another point to be considered is that not only power is required, but applied power; the relative capabilities of different methods for the mechanical transmission of one thousand horse-power is indicated by the following table:—

Means.	Diameter (in inches).	Loss (per mile per cent.).	Practical limit (in miles).
Shafts	4	10	7
Steel ropes (single)	·75	·5	100
Steel ropes (double)	1	1·5	33
Compressed air in pipes	30	—	100
Water compressed in pipes	12	10	7

With regard to the foregoing it may be remarked that a 4-inch shaft will not practically transmit more than 75,000 foot-pounds per second. The great advantages of a steel rope are apparent, but the compulsory use of double steel ropes in most cases tends to lower the figures considerably, and it has been found that they are practically of no use to transmit less than forty or fifty horse-power. Like steel ropes, water is most effective when used in transmitting high pressures, its great disadvantage being due to leakage; but if the diameter of the twelve-inch pipe were doubled, that is to say, if the capacity and cost were quadrupled, instead of the practical limit being seven miles it would be over two hundred. The transmission of energy by means of air compressed in pipes involves no appreciable loss from friction, and unlike other methods this will transmit high or low pressures equally well. DEPREZ has made several experiments on the transmission of energy for long distances by electricity, but although the results look well, the lecturer was of opinion that if reduced to the same standard as that of steel ropes, they would be seen to be really small. It may be remarked, however, that at the end of the course of lectures, the Chairman expressed an opinion that DEPREZ had made his experiments at a disadvantage, and moreover, Sir WILLIAM SIEMENS has recently given his reason for believing that much better results can be obtained by this method.

The second reading of the Medical Acts Amendment Bill has been again adjourned until Monday next. When speaking on Tuesday evening of the Government measures that it is intended to push through Parliament this session, the Prime Minister made no reference to this Bill, so that it is possibly looked upon as one of the "measures of secondary importance," concerning which, he said, doubts might arise as to persevering with them.

* * *

Petitions have already been presented in the House of Commons for the amendment of the Medical Bill, on behalf of the King and Queen's College of Physicians, Ireland, and the Society of Apothecaries, London. The former body asks that it may be placed on an equal footing with other medical authorities by being empowered to return three, instead of two, representatives to the proposed Medical Board for Ireland. The latter body asks for the restoration of the provision originally contained in the Bill, under which it would have chosen one of the fifteen members of the Medical Board for England.

* * *

In the petition from the Society of Apothecaries it is urged, among other pleas, that the large majority of country practitioners obtain their medical diplomas from that Society, and that it is peculiarly connected with what are called general practitioners, who form a very numerous and influential body, and who for the most part supply their own medicines and thereby satisfy a great public want.

* * *

According to the *British Medical Journal* a subcommittee appointed by the Council of the Metropolitan Counties of the British Medical Association has also decided to attempt to secure the introduction of several amendments into the Bill. One of these is to alter the fourth division of clause 27 so as to absolutely prohibit unregistered persons from practising medicine in any of its branches for gain.

* * *

At a meeting of the chemists of Rochdale, held last week, it was resolved to forward a petition to the House of Commons, praying for a clause to be inserted in the Medical Act Amendment Bill, for the purpose of placing pharmaceutical chemists on the Committee for the compiling and revision of the Pharmacopœia.

* * *

A correspondent of the *British Medical Journal* expresses an opinion that the present time, when Bills are under consideration for the amendment of both the Medical and the Pharmacy Acts, would be opportune for an endeavour to prevent druggists from prescribing medicines, of the physiological and therapeutics of which, he says, they know little or nothing. To effect this he proposes that a clause should be inserted in the Pharmacy Bill enacting that scheduled "poisons" are only to be prescribed by a legally qualified man, who shall affix his name and address to all prescriptions ordering them, without which it shall be unlawful for them to be dispensed by a pharmacist. He would also compel a pharmacist to cancel a prescription ordering a poison by writing his name upon it and make it unlawful to repeat a prescription so cancelled without the prescriber's authority. These restrictions he would also impose upon medical men keeping open shop for the dispensing of other practitioners' prescriptions.

The same gentleman expresses his sympathy with chemists and druggists in their "attempts to get the monopoly of selling and compounding all—with a few exceptions—the medicines enumerated in the British Pharmacopœia," and he thinks that such a concession would be a graceful act and only fair to them after the prolonged study and expense to which they have been put to qualify themselves. To prevent, therefore, the sale of articles used in medicine by incompetent persons he suggests that, with the exception of a few scheduled articles to be kept by the grocer and the drysalter, the dealing in all medicines should be restricted to legally qualified druggists. This correspondent does not say whether, having provided for the protection of the medical profession in the Pharmacy Bill, he would secure the interests of chemists and druggists in the Medical Bill; neither does he say how far he thinks the probability of the passage of either Bill would be affected by such a course.

* * *

A case recorded in the *British Medical Journal* last week well illustrates the perverse carelessness which is beyond the power of any poison regulations to control. A woman in a small village in the west of Ireland, finding some whitish powder in a dirty kind of trough that had been left by a previous tenant, came to the conclusion that it must be "bread-soda," and used it in the making of a cake. The result was that within an hour of partaking of the cake the whole family showed symptoms of poisoning and her husband died the next day. The "bread-soda" turned out to be arsenious acid, the residue from a batch of sheep-dressing.

* * *

A case of poisoning by butter of antimony is reported in the last number of the *Lancet*, in which death followed within two hours of swallowing the poison. The poison had been purchased a twelvemonth previously for the treatment of sheep suffering from foot-root; and the portion unused, after being carried about from place to place, appears to have fallen into the hands of the farmer's wife, who was of unsound mind. Mr. Cooke, who reports the case, appears to think that butter of antimony should be included in the first part of the poison schedule, since although in this case the bottle was labelled "poison," and with the name and address of the seller, he remarks that the now prevalent use of this substance by farmers for foot-rot may lead to more frequent cases of poisoning unless its sale be placed under more stringent regulations. He is evidently unaware that the Privy Council has recently refused to sanction its introduction into the second part of the schedule.

* * *

The medical practitioners of Illinois appear to be endeavouring to obtain an amendment of the recently passed pharmacy law of that State, so as to make it compulsory for the pharmacy board to accept medical graduates as duly qualified pharmacists without examination. The editor of the *Pharmacist* has naturally taken umbrage at this claim, and in order to illustrate the danger to the public of allowing physicians to take the place of pharmacists, tells a story sufficient to prove his case—and more! He states that a medical man, whose name is given, went to a grocery store with a patient and asked for an ounce of acetate of potash. The boy in charge, before serving him, explained that the "acetate of potash" in stock had nearly killed a man the week before, but the doctor after examining the substance in the jar pronounced it all right. The following conclusion to the story is the editor's own, italics and all. "*That jar was filled with prussiate of potash*, a deadly poison. The doctor then gave Mr. Swift one ounce of the poison—enough to kill ninety-six adults—and Mr. Swift died from its effects."

* * *

The last volunteer report on the London water supply, put forward on behalf of the Water Companies, shows that the recently expressed opinion of the President of the Local Government Board (see before p. 863) has not been without effect, since it does not purport to be addressed to that official, but is "submitted for the information of the Local Government Board." But it cannot be said that a submissive spirit pervades the report, for the writers express an opinion that "in the reports made to the Registrar general [*i.e.* the official reports], which not merely set forth the bare analytical results obtained, but profess to explain their import and signification, some statement as to the precise nature of what are so vaguely designated 'moving organisms,' and some information of their real importance, might in common fairness be expected from one who, by his persistent use of language which has been reprobated by a Royal Commission, does not a little to create an unfounded prejudice against the water supply on which he is expected impartially to report." *Tantæne animis cœlestibus iræ?*

* * *

The *Pharmaceutical Record* mentions that up to the 1st of May, the examinations for the degree of "graduate in pharmacy" at the different colleges of pharmacy in the United States had been attended by 469 students, of whom 388 had passed. This completes the record for the last session, with the exception of one college.

* * *

A course of botanical lectures and demonstrations has been commenced by Mr. J. G. Baker, F.R.S., at the Garden of the Apothecaries' Society, at Chelsea, and will be continued on successive Saturdays during the summer months. At the first lecture the room was completely filled, Mr. Baker's well-known ability as a lucid lecturer attracting large numbers. Admission to the lectures is obtained by application to the Beadle of the Society at Blackfriars.

* * *

On Monday evening next, June 4, at 8 o'clock, a meeting of the London Section of the Society of Chemical Industry will be held in the Chemical Society's rooms, Burlington House, when Mr. G. W. Wigner will read a paper on "The Packing of Goods of Delicate Odour, such as Tea, etc.;" and a communication will be read from Mr. G. Ward, "On the Salt Deposits of the Cleveland District."

* * *

A meeting of the School of Pharmacy Students' Association will be held on Thursday, June 7, at 8 p.m., when a paper will be read by Mr. C. Ranken, on "Some Old and New Theories concerning the Vegetable Cell." A Report upon Materia Medica will be made by Mr. W. Elborne on the subject of "Commercial Rhubarbs."

Pharmaceutical Society of Ireland.

SPECIAL MEETING OF THE COUNCIL.

Tuesday, May 15, 1883.

Present—Professor Tichborne, President; Dr. Collins, Dr. Montgomery, Messrs. Allen, Brunker, Draper, Hayes, Payne (Belfast) and Wells.

The Registrar (Mr. Fennell) read the following letter and petition:—

"Privy Council Office,
"*May 3rd*, 1883.

"Sir,—I am directed to transmit to you herewith, a copy of a petition which has been presented to the Lord Lieutenant in Council by Mr. John P. Middleton, appealing against the refusal of the Council of the Pharmaceutical Society of Ireland to admit him to the examination for their licence, and I am to request that you will move the Council of the Society to favour me, for His Excellency's information, with any observations they may desire to offer thereon.

"I am, Sir,
"Your obedient servant,
"W. S. B. Kaye.

"The Registrar,
"Pharmaceutical Society of Ireland,
"Kildare Street."

"*Petition.*

"To His Excellency the Right Honourable John Poyntz, Earl Spencer, K.G., Lord Lieutenant of Ireland in Council.

"My Lord,

"May it please your Excellency,

"The petition of the undersigned humbly showeth that whereas the 'Pharmacy Act (Ireland), 1875,' section 22, enacts that the Council of the Pharmaceutical Society 'shall cause examinations to be held at such times and in such manner as may be prescribed by regulations made in pursuance of this Act,' and that 'all persons desirous of being registered as pharmaceutical chemists under this Act, may, at any such examination, present themselves for examination, and shall be examined with respect to their knowledge of the Latin and English languages, of arithmetic, of botany, of materia medica, of pharmaceutical and general chemistry, of practical pharmacy of the British Pharmacopœia, and of such other subjects as may, from time to time, be prescribed by any regulations made in pursuance of this Act.'

"That it is my desire to present myself for examination.

"That regulations made under the sanction of your Council are placed as a bar to my examination under circumstances as set forth in accompanying declaration and correspondence, of great injustice to me.

"That Mr. George H. Grindley was admitted a licentiate of the Pharmaceutical Society in July, 1876; was elected a member in September of the same year; commenced the business of pharmaceutical chemist in 1876 in partnership under the style of Brooks and Co., Pharmaceutical Chemists, at 136, Lower Baggot Street; was elected member of the Council in October, 1880; and kept open shop for the firm until October, 1882.

"That he received me as apprentice to the business of pharmaceutical chemist in 1877, and retained me as such apprentice till the full term of five years' apprenticeship ended in June, 1882.

"That during said apprenticeship, with his knowledge and approval, I presented myself for examination in respect of my knowledge in the Latin and English languages, of arithmetic, of botany and general chemistry, and hold their certificate of having passed the Preliminary examination of the Pharmaceutical Society of Ireland, dated October, 1879.

"That the correspondence annexed showeth that the Council refuse to admit me to examination for their licence because 'Mr. Grindley was associated with an unqualified partner in business,' although his certificate sets forth he was the managing partner, and had the business in his sole control.

"I respectfully submit that I am thereby dealt with unjustly, and appeal for such review and redress as your Excellency in Council may be able to afford; in support of which I claim that Mr. Grindley was 'keeping open shop' in the terms and meaning of the regulation on page 35 of the Society's Calendar, 1883, and that said regulation is itself opposed to the plain reading of section 22 of the Act of Parliament.

"And your petitioner will ever pray.

(Signed) "John P. Middleton,
"11, Hardwicke Street, Dublin.

"*April 26th*, 1883."

The Registrar read the Report of the Certificate Committee on this matter. (See *Pharmaceutical Journal*, April 14, 1883, p. 844.) Also the following query, addressed in August, 1878, to Mr. T. A. Purcell, Q.C., and his opinion thereon.

Query:—"Is it legal for a firm, consisting of two or more members, of whom only one is a qualified apothecary or pharmaceutical chemist, to compound poisons or medical prescriptions, or to sell poisons by retail, for the mutual benefit of all the partners? This question is intended to include co-operative and limited liability companies and societies of which a small number of the members or partners are qualified apothecaries or pharmaceutical chemists."

Opinion:—"In my opinion it is not. The Act makes it unlawful for any unqualified person not only to sell, but also to keep open shop, for the retailing, dispensing, or compounding of poisons or medical prescriptions, and it does not cease to be unlawful for such unqualified persons to sell or keep open shop, because other persons, connected with them as partners, may be qualified to do so.—T. A. Purcell."

Proposed by Mr. Brunker, seconded by Mr. Allen, and resolved:—

"That the Registrar be directed to draw up a reply to the Clerk to the Privy Council stating the circumstances under which the certificate presented by Mr. Middleton was rejected, and to state that the Council were guided in the course which they adopted by the opinion of Mr. Purcell, Q.C., a copy of which is to be enclosed to the Privy Council."

The meeting then broke up.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The annual general meeting of this Association was held on Tuesday evening, May 22, Mr. R. Brodie, Vice-President, in the chair.

The minutes of the previous meeting having been read and approved of, the annual reports by the Secretary, Treasurer and Librarian were adopted.

The President then intimated that a communication had been received from the General Medical Council, inviting suggestions regarding the proposed new edition of the British Pharmacopœia.

After consideration, it was, on the motion of Mr. Joseph A. Clarke, remitted to the Council of the Association to consider the matter.

The following office-bearers were then elected for session 1882–83:—President, Mr. John McMillan; Vice-President, Mr. R. Brodie; Secretary, Mr. John M. Arnot; Treasurer, Mr. John Walker; Librarian, Mr. T. W. J. Law; Councillors, Messrs. J. A. Clarke, John Currie, James Dickie, Daniel Frazer, J. L. Hatrick, J. C. Hunter,

A. Kinninmont, David Lees, R. McAdam, William Maltman, R. Craig Rait and William Simpson; Auditors, Messrs. A. Paterson and W. Paris.

This being all the business, the meeting afterwards broke up.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A lecture was delivered at the rooms of the above Association on Wednesday evening, May 23, by Mr. W. B. Clark on "Ferrum." Mr. J. Garrett presided.

The lecturer explained the chief sources of the iron found in commerce, the methods of separating it from the ore, and the preparation of cast and wrought iron, and steel. He also dealt with the chemistry of iron, specially with the different preparations of it in the B.P.

Throughout the lecturer was listened to with marked interest.

Mr. Garrett proposed a vote of thanks to Mr. Clark for his instructive lecture, which was seconded by Mr. Edwards and carried.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual meeting of the above Association was held at The George Hotel, on Tuesday, May 29, the President, Mr. R. Fitzhugh, F.C.S., in the chair.

The minutes of the previous meeting having been read, the President called upon the Hon. Secretary to read the Annual Report.

The Report commenced by congratulating the members upon the present satisfactory state of the Association. Although the personal interest taken in the work and the attendance of members at its monthly meetings are not what could be desired, the Council feels that good and useful work has been done during the past session. The society at present numbers 52 members and 21 associates (total, 73), as against 52 members and 26 associates (total, 78) last year, showing a decrease of five associates. During the year two new members and three associates have been elected. The Treasurer's account for the past session shows a balance of £70 7*s.* 10½*d.* as against last year of £52 15*s.* 10*d.*, or an increase of £17 12*s.* 0½*d.*; and the Council suggested that the forthcoming executive should, if possible, reduce the above balance, by endeavouring to obtain suitable rooms for the library and museum, and in making additions to the library, so that the Association may become of more value to our young men. During the session six meetings have been held, the average attendance having been fairly kept up. At the social meeting, held on December 19th, Mr. W. H. Parker opened a discussion upon "The present numerous Violations of the Pharmacy Act existing in Nottingham," and after an animated discussion a sub-committee was duly appointed to consider the question. This committee reported that it had gathered the necessary information and had brought the matter under the notice of the proper authorities, and it was of opinion that the time had arrived when some definite and persistent action should be taken against unqualified men, and the large amount of illicit trading going on. It recommended to the Council and Association that a law committee be appointed every year at the annual meeting. The lectures given by Mr. Spencer and Mr. Major had been most valuabie, and thoroughly appreciated by the members and associates, and the Council feel that the thanks of the Association are due to those gentlemen. The annual supper had been as usual a marked success, over sixty members and friends being present. After the supper Mr. Holgate again introduced the subject of the Pharmaceutical Benevolent Fund, and a collection was made, when the sum of five guineas was subscribed, which had been left in the President's hands to distribute in votes on behalf the Association. During the session it had been felt by several members of the Association that he time had come when some recognition should be made to the President for his valuable services rendered to the Association since its foundation. Accordingly the Council took the matter up, and the appeal made had been most liberally responded to by the members. At the commencement of the session the executive had arranged with Professor Blake for a course of lectures upon botany, to be given at the University College, at reduced fees, to the students; but owing either to the apathy of the students, or to the time arranged being inconvenient for masters to spare their young men, only seven entered the class. A hope was expressed that this would be remedied in future sessions, as it would be impossible for the executive to organize classes for so small a number. At the present time the Council is taking steps with a view to the formation of a class during the next session at the University College, and will endeavour to make the time and fees within the reach of all students. The library contains 87 books, all in good condition. The issues have been 17 against 10 last year. The Council hopes the day is not far distant when more suitable rooms can be found, and the number of books materially increased, as it is felt the present arrangement is only a temporary one. In concluding the report, mention is made of the retirement of an old and valued member of the Council, Mr. Robert Jackson, who for five years filled the post of Honorary Secretary with great energy and zeal.

A discussion took place upon the above report, in which it was suggested the large balance in hand should be used in part by furnishing the Library with some standard medical works for the use of the members. This was decided to be discussed at the next Council Meeting, and the report was unanimously adopted.

The Treasurer's report was next presented, having been duly found correct by the Auditors, Messrs W. W. Widdowson and W. Smith, showing a balance in hand of £70 7*s.* 10½*d.*, and on the motion of Mr. Fitzhugh, seconded by Mr. Jackson, was passed.

The following Officers and Council were elected for the ensuing year. President, Mr. R. Fitzhugh, F.C.S.; Vice-President, Mr. J. Wilford; Treasurer, Mr. W. H. Parker; Honorary Secretary, Mr. C. A. Bolton. Council:—Messrs. F. White, M. H. Humphreys, T. B. Fletcher, C. W. Warriner, S. V. Holgate, J. Lewis, W. Oldershaw, and A. Smith.

During the evening, the following members and associates were admitted:—Messrs. Gill, Bull, and Rowe.

A vote of thanks, proposed by Mr. Fitzhugh, seconded by Mr. Jackson, and supported by Mr. Parker and Mr. White, was accorded to the Honorary Secretary, Mr. C. W. Warriner, upon his retirement from that office, after having held it three years.

The meeting was brought to a conclusion with the usual vote of thanks to the President for his services during the past year.

Proceedings of Scientific Societies.

SOCIETY OF CHEMICAL INDUSTRY.

Chemistry and Analytical Examination of Fixed Oils.*

BY ALFRED H. ALLEN.

It is a significant fact that the technical examination of oils was, until very recently, usually limited to the application of a few rough tests of a very unsatisfactory kind, the assay being commonly conducted by the oil merchant, drysalter, or engineer. That this state of things should exist is doubtless due in a great measure to the difficulties attending a more complete examination, but still more is it owing to the general indifference of chemists on the subject of oils, which indifference has necessarily reacted and prevented their services from being sought. That there are signs of a better

* Paper read before the London Section of the Society.

condition of things I think is certain, but the fixed oils, as a class, are still regarded with a kind of horror by many able chemists, and their chemistry is, I fear, considered eminently uninteresting. That there should be a feeling of this kind with respect to a class of bodies not readily yielding crystallizable or coloured products, and of indefinite chemical composition, is very excusable, but it is to be feared that the limited interest taken by the great majority of chemists in the history of the fixed oils is the main reason why we know so little of them, and so many really interesting problems relating to them still remain as far from solution as when the matter was examined by Chevreul more than half a century ago.

The natural fixed oils may be conveniently described as ethers of higher fatty acids, occurring naturally in certain parts of animals and vegetables. Thus defined, the waxes are included under fixed oils, and although they present a marked difference in constitution from the majority of fixed oils, it will be seen afterwards that any sharper definition of the latter would introduce difficulties. Under the general term of fixed oils I include those members of the group which, like tallow and palm oil, are solid at the ordinary temperature. In a molten state the fats are true fixed oils.

It is well known that when treated with a strong base, or subjected to the action of superheated steam, the fixed oils are decomposed, in the same manner as artificial ethers, into an alcohol, and one or more fatty acids, which latter are obtained in a free state if steam be the agent employed, but in the form of a soap or salt of the fatty acid if a metallic base be used for the decomposition. On treating the resultant soap with a strong acid the fatty acids are set free.

The nature of the fatty acids obtained varies with the kind of oil operated on, but the following list of fatty acids obtainable by the saponification of natural fixed oils shows that the variety is much greater than is commonly imagined.

Name of Acids.	Formula.	Chief mode of occurrence.
1. Formic . . .	CH_2O_2	Butter fat. (?)
2. Acetic . . .	$C_2H_4O_2$	Butter fat.
4. Butyric . . .	$C_4H_8O_2$	Butter fat.
5. Valeric . . .	$C_5H_{10}O_2$	Whale oil.
6. Caproic . . .	$C_6H_{12}O_2$	Cocoanut oil, butter fat.
8. Caprylic . . .	$C_8H_{16}O_2$	Cocoanut oil, butter fat.
10. Capric or Rutic	$C_{10}H_{20}O_2$	Cocoanut oil, butter fat.
12. Lauric . . .	$C_{12}H_{24}O_2$	Cocoanut oil, spermaceti, fat of the bay-tree, pichurum beans.
14. Myristic . .	$C_{14}H_{28}O_2$	Cocoanut oil, spermaceti, nutmeg-butter.
16. Palmitic . .	$C_{16}H_{32}O_2$	Most natural fats, notably palm oil, spermaceti, and beeswax.
18. Stearic . . .	$C_{18}H_{36}O_2$	Most animal fats, and in some of vegetable origin.
20. Arachidic . .	$C_{20}H_{40}O_2$	Arachis, or earthnut oil.
22. Behenic . . .	$C_{22}H_{44}O_2$	Oil of ben.
25. Hyænic . . .	$C_{25}H_{50}O_2$	Glandular pouches of the striped hyæna.
27. Cerotic . . .	$C_{27}H_{54}O_2$	Beeswax, Chinese wax.

The acids in the foregoing list all belong to what is known to chemists as the acetic or stearic series, but, besides these, the following fatty acids of other series are important constituents of certain natural fixed oils.

Name of Acids.	Formula.	Chief mode of occurrence.
Hypogœic . . .	$C_{16}H_{30}O_2$	Earthnut oil (oil of arachis-hypogœa); said to exist also in sperm oil.
Oleic	$C_{18}H_{34}O_2$	Most animal fats, and non-drying vegetable oils.
Döglic acid . . .	$C_{19}H_{36}O_2$	As an ether in bottle-nose oil.
Brassic, or Erucic .	$C_{22}H_{42}O_2$	Rape, mustard, and other oils from the Cruciferæ.

In addition to these, ricinoleic acid, $C_{18}H_{34}O_3$, is the chief product of the saponification of castor oil, while linoleic acid, $C_{16}H_{28}O_2$, exists in linseed and probably in other drying oils. It is a curious fact that the great majority of the acids obtained by the saponification of natural fats contain an even number of atoms of carbon.

By far the most important aud widely distributed of the acids of oils are the three which are obtained by the saponification of common lard and tallow. These are palmitic acid, $C_{16}H_{32}O_2$, stearic acid, $C_{18}H_{36}O_2$, and oleic acid, $C_{18}H_{34}O_2$. These three, with the linoleic acid of the drying vegetable oils, may be said to be the main products of the saponification of oils and fats.

In the great majority of fixed oils, the foregoing acids exist as "glycerides," or saturated ethers of the triad radical glycyl, C_3H_5. Thus the triolein, which constitutes the greater part of olive, almond, and lard oils, is the trioleate of glycyl.

$$\left.\begin{matrix}(C_3H_5)'''\\(C_{18}H_{33}O)_3\end{matrix}\right\}O_3$$

On saponification the fat undergoes hydrolysis, thus:—

$$C_3H_5.O_3.(C_{18}H_{33}O)_3+3H_2O=$$
$$3(C_{18}H_{33}O.OH)+C_3H_5.(OH)_3$$

Hence the glycyl trihydrate, commonly known as glycerin, but called by the Publication Committee of the Chemical Society *glycerol*, is the second product of the saponification of fixed oils.

In consequence of the similarity in the constitution of the various fixed oils, and the very nearly identical ultimate constitution of their leading proximate constituents, the majority of these yield nearly identical percentages of fatty acids and glycerin on saponification. Thus the following table shows the theoretical composition and products of saponification of the leading constituents of oils:—

	Empirical Formula.	Molecular Weight.	Products of saponification of 100 parts.	
			Fatty Acid.	Glycerin.
Glycyl tripalmitate (tripalmitin) . .	$C_{51}H_{98}O_6$	806	95·28	10·74
Glycyl tristearate (tristearin) . .	$C_{57}H_{110}O_6$	890	95·73	10·34
Glycyl trioleate (triolein) . . .	$C_{57}H_{104}O_6$	884	95·70	10·40
Glycyl trilinoleate .	$C_{57}H_{86}O_6$	794	95·21	11·58

The waxes, on the other hand, are not ethers of glycyl, but ethers of some of the higher homologues of ethyl. Accordingly they yield a much lower percentage of fatty acids when saponified, and give in place of glycerin, solid monatomic alcohols. It is evident from these considerations that the study of the product of saponification may be of essential service in the examination of those oils which do not come under the general rule of yielding from 95 to 96 per cent. of fatty acids. Again, the acids being separated, much information can be gained from a study of their melting points and combining weights. The latter method of examination was first employed by Kœttstorfer, but he makes no attempt to isolate the fatty acids, but deduces the combining weight from the amount of alkali required for the saponification of the oil. This is effected by boiling the oil with a known quantity of a standard solution of caustic potash in alcohol, and when the saponification is complete adding a few drops of a solution of phenol-phthalein, and titrating back with standard hydrochloric acid. Manifestly the alkali which has disappeared is that which has combined with the fatty acids of the oil. Each cubic centimetre of half normal caustic alkali thus utilized represents ·02805 grams of KHO, whence the saturation-equivalent of the fat can be ascertained by the following formula, in which W is the weight of oil taken, and N the number of cubic centimetres of half normal alkali taken up by the fatty acids.

$$\frac{2W}{N} = \text{saturation-equivalent.}$$

In the great majority of cases this saturation-equivalent will be one third of the mean of the molecular weights of the constituents of the oil examined.

The following table shows the milligrammes of caustic potash required by one gram of various oils, and the saturation-equivalents calculated therefrom by dividing the former number into 56,100.

Oil.	Grams of KHO required for 1000 grams of oil.		Average saturation.equivalent of oil.
A. Tripalmitin	208·8		268·67
Tristearin	189·1		296·67
Triolein	190·4		294·67
Tributyrin	557·3		100·67
B. Butter fat	221·5 to 233·4		247·1
Cocoanut and palm oils	270 „ 275		205·0
C. Dripping	197 „ 196·5		285·1
Lard	195·8 „ 195·4		286·8
Tallow	196·8		285·1
Horse oil	199·4		281·0
D. Lard oil	191 „ 196	189 to 196	296·8 to 286 7
Olive oil	191 „ 196		
Niger-seed oil	189 „ 191		
Cotton-seed oil	191 „ 196·5		
Linseed oil	189 „ 195		
Whale oil	190 „ 191		
Seal oil	191 „ 196		
E. Colza and rape oils	175 „ 179	175 to 189	320·6 to 296·8
Codfish oil	182 „ 187		
Pilchard oil	186 „ 187·5		
Castor oil	176 „ 178		
F. Sperm oil	130 „ 134·4		417 to 425·0
Bottle-nose oil	184·2		304·5
Shark oil	84·5		

The figures referring to the pure fats in class A are calculated, but all the others are the results of experiments made by Kœttstorfer, F. W. and A. F. Stoddart, L. Archbutt, or myself.

In the first place, it will be observed that, while dripping, lard and tallow have saturation-equivalents such as might be predicated from their known composition as mixtures of palmitin, stearin and olein, butter fat requires a much larger proportion of alkali for its saponification. This peculiarity is of course due to the fact that butter fat contains a notable proportion of tributyrin and glycerides of other of the lower fatty acids.* As a consequence, although it agrees with other animal fats in yielding about 95 per cent. of fatty acids, only about 87 to 88 per cent. consists of oleic and palmitic acids, the remaining being butyric acid and other acids more or less soluble in water. This peculiarity is now utilized by public analysts, at the suggestion of Messrs. Angell and Hehner, to distinguish real butter fat from "butterine" and other butter substitutes prepared from the more fusible portions of the fat of oxen, sheep, swine and other animals. The only fats which would give results on analysis at all comparable with those yielded by butter are the oils from the palm-nut and cocoa-nut,† and practical difficulties have hitherto prevented the complete success of this scientific sophistication.

(*To be continued.*)

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, May 24, Mr. W. E. Crow in the chair.

Mr. E. E. Sewell read a paper entitled "Notes on some Abnormal Flowers," which will be published in a future number of this Journal.

In the discussion that followed, the Chairman, Secretary, Dr. Senier, Messrs. Baily, Dymond, Ranken and Ransom took part, after which a vote of thanks was passed to Mr. Sewell.

The Secretary (Mr. Dunstan) then made a Report upon Organic Chemistry, dealing with the "Chemistry of Mel Boracis." This paper also will be published in a future number of this Journal.

A discussion followed the reading of the Report, in which the Chairman, Dr. Senier, Messrs. Baily, Barnes, Carne, Dymond, MacDermott, Ranken, Ransom and Taylor took part.

The meeting then adjourned.

Parliamentary and Law Proceedings.

Prosecutions under the Patent Medicines Act.

At the Manchester City Police Court, on May 23, Mrs. Alice Lawton, chemist and druggist, Moss Lane, Hulme, was charged with selling patent medicines, without proper Government stamps on, and in this manner evading the patent medicine duty. Mr. Alpe, who prosecuted on behalf of the Inland Revenue authorities, said the articles had been advertised by means of a handbill wrapped round the bottles of medicine, and it was in this that the offence consisted. The labels placed on the bottles did not in themselves render the seller liable to the patent medicine duty. The medicines thus illegally advertised by Mrs. Lawton were "Lawton's celebrated

* Experiments of Mr. J. Bell indicate that the glycerides of butter fat contain several acid radicles in the same molecule, and therefore the butyrin cannot be separated by any process of fractional solution from the less soluble glycerides of palmitic and oleic acids. Hence butter fat probably contains complex glycerides of the following character:—

$$(C_3H_5)''' : \begin{cases} (C_4H_7O\,.\,O) \\ (C_{16}H_{31}O\,.\,O) \\ (C_{18}H_{33}O\,.\,O) \end{cases}$$

Such a complex glyceride will yield, on saponification, fatty acids and glycerin in the same proportions as would be obtained from a mixture of butyrin, palmitin and olein in the proportion of their molecular weights.

† The lower fatty acids of these oils are chiefly capric and lauric acids.

infant preservative," "Lawton's tic-douloureux drops and pills," and "embrocation for rheumatism, pains, etc.— This embrocation is invaluable in all kinds of sprains, bruises, or contusions—relieving pain."

The defendant was fined 40*s.* and costs in each case.

Mr. William Ramsden, chemist, Upper Moss Lane, was also charged with similar offences, one with respect to a bottle of medicine advertised as "an excellent remedy for neuralgia," and the other advertised as a "concentrated essence of sarsaparilla."

Defendant said he had acted quite ignorantly in the matter. He had no intention or desire to defraud the revenue, and he was satisfied that half the chemists in Manchester were doing the same thing, though that of course did not exculpate him. He did not push the sale of the medicines in any way whatever.

Mr. Headlam imposed a fine of 20*s.* and costs in the first case and ordered the defendant to pay the costs in the second case.—*Manchester Evening News.*

At the Manchester County Police Court, before Sir John Mantell and Mr. Hulme, Mr. James Bond, chemist, of Cornbrook Street, Stretford, answered to three summonses charging him with selling medicines liable to duty without having paid such duty. In two of the cases the defendant admitted the offence, but pleaded ignorance. With regard to orange quinine wine forming part of the charge, he denied that a duty was required. It was made according to instructions given in the British Pharmacopœia, and under the Pharmacy Act no duty had to be paid.

Mr. Alpe, who conducted the cases on behalf of the Inland Revenue, proved, however, that a showcard was exhibited in the defendant's shop window, calling the attention of the public to this particular preparation, which brought it within the scope of the Act and rendered it imperative that it should be properly stamped.

Defendant said there was no desire on his part to defraud the revenue. He was simply following a practice adopted by every chemist in Manchester.

Mr. Alpe said it was not properly understood in Manchester that medicines of this class were liable to duty.

The magistrates inflicted the nominal penalty of 2*s.* 6*d.* in each case and the costs.

Poisoning by Prussic Acid.

The Plymouth Coroner, Mr. T. C. Brian, held an inquest on Thursday, May 24, at the Guildhall, touching the death of Herbert Francis Montague Evans, a junior reporter, who had committed suicide on Tuesday by taking prussic acid.

Deceased was discovered lying on the bed quite dead and cold, and a bottle was found on the window sill with a label marked "prussic acid" and "poison," the latter word in two places.

The Coroner stated that deceased had pre-arranged the act, for he had spoken to his clerk (the coroner's officer) as to the best means of getting prussic acid, and the latter told him to go to the police, which he did.

Police Constable George Ryder stated that he was on duty at the Central Station. Deceased was in the habit of frequently calling there. On Thursday morning he said to witness, "I want to get rid of a large Newfoundland dog. Which is the best way?" Witness told him to poison it, and volunteered to administer poison. On Saturday morning he again came to the station, and said the dog was not getting any better, and would witness assist him in getting some poison. He said, "You know me well enough," and witness told him he had better get sixpennyworth. They then went to Mr. Wilmot's (late Lewin's) shop and asked for sixpennyworth of prussic acid to destroy a dog. The chemist gave witness the poison without any hesitation, as he was known there officially. Deceased took the bottle and he paid for the poison. He appeared quite collected and in his right senses. He said it was his father's dog and there was no chance of its recovery. Witness suggested he should bring the dog to the Guildhall and he would destroy it, but Evans said it could not walk and that he lived at Laira Bridge Terrace.

Medical evidence having been given to the effect that death had resulted from poisoning by prussic acid, the Jury returned a verdict that "Deceased died by taking prussic acid, self-administered when in a state of temporary insanity."

Reviews.

Elementary Chemical Arithmetic. By Sydney Lupton, M.A. London: Macmillan and Co.

To know chemistry it is obviously necessary to have grasped the methods of calculating employed by chemists. Formerly, when chemical students were fewer, this knowledge was usually communicated separately to pupils, or thought out by the students themselves as occasions arose. Later, as the teaching of the subject became more developed, it formed a more important part of the formal instruction given in lectures, and at present it has become a common custom for chemical lecturers to give their classes, from time to time, examples to work as exercises.

One of the first, if not the first, efforts made to supplement oral by printed instruction was the little book published by Professor Thorpe in 1872, which was intended to be associated with elementary lectures or with an elementary text-book, such as Roscoe's 'Elementary Chemistry.' Perhaps the chief objection to Dr. Thorpe's book is that the number of examples, about two hundred, is rather small, and Mr. Lupton's book is the better one on this point, since he has collected together some eleven hundred examples from various sources.

Mr. Lupton's book may be divided into three parts, first an introduction, which deals with the methods of calculating, secondly a collection of problems, thirdly several tables of data for use in solving the problems.

The introductory portion includes all, or nearly all, the methods of calculating ordinarily employed in chemistry (though we do not notice any account of those used in analyses of mixed gases, except indirectly), and indeed, occasionally strays to matters not involving calculation at all, as on page 63, where four reasons are given for considering that molecules of elements usually consist of more than one atom. Many parts of this introduction, indeed, perhaps the greater part, will serve the author's object of supplying missing ideas to pupils who have previously grasped the subject, and the easier sections will also be valuable to beginners. We regret, however, that Mr. Lupton should have limited his aim to this. Surely lecture notes ought to be enough for those who only want to recall lost ideas; whilst those for whom lecture notes are insufficient will not, we fear, find this book in all cases a sufficient substitute, though they will probably do so, as we have said before, in the easier sections. For example it would surely have been better to have given either more or less information on the methods of determining atomic weights (page 55). Except on one point (the law of Dulong and Petit) we find it difficult to imagine that this section would help much even to recall lost ideas. Altogether, while recognizing that much of the introduction will be of great value to beginners, and much more to advanced students, we cannot help regretting that Mr. Lupton has not aimed at a more complete treatment of some points.

The collection of problems is very large and very varied, and it ought to be of great assistance to students who want to test themselves and to teachers who want to exercise their pupils; both classes will be much indebted to Mr. Lupton for the amount of very tedious labour which he must have gone through in collecting, classifying and verifying them. Their usefulness will perhaps be a little reduced by the cost of the book, and we hope that when it comes to a second edition it may be found desirable to publish a rather extended introduction separately from the collection of problems.

PRACTICAL CHEMISTRY; Analytical Tables and Exercises for Students. By J. CAMPBELL BROWN, D.Sc. (Lond.). London: J. and A. Churchill.

The production of elementary text-books on chemistry is beginning to assume a serious aspect, hardly a month passing without the appearance of a new candidate for the reviewer's approval. This over-production may partly find its explanation in the reflection that we are still accumulating experience in the methods of teaching the elements of chemistry, and having no journal specially devoted to the discussion of scientific educational questions, no sooner does a teacher think he has made an improvement in method than a text-book appears to announce, illustrate, and advocate its adoption. The perusal of many recent text-books, however, fails to disclose any advance upon the old and in many respects defective methods, and only to expose an imperfect rehash of schemes to be found in previous and more worthy works. Such productions, whose authors are evidently bent upon mere book-making, cannot be too strongly condemned, and it is the bounden duty of the critic to rigidly examine every so-called new text-book in order to see whether the contents justify its publication. The present book is perhaps exempt from this preliminary criticism by reason of its being a second edition. From its title it would be inferred that the old flimsy notion of practical chemistry, which quietly ignores more than one half of the science by excluding exercises in synthesis, is adopted. But since the book has no preface, we know not for what purpose the author intended it. Such a book consisting of analytical exercises has both its use and abuse. It is used and only rightly used when employed as a laboratory hand-book in a course of analysis, this course having been preceded by practical work in synthesis and paralleled by a course of lectures. On the other hand, if it is at once put into the hands of the beginner, which is too frequently the case, as a first course of practical chemistry, its function is mistaken and abused. For over and above the fact that synthesis is not included, the beginner who employs such a book acquires the art of chemical analysis, not rationally, but in the merest mechanical way; a knowledge of the colour of precipitates without any conception of their composition or manner of formation. Anyone who has performed the unwelcome task of examining a student who has acquired his knowledge of analytical chemistry in this way, is full well aware of the ludicrous blunders committed by such an analytical machine when it is made to work upon a substance which involves a slight departure from the routine of a "chart" and consequently the exercise of a little intelligence. A striking example of this lately occurred when such a student was given acetate of lead for examination. Lead was easily found by the application of the usual tests; the acidulous radical was next sought for, and as a matter of course barium chloride was added, with the production of a white precipitate which proved to be insoluble in nitric acid, and hence the substance was considered to be sulphate of lead.

Considering the present book as an analytical handbook, it is better than many, in that the metals and acids are separated and the various reactions of the metals are first of all performed upon known substances before the charts are employed, but this is omitted in the case of many acids; further, also, formulæ are used to indicate the nature of precipitates and reagents, but unfortunately this plan is not consistently and uniformly adopted. Nothing is more to be deprecated than the much too common practice of commencing the study of analytical chemistry by taking an unknown substance "through a chart," and recognizing it by its behaviour when thus treated, without first having separately studied its reactions. The analytical tests and tables have, on the whole, been carefully compiled, although here and there errors are to be found. The formula of "white precipitate" is written $H_4Hg_2N_2Cl_2$; this indiscriminate and unmethodical clubbing of symbols is quite illegitimate, even in an elementary text-book; in the present instance a student might well be forgiven for inferring the substance to be a tetrabasic acid. The method for separating barium and calcium is needlessly tedious. To say that the precipitate caused by sodium hydrate in a solution of a cupric salt "is insoluble in excess, except in the presence of glucose," is very loose and misleading, and the same may be said of the statement that the flame is temporarily tinged yellow or orange by ammonium salts. Hyposulphurous acid is alone used to designate the substance more properly termed thiosulphuric acid. Hydrochloric acid certainly never precipitates HBO_2 from a solution of a borate, even "if the solution is a concentrated one." No reliable or precise method is given for the separation of tartrates and citrates. The section upon the alkaloids is scant, especially the portion relating to the alkaloids of cinchona. A violet colour is attributed to aconitine under the influence of phosphoric acid, although the incorrectness of this statement has more than once been pointed out during recent years. Taking the book as a whole, it is good of its kind, but it is a poor kind.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE ELECTION AND "CALIBRE" OF THE COUNCIL.

Sir,—The Council is in no need of any apologist, nor have I any desire to pose as such, yet I cannot refrain from expressing an opinion that Mr. Giles's impeachment of that august body is not justified in "fact."

Pharmacy did not die out with Messrs. Hanbury, Savory, Bell, or Deane, though the modern prototypes of some of these historic houses, with less of the spirit "æsthetic," and more of the wisdom "commercial," find it pays better to cater for ailing epicures, rather than write 'Pharmacographias.'

I have been curious enough to refresh my memory by looking through the Journal for the last twenty years, and during that period cannot find that any Council has existed with any right to boast of heavier calibre than the present; there is, indeed, nothing to quarrel about in the matter of quality, influence, or capacity, though of course one may sometimes have occasion to differ with their views and policy. At any rate, the members of the Council are fairly entitled to regard their re-election as a "vote of confidence" on the part of the Society; it admits of no other construction.

With very much of Mr. Giles's speech I cordially agree, but I must protest that we want no patronizing recognition of anybody's personal weight and importance. The Medical Council has, or ought to have, to deal with the Pharmaceutical Council, or its representatives, and not with any favoured individual it may choose to benignly smile upon.

Warrington. J. RYMER YOUNG.

Sir,—As I delivered myself of a speech intended as a defence of the outgoing, now substantially the re-elected Council, you may be good enough to permit me space to amplify the concluding sentence of my appeal to the country section of our members.

The provincial members have it in their power, when they choose to vote, to elect none but country members of Council; the Londoners voting as such can be left to sigh and moan in the cold shade of disfavour.

Now why cannot our provincial societies give us a fair sample of their best men? men who are known and looked up to for their tried abilities, or their well-defined social standing,—gentlemen who have held office as town councillors, mayors or justices of the peace? It seems to me such are more likely to have reached an independent position and acquired a matured experience, which would place them above the suspicion of having an excuse to come to London as the representatives of a mistaken local feeling.

Lest I should exceed the limits of your patience, let me repeat what I meant to say at the meeting, that country associations might very well relieve the Society from the incubus of the slowly increasing tax of travelling expenses. If Yorkshire, Lancashire, Scotland and the Midlands require "out and out" country representatives, let them pay their travelling expenses (and vote them salaries if necessary), if men of repute, position and independent means are not to be had. My argument resolves itself to this: you have in London (not necessarily cockneys bred and born) men possessing every qualification, who would willingly serve on your Council without pay or reward, but are deterred for reasons too plainly apparent to those who study the records.

T. Howard Hall.

Direct Representation upon the Pharmacopœia Committee.

Sir,—I have read with much interest the discussion and correspondence upon this subject, and I confess that I am not a little amused at the opposition raised against the Professors for an entirely voluntary act on their part. Indeed, it is quite evident that the Medical Council had a perfect right, in the absence of any legal arrangement to the contrary, to call in the aid of any persons from whom they hoped to obtain the most practical and useful knowledge, and for my own part I think that the Society is so far indebted to the Professors, who, by such a voluntary acknowledgment of their special skill, have really saved the doctors from getting it all their own way. On the other hand, I am glad to find that steps are being taken to get a legal clause inserted in the Medical Bill, which shall give to pharmacists at home that legal status in the compilation of the Pharmacopœia which has so long attained in other countries.

35, *Baker Street, W.* A. W. Postans.

Pharmacopœia Revision.

Sir,—The report of our Professors on the new Pharmacopœia bears evidence of the careful thought which one felt certain such capable authorities would give to so important a subject; but as to details, of course opinions will vary, since scarcely two pharmacists would quite agree to what should or should not be retained in the Pharmacopœia, each person necessarily being biassed by the preparations locally in demand. Nor we cannot expect our Professors, however well informed, to give to us a thoroughly representative book, unless pharmacists from various parts of Britain express their ideas as to what medicaments should be included in the new edition, which, it is trusted, will compare favourably even with recent continental and American Pharmacopœias. In order to ensure this may I be allowed to express a hope that the Professors and the other gentlemen acting on the Committee will err rather on the side of catholicity than restriction, so that the book may really represent the dispensing of the day. While warmly welcoming most of the additions proposed by the Professors, still it would be advisable to considerably extend the list. Would it not be better to include some of the following articles?—

Aloin.	Paraffin, solid.
Caffeine cit.	Quinine bromide.
Calamine, prep.	Sodii benz.
Croton chloral.	Styptic colloid.
Euonymin.	Syr. calc. lactophos.
Iridin.	Syr. hypophosphitum.
Liq. ferri dialysati.	Syr. Eastoni.
Malt extract.	Thymol.
Menthol.	Tinct. iod. decol.
Monobrom camphor.	Ung. ac. borac.
Ol. pini sylvestris.	Zinci sulphocarb.

as well as the various medicated cotton wools, lints; also to considerably enlarge the list of vapours, etc.

The three articles proposed to be omitted are somewhat open to criticism. The green iodide of mercury is still frequently prescribed, and although an unstable preparation it certainly seems wise to retain it in the Pharmacopœia so as to give standard tests and characters, and surely the two preparations of buckthorn might be retained in a Pharmocopœia which includes areca nuts. Less regret would probably be felt if aconitine and digitalin were to be relegated to the obsolete class.

With respect to the proposed change in weights, it should be remembered that the book is not only to be a class book, but the trade guide, and for the latter purpose the present weights, properly carried out into ounces and pounds, would, in my estimation, be far preferable, as a saving of time would certainly be made by it; but I would urge the printing in separate columns of the metrical weights, so as to give a greater impetus to the adoption of the latter than would the use of proportional parts.

The addition of the French and German names would be useful, and, finally, let the language of the book be Latin.

118, *High Street, Oxford.* G. C. Druce.

The Dispensing Question.

Sir,—From the absence of any mention of the "dispensing question," either in the reports of the meetings of the Council of the Pharmaceutical Society or the executive of the Chemists and Druggists' Association of Great Britain, anyone might think that it is a subject of little or no interest to chemists in general. But I feel certain such is not the case, and I think it is expecting too much of human nature that members of the above-mentioned bodies, who have extensive business relations with medical men and who must feel that any change in this direction will be of no advantage to them, but the reverse, will be likely to imitate or give every co-operation to any plan likely to bring about such results.

Rheum.

"*Edina.*"—(1) *Honkeneya peploides*; (2) *Cochlearia angelica.*

J. N.—We are unable to give you the definite reply you ask for, and can only say that we are unaware of the existence of any article bearing the name.

N. J. Lewis.—We do not think that the case referred to would be held to come within the meaning of the Act.

E. Presley.—We are not aware of any such difference as was referred to in your query, and consequently there was nothing to answer.

Oxonian.—Yes.

C. Ridgley.—We think it very probable it would be held that the use of such a label would render the preparation liable to stamp duty, but the Inland Revenue authorities are the only persons competent to give an authoritative answer to the question.

W. J. Smith.—So many works of the kind have been published that one may be found in almost every publisher's list.

A. Wrighton.—The work was reviewed in the *Pharmaceutical Journal* for April 6, 1882.

Cymro.—Apply for the information to the Secretary of the Royal College of Veterinary Surgeons, Camden Town, N.

"*Cymro.*"—The only popular treatise on the subject with which we are acquainted is now out of print.

Sterlini Oppidum.—We do not think there is such a work.

"*Querist.*"—Apply to the Secretary to the Royal College of Physicians, Edinburgh.

"*Pharmaceutist.*"—Presuming that the dose of the mixture would not be more than a teaspoonful, we do not think the quantity mentioned would be dangerous or excessive. But of course this might not be the case if it were administered to children.

Justice.—You are recommended to address your questions, together with the particulars, to the Registrar, 17, Bloomsbury Square.

Communications, Letters, etc., have been received from Messrs. Saul, Heger, Von Heyden, Jackson, Boutell, Roberts, Wilkinson, Inquirer, Conservative, One Interested, Major.

THE EFFECT OF ALTITUDE ON THE ALKALOID OF RED BARK.

BY J. E. HOWARD, F.R.S.

I beg to forward the enclosed published communication from Dr. Trimen, which will interest many of your readers and sustain the character of your Journal as the best repertory of information on the important subjects of which it treats.

It gives me pleasure to see that "the relationship of the alkaloids" is brought under notice in Dr. Trimen's letter. It is long since I worked at this in conjunction with Dr. Herapath, and much of the information then published is probably forgotten; and much that was inferred relative to the manner in which the molecules appear to be built up in nature (bearing on the possibility or otherwise of the artificial production of quinine) remains for further investigation. I can only remark, at present, on the universality of the relationships thus disclosed by the ray of polarized light.

The relationship is this:—

Lævogyrate.	Dextrogyrate.	Feebly Dextrogyrate.
Quinine.	Quinidine.	Quinicine.
Cinchonidine.	Cinchonine.	Cinchonicine.

Dr. Herapath, in his "Researches on the Cinchona Alkaloids" ('Proceedings of the Royal Society,' November, 1857), attempted to demonstrate this relationship on chemical grounds; and even thought that quinine and cinchonidine might be mutually convertible. He observes that "closely as the quinine and cinchonidine salts agree amongst themselves, they differ widely from the quinidine and cinchonine compounds."

In order to confirm the interesting experiments instituted by Dr. Trimen, I selected specimens given me by Dr. Morris, Jamaica, of red bark grown under somewhat similar differences of altitude; that from the lower elevation having (as in India) the best appearance; that from the higher the richer produce. I shall send portions of these to the Museum.

The bark from which the second sample was taken proceeded from trees grown in the parish of Manchester at an elevation of about 2400 feet. This is the lowest elevation at which cinchona bark trees have been cultivated in Jamaica. The trees were between eight and nine years old, growing in a sheltered situation and on a good strong red soil; the mean annual rainfall about 90 inches, and the mean annual temperature about 73° F.

As the elevation is intermediate, so the alkaloids hold a consistently intermediate position between the two samples of Ceylon bark, perhaps with a slight exception as to the amorphous alkaloid. If the circumstances of growth in other respects had been the same as in India, it is probable that the amount of quinine in the Jamaica sample of 6000 feet would have increased at the expense of the amorphous alkaloid. As it is, the Jamaica bark at this elevation scarcely equals expectations, although the botanical samples are very true to type.

Analysis of samples of *Cinchona succirubra*, sent by Drs. Trimen and Morris, at different elevations:—

Elevation above sea level.	Place of growth.	Quinine.	Cinchonidine.	Cinchonine.	Quinidine.	Amorphous.	Total alkaloids.
A. 5500 ft. .	Hakgala	2·06	3·47	0·61	Traces	0·66	6·80
5500 to 6000 . .	Jamaica	1·76	3·17	0·75		0·75	6·43
2400 . . .	Jamaica	1·50	0·86	3·06	0·06	1·13	6·61
B. 1500 ft. .	Peradeniya	0·47	0·05	1·67	0·30	1·06	3·55

The *succirubra* is, however, the wrong sort to cultivate, and (except only as regards the bark *renewed* in McIvor's method) will always be found disappointing. The *shaving* process is incomplete. It is requisite that the bark should be stripped in the wet line of the cambium. The tree then begins *de novo.* An exudation is thrown out from the peeled surface, "like the perspiration from the back of the hand," as McIvor described it to me. The formation is then *radial,* and not concentric (see Fig. 5 and 6 of Plate III. of my 'Quinology'), with abundance of cellular tissue and a consequent complete change in the alkaloids. I have objected to the *succirubra* from an early stage in the culture, but opposite counsels prevailed. The prices obtained for very inferior bark now sent home may perhaps show the planters that it would have been more to their interest to cultivate the better sorts—the *Pata de Gallinazo* introduced together with the *succirubra* by Cross, the *magnifolia* (Uritusinga?), the *robusta,*—known to them but neglected till lately. I have just received an account of the 1882 harvest of bark in Java, from which I learn that 763 bales of all sorts of succirubra bark gave on an average of 28 analyses 1·04 per cent. of quinine; but of this two lots were of "*renewed*" bark, respectively 2·2 and 2·4 per cent., and, deducting these, the percentage falls to 0·94 of quinine. This culture can hardly be profitable for quinine manufacture,* nor yet for pharmaceutical purposes, as I have shown first in my 'Quinologia,' 1862, and many times since, that the "red bark" contains a *distinctly noxious ingredient* not found in the barks better adapted for medicinal use.

The tests of the inferior Calisaya, Schukraft, Javanica and Anglica, are about 1 per cent. of quinine. Surely this cannot pay *at present*; but, even if it does, how will such plantations compete in future with the immense cultivation commencing elsewhere. Of course in Java the redeeming feature is the *Ledgeriana*; the *officinalis* seems also to promise well.

The result of these trials seems to prove that elevation above the sea level is far more important than all the other factors in the problem, but why this should be so, I confess I do not see. The true home of the Cinchona is in the clouds; direct scorching sunlight is fatal.

I am at this moment observing with interest the effect of light on some Cinchonas. In the early part of last year I sowed, almost at the same time, seed of the true *Ledgeriana* from the Yarrow estate in Ceylon, derived from trees yielding from 7 to 12 per cent. of quinine, and also seed kindly given me by Mr. Christy, from Bolivia, of the best kinds there cultivated. I watched with interest the development of the young plants, which for a considerable time entirely resembled each other—only that I found the *Ledgeriana* the more sensitive to surrounding influences. After some months' growth the Bolivian seed began to develop the characteristics

* See the Blue Book of Indian Government (June 18, 1866, p. 134), in which, after analysis of the first parcels sent home, I observed the great preponderance of cinchonidine, and notified to the Indian Government "This difficulty must be looked steadily in the face, and I would suggest that it may be obviated, either by a change being wrought in the opinion of the medical world as to the value of cinchonidine as a medicine, or by the plant being encouraged to produce quinine instead of cinchonidine." This latter Mr. McIvor afterwards succeeded in effecting by his renewing process. The Government also acted on my former suggestion.

of the *verde, morada* and the *rubra venada* of Bolivia; whilst the *Ledgeriana* showed features of difference, though at the same time of close affinity. This was shown, amongst other things, by the rich velvety surface of the leaf, marking the best Calisayas,* as also by a delicate fringe of hair at the edges of the leaves. But now that the more flourishing plants are some ten inches in height (the *rubra venada*, twenty), further diversities appear. The leaves of the *Ledgeriana* turn *red* in fading, which is said by Mr. Ledger to be characteristic of his "rojo" (*roxo*) at the flowering season, from whence it derives its name "*red*."

They are more delicately formed than the others I have named, and more easily damaged by direct sunlight. As night approaches, the top leaves gradually change their position, approaching each other so as in some cases almost to fold together. This is well shown in a fine plant of true *Ledgeriana* which I have from Darjeeling, and also in the more flourishing of my plants from Ceylon. I do not notice the same in the *verde* from Mr. Christy's Bolivian seed, of which the leaves are more robust, but the above features are not *confined* to the "rojo."

These peculiarities would scarcely be seen unless the plants were well developed under glass, but once observed it is impossible to forget or to confuse these rich varieties of Calisaya (which I described and figured as such from well ascertained specimens sent by M. Moens) with the plant described and figured by Dr. Trimen as "*C. Ledgeriana*, Moens," and which I should call *C. micrantha*, var. *Calisayoides*. Dr. Trimen had not the opportunity of comparing the plates drawn by Fitch, in my 'Quinology,' with those in the *Journal of Botany*; but the distinction is most evident, as I have endeavoured to demonstrate to the Linnean Society. My figures of *C. Calisaya*, var. *Ledgeriana*, are from trees yielding respectively (Pl. IV.) 9·06, (Pl. V.) 9·90, and (Pl. VI.) 9·97 per cent. of quinine and the fruit-bearing branch 10·90 (same plate). See the account of my herbarium, pp. 58–66.

The "rojo" (*roxo*), or *C. Calisaya*, var. *Ledgeriana*, is the queen of all the Cinchonas; but certainly possesses a delicate organization which makes the cultivation difficult. The "verde," as being a quick growing tree, flourishing at lower elevation, is found in Bolivia more profitable to cultivate than the "morada," although the latter is richer in percentage of quinine. I do not think that the *Ledgeriana* is cultivated in Bolivia, but another sort of "rojo" is extensively planted in Coroico, in the Yungas of Bolivia. "This is not so good as the Caupolican rojo." It is the *Colorada naranjada*, or *orange peel red*, only known to me by the bark, which has a character peculiarly its own. The bark of the *Ledgeriana* is most characteristic. It is thick and composed almost entirely of cellular tissue; quite contrasted with that of the "verde," which bears the stamp of more vigorous growth and has a more fibrous structure and less alkaloid. This last has for many years been familiar to me in importation from South America.

But I must defer for the present any further remarks.

From a letter from Mr. Ledger, February 7, 1881:—

"I repeatedly used to joke poor Manuel when he used at first to tell me the trees from which the thick, heavy slabs of bark (in fact the *Rojo*) came from had white flowers. The *Rojo* from Coroico and in South Yungas, though with purple red leaves underside [the *morada*], are nothing to be compared with the *Rojo* of Caupolican and Apolobamba. The *Rojo* or *Ledgeriana* is very little known in Bolivia even. According to Manuel this tree is never met with in *Manchas* (patches) like the other classes of Cinchona. It is found by itself here and there. With all cascarilleros from Pelechuco a '*slab' of Calisaya rojo* means *unsurpassable*, and is meant to say, where that is, all the rest is good or Calisaya."

* See Weddell's 'Histoire.'

(*From Ceylon Observer, April* 9, 1883.)

THE EFFECT OF ALTITUDE ON THE ALKALOIDS OF RED BARK.

Sir,—Everything that may throw any light upon the relationships of the cinchona alkaloids, or on the causes which influence their production, is of much interest; it also has a practical value to cultivators. I therefore no longer delay in making public the results of two remarkable analyses of Ceylon *C. succirubra*.

With the object of ascertaining the effects of altitude on the alkaloid production of this species, I, towards the end of last year, barked two trees growing respectively at elevations of 5500 (Hakgala) and 1500 (Peradeniya), a difference of 4000 feet. The trees were, I have every reason to believe, of common origin: both being, in all probability, raised from the original seed collected in South America by Dr. Spruce, and planted out in the midst of other trees, in or about 1863. They were therefore about nineteen years old reckoned from the planting, and both had grown up under fairly similar conditions, excepting as regards climate. Their growth, however, had been very different. The tree at Hakgala was one of the largest there, 37 feet high to the point where the stem was but 1 inch in diameter and 37 inches in girth at the base lessening to 24 inches at 5 feet from the ground. It afforded 25 lbs. of dry bark (77 lbs. of wet), and the sample sent home was large quill 18 inches long with a "brown coat." On the other hand, the Peradeniya tree, though not far off the other in height, being drawn up by the large trees around, girthed only about 20 inches near the ground and yielded about 7 lbs. of dry bark (21 of wet). The sample of small quill sent home was described as having a "grey coat."

It is to my friend, Mr. J. E. Howard, who is ever most liberal in helping to advance our knowledge of quinology, that I am indebted for the following comparative analysis of these two samples. He is himself much interested in the result, and we may, I believe, expect some observations upon it from his pen:—

	Quinine sulphate.	Quinine.	Cinchonidine.	Cinchonine.	Quinidine.	Amorphous.	Total-alkaloids.
A. Large quill grown at Hakgala, 5500 ft.	2·75	2·06	3·47	0·61	Trace	0·66	6·80
B. Small quill grown at Peradeniya, 1500 ft.	0·62	0·47	0·05	1·67	0·30	1·06	3·55

A comparison of these very different analyses suggests many observations. And at first sight we cannot but be struck with the influence for good of elevation in the production of the alkaloids as a whole, nearly double as much being produced in the higher locality. Mr. Howard remarks that as far as the *appearance* of the bark is concerned the contrary was the case, that from the low elevation being the "more attractive to those who judge merely by the eye."

The large amount of quinine in analysis A is also noteworthy in red bark from a tree nearly twenty years old, as showing that there is no necessary diminution of that alkaloid after eight or nine years, as Mr. Broughton was led to believe.

It is however as regards the proportions of the alkaloids that the comparison will be found most instructive. In A we have of quinine over 2 per cent., and of cinchonidine nearly 3½ per cent., whilst there is but 0·61 of cinchonine and a mere trace of quinidine: in B the change is very remarkable: quinine has sunk to less than ½ per cent., and cinchonidine to little more than a trace (0·05 per cent.), whilst on the other hand, cinchonine has increased to 1·67 per cent.—that is, about two and a half times as much as in A—and there is also an appreciable amount (0·30 per cent.) of quinidine. It has been remarked* that the natural or physiological relationship of the four principal alkaloids of cinchona bark is not expressed by their chemical constitution and terminology. Quinine and quinidine are, as is well known, isomeric chemical bodies, *i.e.*, both have the same empiric formula of composition, $C_{20}H_{24}N_2O_2$, and cinchonine and cinchonidine are similarly related, their common formula being $C_{20}H_{24}N_2O$. But in nature it would appear that the pairs are differently composed, and it is customary to find associated in the tissues, quinine and cinchonidine and cinchonine and quinidine and not the isomeric couples. It is indeed highly probable that, under conditions of oxidation and deoxidation at present not understood, the units in each of these naturally associated pairs are mutually convertible. The analyses before us bring out this association in a very marked manner.

The relationship of the alkaloids, to which attention is here called, is also indicated by the action of their solutions on a ray of polarized light. Quinine and cinchonidine deflect this to the left and are lævo-rotatory, whilst cinchonine and quinidine have a right hand or dextro-rotatory action.

As to the causes which in the case before us have led to the disappearance of the quinine and cinchonidine in the low-grown bark, and their partial substitution by cinchonine and quinidine we have little to guide us, but the fact is a very important one as bearing on the cultivation of red bark at low elevations. A similar substitution has been recorded before in old trees, but age alone is seen, by analysis A, to be an insufficient cause. It is probable that temperature is the more important factor, and support is given to this by the remarkable case recorded by Broughton,† of the reversed action in *C. peruviana*. This species, as grown at Neddivuttum, is remarkable for affording cinchonine in large quantity —in the experiment recorded 3·84 per cent.—and absolutely no quinine; when grown, however, at the higher elevation of Dodabetta, the cinchonine was greatly diminished, whilst quinine was present to the amount of 0·79 per cent. I am, sir, yours faithfully,

HENRY TRIMEN.

Peradeniya, April 5, 1883.

* Mr. Howard especially called attention to this so long ago as 1866 (see 'Proc. Bot. Congress in London,' p. 198).

† 'Report to Government of Madras,' September 26, 1871.

NOTE ON A SAMPLE OF "CRETA PRÆPARATA."

BY F. HARRIS ALCOCK.

A short time ago I was requested by a friend who is engaged in one of the large dispensing establishments of the West-end to examine a specimen of what had been described to him as a special brand of the above-mentioned article.

It seems that his suspicions were aroused by the fineness of the cones and their white appearance, and in order to satisfy himself on their composition he wished me to subject them to an examination, and let him know the result, which was as follows:—

Physical Characters.—In cones of almost equal size, each weighing (average of fifteen) 70 grains and measuring 1⅜ inch in height and about ⅞ inch diameter at the base; much lighter and whiter than the British Pharmacopœia variety and having a satiny touch, free from grittiness. Under the microscope, a little of the powder scraped off one of the pieces was seen to consist of very small uniform prismatic crystals when viewed with a ¼-inch objective, whereas a sample prepared by elutriation as officially directed was found to be amorphous when similarly examined.

Chemical Characters.—As I had some weeks before had occasion to use some "blackboard chalk" for an experiment (thinking it to be carbonate of calcium) and finding that it only slightly effervesced with diluted hydrochloric acid, and that it was chiefly sulphate of calcium, I suspected the same substitution in the substance under examination. This proved to be the case, for when diluted hydrochloric acid was added to it a little effervescence resulted, but not enough for the quantity used to indicate presence of carbonate of calcium only; on the application of a little heat a perfect solution was obtained, and this gave evidence of the calcium when the usual tests for the compounds of that metal were applied. When, to a similar solution, chloride of barium was added a copious precipitate fell, which corresponded in every particular to the usual behaviour of the sulphate radical. On further examination of the substance it proved to be chiefly a mixture of calcium sulphate ($CaSO_4,2H_2O$) with calcium carbonate.

To obtain an idea as to the amount of sulphate present I made three quantitative experiments, the mean of which gave 67·016 per cent. (calculated as $CaSO_4,2H_2O$), and the amount of the carbonic anhydride which was obtained from a given weight of the substance by the usual means recommended for estimating that gas showed the presence of 32·379 per cent. calcium carbonate, the rest being a trace of iron, silica and chloride.

My object in writing this is to call the attention of pharmacists to this matter, to enable them to examine their specimens to see if they are genuine and free from such an impurity.

Of course for cosmetic purposes gypsum is largely used, but not so much as an internal remedial agent, and consequently it might prove objectionable rather than otherwise when used in such cases as when true "creta præparata" would be required.

I am informed that when tooth powders containing chalk and soap, etc., are made up with the above material, the usual frothing does not take place and altogether a disagreeable result is obtained.

PICRIC ACID AS A TEST FOR ALBUMEN AND SUGAR IN THE URINE.*

BY GEORGE JOHNSON, M.D., F.R.S.,

Physician to King's College Hospital and Professor of Clinical Medicine in King's College

During a period of about two years, I have been in the habit of using picric acid as a test for albumen in the urine. I was induced to employ this test by my son, G. Stillingfleet Johnson, one of the Demonstrators of Chemistry at King's College, who, while working at the compounds of albumen with the mineral acids, the results of which he published in the *Journal of the Chemical Society* (August, 1874), found that picric acid

* Paper read before the Clinical Society, March 9, 1883. Communicated by the Author.

caused coagulation in all the acid compounds of albumen; and he therefore suggested that it might be found a valuable test for albumen in the urine. At that time, we were not aware that it had ever been employed as a test for albumen; and in a communication to the *Lancet* (November 4, 1882), I spoke of it as a new test; but, a few days after the publication of my paper, I chanced to come upon a leading article in the *Medical Times and Gazette* (vol. ii. for 1874, p. 366), in which picric acid is mentioned as having been recommended as a test for albumen by a French physician, M. Galippe. There is, therefore, no novelty in the suggestion; but, so far as I can learn, the true value of the test has not hitherto been appreciated, and therefore it has not come into general use. The test may be used in the form of a saturated aqueous solution, or in the form of powder or crystals. The aqueous solution is most suitable for home use, while the powder or crystals may conveniently be carried in a urinary pocket test-case.* A saturated aqueous solution may be quickly made by dissolving the dry acid in distilled or rain water in the proportion of seven grains to the fluid-ounce; a portion of the acid will crystallize out on cooling, leaving a transparent yellow supernatant liquid. This solution, being added to an equal volume of albuminous urine in a test-tube, immediately coagulates the albumen. The coagulated picrate of albumen is soluble in alkalies; if, therefore, the urine be highly alkaline, it must be acidulated by a vegetable or a mineral acid before adding the picric acid solution. In my numerous testings for albumen with picric acid, I have not once found it necessary to acidulate the urine. The picric acid solution is itself sufficiently acid to dissolve the phosphatic sediment which results from boiling a neutral or alkaline specimen of urine.

To detect a very minute quantity of albumen, the following method is the best. Into a test-tube about six inches long, the urine is poured to within two inches of the top; then, the tube being held in a slanting position, about an inch of the picric acid solution is gently poured on the surface of the urine, where, in consequence of its low specific gravity (1003), it only partly mixes with the upper layer of the urine; and, as far as the yellow colour of the picric solution extends, there will be more or less turbidity from coagulated albumen, contrasting with the pellucid unstained urine below. If, then, the tube be placed in a stand, the coagulated albumen will gradually subside, and form a delicate horizontal film at the junction of the coloured and the unstained stratum of urine; the yellow liquid above and the uncoloured urine below being quite free from turbidity. If the urine should be turbid with urates, it must be cleared by heat before the addition of the picric acid solution.

As a result of numerous careful observations, I have arrived at the conclusion that picric acid applied in this way is a more delicate, and therefore more trustworthy, test for albumen than nitric acid in cold urine, whether the latter be employed by the method of dropping the acid into the cold urine or by pouring the urine on the acid previously placed in the tube. The simplest and most satisfactory mode of comparing the two tests as regards their relative delicacy, is to dilute a specimen of albuminous urine until one or the other test fails to act; and it will be found that the picric acid solution shows the presence of albumen in a specimen diluted considerably beyond the point at which the nitric acid fails to give any indication. The picric acid, too, often causes an immediate albuminous opalescence in specimens in which nitric acid only slowly, and after an interval of some minutes, gives a similar, but sometimes a doubtful, indication.

It scarcely need be insisted on that, for example, during convalescence from acute albuminuria, it is of the greatest practical importance to be assured that no trace of albumen remains.

* Such a case has been made for me by Hawksley, 357, Oxford Street.

Here it may be well to mention that the albuminous opalescence with picric acid which always occurs immediately, if at all, may readily be distinguished from the coarse granular particles of urate of soda, which, after a delay of some minutes, sometimes result from the acidity of the picric solution. These granular masses of urate, sometimes mixed with crystals of free uric acid, quickly fall to the bottom of the test-tube, and carry with them so much of the picric colouring matter, that, when placed under the microscope, they are so opaque as to appear almost black.

In testing with the powder or crystals, as much as is equal in bulk to a peppercorn may be shaken up in a test-tube, with a column of urine about an inch in height. As the powder dissolves, the urine becomes turbid with coagulated albumen. The object is to add as much of the test as the urine will dissolve, and no more. The solution of the picric acid in the urine, and the coagulation of the albumen, are quickened by heating the tube over a spirit-lamp or a candle, or by immersing the tube in hot water.

Another convenient mode of using the powder or crystals is to add fifteen or twenty minims of water to the peppercorn bulk of the acid in the tube, and quicken the solution by the application of heat; an equal bulk of urine is then gradually added to the hot solution, when albumen, if present, is at once detected.

The value of picric acid, as a test for clinical use, is much increased by the fact that, when boiled with a solution of potash, it forms a most delicate test for glucose. As I have stated, in a letter which I addressed to the *Lancet* (November 18, 1882), I stumbled upon this fact by adding some picric acid solution to a boiling specimen of saccharine urine which had previously been mixed with half its volume of liquor potassæ. I was at that time not aware of the fact, that the reaction of picric acid with grape sugar had been observed by Braun, a German chemist, nearly twenty years ago. I am indebted to Dr. Pavy for a reference to Braun's paper ("Ueber die Umwandlung der Pikrinsäure in Pikramminsäure, und ueber die Nachweisung der Trauben-Zucker." C. D. Braun.—*Zeitschrift fur Chemie*, 1865). In this paper, it is shown that grape-sugar, when boiled with picric acid and potash, reduces the yellow picric acid to the deep red picramic acid, the depth of colour depending on the amount of sugar present. I am not aware that hitherto any attempt has been made to utilize this as a qualitative clinical test for sugar in the urine, or as a means of accurately estimating the amount of sugar in a saccharine solution. I trust, however, to be able to establish its value for both purposes.

Take a fluid drachm of a solution of grape-sugar, in the proportion of a grain to the fluid ounce; mix it with half a drachm of liquor potassæ (B.P.), and ten minims of a saturated solution of picric acid; and make up the mixture to four drachms with distilled water. The mixture is conveniently made in a boiling tube, ten inches long and three-fourths of an inch in diameter, which may be marked below at the height of two and four drachms. With a long boiling tube, there is little risk of the liquid boiling over; and, the steam, condensing in the upper cool part of the tube, flows back as liquid, so that there is little loss by evaporation. The liquid is now raised to the boiling point, and the boiling is continued for sixty seconds by the watch, so as to insure the complete reaction between the sugar and the picric acid. During the process of boiling, the pale yellow colour of the liquid is changed to a beautiful claret red.

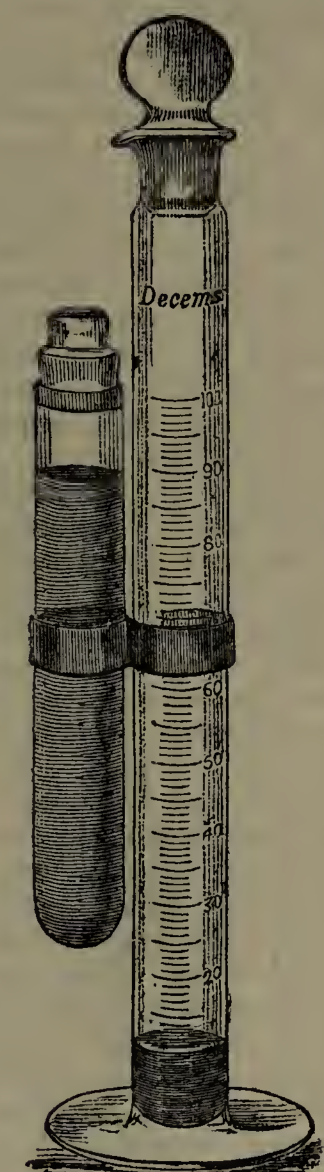
The liquid having been cooled, by cautiously immersing the tube in cold water, and it having been ascertained that its level is that of the four-drachm mark on the tube, or, if below the mark, it having been brought up to it by the addition of distilled water, the colour is that which results from decomposition of picric acid, by a grain of sugar to the ounce, four times diluted; in other words, it indicates one-fourth of a grain of sugar to the ounce; and this colour is a convenient standard for comparison in making a volumetric analysis. The picramic acid solution, however, on exposure to light, even for a few hours, becomes paler; but the colour may be exactly imitated by a solution of ferric acetate, with a slight excess of acetic acid and an excess of ferric chloride. The iron solution, we have found to retain its colour unchanged for a fortnight, even when exposed to a strong light; and we expect that, when light is excluded, it may be kept for an indefinite period; and it is, therefore, a convenient standard for comparison.*

If, now, a drachm of a solution of grape-sugar, containing two grains to the ounce, be mixed with the same quantity of liquor potassæ (half a drachm) as before, but with double the amount of picric acid (*i.e.*, twenty minims), and made up to four drachms in the boiling tube, the result of boiling the mixture as before for sixty seconds, will be the production of a much darker colour than when the one-grain solution was acted upon; but if now the dark liquid be diluted with its own volume of water, the colour will be the same as that of the one-grain solution.

The dilution is accurately done in a stoppered tube, twelve inches long and three quarters of an inch in diameter, graduated into $\frac{1}{10}$ and $\frac{1}{100}$ equal divisions. By the side of this tube, and held in position by an S-shaped band of metal, is a stoppered tube of equal diameter, and about six inches long, containing the standard iron solution.†

Sufficient of the dark saccharine liquid to be analysed is poured in to occupy exactly ten divisions of the graduated tube. Distilled water is then added cautiously, until the colour approaches that of the standard. The level of the liquid is then read off and noted. A more exact comparison of the saccharine liquid with the standard is made by pouring into a flat-bottomed colourless tube, about six inches long and an inch in diameter, as much of the standard as will form a column of liquid about an inch in height, and an exactly equal column of the saccharine liquid in a precisely similar tube. The operator then looks down, through both tubes at once, one being held in each hand, upon the surface of a white porcelain slab, or a piece of white paper. In this way a slight difference of tint is readily recognized, and if the liquid to be analysed be found to be darker than the standard, it is returned to the graduated tube, and diluted until the two liquids are found to be identical in colour, when the final reading is taken. The saccharine liquid having been diluted four times before it was boiled, a colour equal to that of the quarter-grain standard would indicate one grain of sugar per fluid ounce. If further dilution were required—say from ten to twenty divisions—the proportion of sugar would be two grains per ounce, and so on to thirty or forty or upwards, or to intermediate divisions. Thus dilution from ten to thirty-five divisions would indicate 3·5 grains of sugar per ounce.

We have found, by experiment, that ten minims of a cold saturated solution of picric acid are rather more than sufficient for decomposition by one drachm of a solution of grape sugar in the proportion of one grain to the ounce. A drachm of the solution would, of course, contain one eighth of a grain of sugar. In making an analysis, the



The picro-saccharimeter, as described in the text. The shading of the side tube indicates the ferric acetate standard. The darker shading at the bottom of the graduated tube shows the saccharine fluid, darkened by boiling with picric acid and potash, and occupying ten divisions before dilution.

picric acid must be added in proportion to the amount of sugar. If the proportion of sugar be as high as six grains per ounce, a drachm of the picric acid solution will be required. If the proportion of sugar be higher than this, the saccharine fluid should be diluted with distilled water in a definite proportion before commencing the analysis, and the product of the analysis of the diluted fluid is then to be multiplied by the degree of dilution—two, five, or ten, as the case may be, to which the original liquid has been subjected.

Distilled water, or clear rain-water, should be used for diluting. Hard water, containing salts of lime, is rendered turbid by the carbonate of lime precipitated by mixture with caustic potash, and any turbidity in the liquid interferes with the estimation of the depth of colour. In testing undiluted urine, a slight turbidity often results from separation of phosphates by the potash. This turbidity may be removed by allowing the phosphates to form a sediment, or more speedily by filtration. When a highly saccharine liquid is diluted five or ten times before mixture with the testing materials, no phosphatic turbidity occurs. In making a volumetric analysis, care must, of course, be taken that the measurements and dilutions are accurately made.

The preliminary dilution of a strongly saccharine specimen may be made in the graduated tube; or into a flask graduated to contain fifty cubic centimetres; five or ten cubic centimetres of the saccharine liquid may be delivered from a graduated pipette; then the flask being filled up to the graduation with distilled water, the dilution will be ten times with five cubic centimetres, and

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* I hope and believe that our friends and fellow-workers, the pharmaceutical chemists, will prepare standard sugar solutions, and also the ferric acetate standard for those who require them. We have made the ferric acetate by adding ferric chloride to ammonium acetate. It is of primary importance that the standard be correct.

[We have been kindly supplied with the following form for a "standard sugar solution," which is, we believe, due to the suggestion of Mr. G. Stillingfleet Johnson.—Ed. P. J.

Liq. ferri perchlor. fort.	ʒj.
Liq. ammon. acet.	ʒiv.
Acid. acet. glacial.	ʒiv.
Aq. dest.	ad ℥iiss.

The colour of this is equal to a quarter of a grain of grape sugar to the ounce. Of course this wants checking every time it is made.]

† This picro-saccharimeter was made for me by E. Cetti, 36, Brooke Street, Holborn, E.C.

five times with ten cubic centimetres of the liquid to be analysed.

Another important point is that, while the amount of potash remains the same, the picric acid must be in proportion to the amount of sugar in solution. It has already been mentioned that ten minims of the picric acid solution are more than equal to one-eighth of a grain of glucose, which is the amount contained in one drachm of a solution, in the proportion of a grain to a fluid ounce. A slight or even a considerable excess of picric acid does not appreciably affect the colour of the picramic acid, while a deficiency would, of course, lead to an underestimate of the amount of sugar. If an analysis with thirty minims of picric acid solution indicate, say, from three to four grains of sugar, it is probable that some sugar has been left undecomposed, and a second analysis, with a larger proportion of picric acid, might therefore give a higher and a more correct result. If, on the other hand, a second analysis, with a larger proportion of picric acid, give an identical result, we may feel certain that the whole of the sugar has been decomposed, and the amount indicated by the resulting picramic coloration. In any case, when the amount of sugar indicated is less than would suffice to react upon the amount of picric acid employed, the result may be relied upon as correct.

The presence of albumen, even in large amount, has but little influence on the picric acid test for sugar. In illustration of this, the following experiments will suffice. A specimen of urine, normal as regards the amount of saccharine or saccharoid material, but containing a large amount of albumen, was boiled with picric acid and potash with sufficient water to dilute the urine by its own volume of liquid. A second portion was treated in the same way after the separation of the albumen by boiling and filtration, and the first specimen gave a darker tint than the second to a degree that might be considered to indicate one-tenth of a grain of sugar per ounce. Another portion of the urine was decolorized by repeated filtering through charcoal; and, of this, one specimen was tested while it retained its albumen, another after the separation of the albumen — the result being that both yielded identical tints of colour, and this was very slightly paler than that of the specimen which was tested after having been deprived of its albumen without previous decolorization by charcoal. The explanation is, that pure albumen has no reducing influence on picric acid when boiled with dilute potash, such as is used in testing for sugar; but with seralbumen, as with white of egg, there is associated a colouring matter which is partly separated by filtering off the coagulated albumen, and entirely removed by repeated filtering through charcoal. The colouring matter in question has a reducing influence on picric acid, although the colouring matter of normal urine has been found to have none. The coagulated albumen collected on the filter, after being thoroughly washed, gives no red reaction when boiled with picric acid and potash diluted in the same proportion as that employed in testing for sugar. This has been proved by repeated experiments.*

The accuracy of the picric acid method of volumetric sugar analysis has been fully and fairly tested. Our plan has been to compare the results of this process with those obtained by Dr. Pavy's beautiful and accurate ammonio-cupric method. We have analysed the same specimens, many of them albuminous as well as saccharine, by the two processes, my son employing Dr. Pavy's method in the laboratory at King's College, and I the picric acid process at home; and our results are found to be practically identical, the differences being only such as are due to unavoidable slight errors in conducting an experiment. Both methods, in fact, are based upon the same chemical principle—namely, that glucose, when heated with potash in the presence of an oxidizing agent, has a tendency to rob it of its oxygen. In the one process, the reducing action of the sugar is exerted upon an oxide of copper; in the other, on picric acid, A definite weight of sugar reduces, in the one case, a proportional amount of cupric oxide, and in the other an equivalent proportion of picric acid, with resulting picramic acid, and a corresponding measurable intensity of colour.

The proportion of sugar in the specimens analysed has varied from one grain to fifty grains per fluid ounce. The following may be taken as examples of practically identical results.

1.	13·5 grs. per fluid oz. . .	13·5 grs. per fluid oz.
2.	33 " " . .	32 " "
3.	31·2 " " . .	30·5 " "
4.	36.4 " " . .	36 " "
5.	10.3 " " . .	9·5 " "
6.	1·28 " " . .	1 " "
7.	11·5 " " . .	11 " "
8.	36·4 " " . .	36 " "
9.	2·57 " " . .	2·5 " "
10.	3·1 " " . .	2·9 " "
11.	7·27 " " . .	7 " "
12.	16·8 " " . .	16 " "
13.	48·5 " " . .	47·5 " "
14.	27·7 " " . .	27 " "
15.	48·4 " " . .	48 " "
16.	17·47 " " . .	17 " "
17.	49·6 " " . .	49 " "
18.	9·3 " " . .	8·5 " "
19.	9·9 " " . .	10 " "
20.	6·05 " " . .	6 " "

It will be seen that in the majority of cases, the ammonio-cupric process gives results slightly in excess of the picric acid method. This excess is due to some non-saccharine ingredients in the urine, which reduce cupric oxide, but not picric acid.

During the last three months, I have tested with the picric acid and potash a large number of specimens of normal urine (about 300), with the almost uniform result of a depth of colour indicating the proportion of 0·6 grain of sugar in the fluid ounce, the indications usually varying between the limits 0·5 and 0·7 grain in the fluid ounce. In a considerable number of cases, my son has tested the same specimens by the ammonio-cupric method, with the indication usually of from 0·7 grain to 0·9 grain in the fluid ounce; *i.e.*, an excess of that obtained by picric acid of from 0·1 to 0·3 grain in the fluid ounce.

The following have been the proportions of the various liquids: a drachm of urine, ½ a drachm of liquor potassæ, 10 minims of picric acid solution, made up to 2 drachms with distilled water. The mixture is kept boiling for a minute, and, when cooled, is compared with the standard. The urine having been diluted by its own volume, a depth of colour equal to that of the standard would indicate 0·5 grain of sugar; but in nearly every case I have found it so much darker than the standard, as to require further dilution equal to 0·1 grain before the standard colour is reached, thus giving an indication of 0·6 grain.

So constant is this degree of coloration with normal urine that if, instead of diluting up to 2 drachms, the dilution be carried further by 24 minims, the resulting colour might be taken as an approximation to an exact quarter-grain standard, and, in the absence of a more exact standard, might be used for making an analysis. The question arises—Does normal urine contain as much as 0·6 to 0·7 grain of glucose in the fluid ounce? We are

* A chemical result of boiling albumen with potash, and the question of the formation of alkaline sulphide, was discussed at some length in the columns of the *Lancet* during the months of December and January last. For the final communication from my son, in which he demonstrates that the apparently contradictory results obtained by different observers are explained by the varying proportions of the caustic potash employed, the *Lancet* could not find space, but it is published in the *Chemical News*, February 23, 1883, page 87.

not prepared to assert this without further evidence than we have as yet been able to obtain; but, if it be not glucose which gives these almost identical analytical results with the two processes, it must surely be some nearly allied substance.

There are certain facts connected with the behaviour of this reducing agent so constantly found, and in such constant quantities in normal urine, which point to its saccharine nature. 1. Its reducing effect upon both cupric oxide and picric acid is equal to that which would be exhibited by an equal weight of pure glucose. This is remarkable, since any other substance than glucose or an isomeric sugar would probably reduce more or less either of the picric acid or of the cupric oxide. 2. It is completely destroyed by prolonged ebullition with dilute caustic alkalies. On the other hand, we are unable to assert positively that it is glucose, since it is unfermentable by yeast, and the most careful analyses have failed to produce more than those traces of grape-sugar from normal urine which were obtained by Brücke and Bence Jones ($\frac{1}{50}$ of a grain per fluid ounce). The results of careful analyses of normal urines tend to show that the secretion of the healthy human kidney contains two distinct classes of cupric oxide-reducing substances, viz., (1) such substances as uric acid, etc., which are not destroyed by boiling, with dilute caustic potash; and (2) what may be described as saccharoid bodies which *are* disintegrated by such treatment. Moreover, it appears that picric acid is reduced only by the second, or saccharoid group of normal urinary constituents; for the results of analyses by the ammonio-cupric method of healthy urine which has undergone sufficiently prolonged boiling with dilute potash to completely destroy everything which is capable of reducing picric acid—*i.e.*, everything belonging to group 2, or the saccharoids—invariably show the presence of more or less cupric oxide-reducing substance which has escaped disintegration by the boiling alkali; and on deducting this reduction from the total cupric oxide-reduction effected by the original urine, an indication of (?) glucose is obtained equal to that given by the picric acid method with the original urine.

The results of some such analyses are tabulated below, in which all reduction is expressed in grains of glucose in the fluid ounce.

I. Total indication by picric acid.	II. Total indication by Ammonio-cupric method.	III. Indication by Ammonio-cupric method after boiling with potash.	IV. Difference between II. and III. Saccharoid substance.
gr. per fl. oz.	gr. per fl. oz.	gr. per fl. oz.	gr. per fl. oz.
(1). 0·6	0·909	0·276	0·63
(2). 0·5	0·607	0·09	0·517
(3). 0·35	0·546	0·145	0·401
(4). 0·8	1·245	0·437	0·808

All reductions expressed as grains of glucose per fluid ounce.

These results are explained by the fact that those ingredients of healthy urine which reduce cupric oxide, and are not destroyed by boiling with potash, such as uric acid and urates, have been found to exert no reducing action upon picric acid.

There are at least two undoubted sugars, viz., sorbite and eucalin, which reduce cupric oxide from potassio-cupric tartrate, and are destroyed by boiling with dilute potash, but do not undergo the vinous fermentation under the influence of yeast; and both these sugars are isomeric with glucose. Hence, though the evidence of the indentity of the saccharoid ingredient of normal human urine with glucose is incomplete, it is at least probable from its behaviour and reactions that it may be a true sugar.

I trust that the method of saccharimetry which I have described, will enable every practitioner who has the will, to estimate with ease and accuracy the amount of sugar in any specimen of urine.

ALGIN: A NEW SUBSTANCE OBTAINED FROM SOME OF THE COMMONER SPECIES OF MARINE ALGÆ.*

BY E. C. C. STANFORD, F.C.S.

The utilization of hitherto waste materials presents a large field for chemical investigation, and many important industries have within the last twenty years resulted from such researches.

There are few materials so abundant, so general, and so easily obtained as the commoner kinds of seaweed thrown up on all our coasts, but especially on those exposed to the waves and storms of the Atlantic. The species I refer to—the laminaria and fuci—are found growing on all rocky shores. And it may also be remarked that, except as manure, the great bulk of this material has been long practically unutilized. It is true that, when burnt into the rough slag known as kelp, this material was formerly the means of securing large revenues to the proprietors of the Western Islands. For several well-known reasons, that manufacture has long ceased to be profitable, and it never could have been considered as utilizing the seaweed, except in the sense that burning down a forest could be called utilizing it, when it ought to be cut into timber and really utilized in building houses or making furniture.

In 1862, the writer introduced a method of carbonizing the seaweed in retorts, and thus converting the material into charcoal instead of kelp, and preventing the great loss of iodine arising from open-air burning. This was simply another step of improvement, and, comparing it again with the forest, was merely equal to making the timber into charcoal instead of burning it into ash. It is not, in a proper and fuller sense, utilizing the seaweed. The results of further attempts in this direction form the subject of this paper. When we remark that the present wide-spread destitution and want of employment amongst the poor cottars is most severe in just those districts in Ireland and the Highlands where this material is most abundant, the importance of this inquiry will be at once seen. Indeed, if a remunerative price can be paid for a waste material that every child in a large family can easily assist in collecting at their own doors, it would go far to settle many existing difficulties, of which the worst is always hunger. And this brings me to mention the value of the algæ as a food material. In my paper, read before the Society of Arts, in 1862, on "The Economic Applications of Seaweed," the various kinds so used were described, and I have called attention more recently, in a paper read before the Chemical Society, to the fact that the analysis of the charcoal obtained from the various algæ approximates more nearly to that of a product of the animal than of the vegetable kingdom. I believe the algæ, generally, to be quite as valuable food products as the fungi, with the advantage that we are unaware of any poisonous species. Both are, however, equally neglected in this country. As the edible fungi are much consumed by other European nations, so the edible algæ are largely enjoyed and realize a high price in China and Japan. A sample of one of the Japanese varieties before us yielded on analysis a composition closely similar to our laminaria. It has, however, evidently been cut up, and presents the appearance of long shreds, and is coloured green by the action of an alkali. The poor people in Donegal are now eating the *Fucus vesiculosus* with Indian meal, and it is a common thing to see the Highland cattle browsing on this plant at low tide. The *Aliaria esculenta*, or murlins, of which a fine specimen is on the table, may be called our edible species, but the *Rhodomenia palmata*, or dulse, is perhaps better known in Glasgow, being regularly sold on the streets.

The most important species consumed in this country is the *Chondrus crispus*, or Irish moss. This plant contains

* Read before the Chemical Section of the Glasgow Philosophical Society, April 2, 1883. Communicated by the Author.

79 per cent. of caragheenin, a substance of great gelatizing power, and largely used in jellies and puddings. This seaweed would, no doubt, secure a considerable market as a size for fabrics, but it cannot be obtained in any great quantity. It is only uncovered at low spring tides, and any very large demand would soon exhaust the supplies. A recent application of Irish moss is being worked by a limited company, under the name of "velo-plastic," which is said to be made of refuse leather, dried and finely ground and mixed with caragheenin. I am indebted to Mr. John A. Walker, of Dublin, for specimens of green and yellow morocco, poplin, and satin damask, and watered silk, all of which appear to be most successful imitations. The new substance to be described in this paper would probably answer equally well for this application.

Another still more powerful gelatizing substance is gelose. This was first imported into France from China in 1856. It has ten times the gelatizing power of isinglass, and will set into a jelly five hundred times its weight of water. It is not nitrogenous, and contains—carbon, 42·8; hydrogen, 5·8; oxygen, 51·4. It has not superseded isinglass for jellies, as the fusing point of the jelly is too high to melt in the mouth. I found some years ago, in experiments on every variety of seaweed that could be procured, that this gelatizing principle was confined to two British species—the *Chondrus crispus* and the *Gelideum corneum.* An Australian alga, the *Euchemia spinosa*, or agar agar, is also a jelly-yielding species. Several articles have recently been introduced under various names, such as thao, fucyne, etc., all of which appear to be modifications of, or products from, these plants.

The application of seaweed as manure is very general where it can be obtained. In fact the practical value placed on it is far above its actual chemical valuation. It usually contains 80 per cent. of water, so that 4 tons of water are carted to the land for every ton of dry seaweed, and even when dried there is not a large saving in carriage, as it is then very bulky. It is, however, carried long distances in some places, and there is no doubt that it is very valuable on soils that are all sand; but it is more of a mechanical value, as its use is not to *manure* but to *make* the soil—a rather expensive manufacture. Kelp waste, a ton of which, dry, represents 40 tons of wet seaweed, and contains all the phosphates of the weed in a convenient form—is absolutely unsaleable to farmers in this country at any price.

The only other important proposed application of seaweed has been to the manufacture of paper, and about twenty years ago several patents were taken out with this object, and some specimens were exhibited at the Society of Arts on the occasion before referred to. They were all made, however, from the *Zostera marina*, or grass wrack—a marine plant with flowers growing in the sea, but not one of the algæ—and this plant makes a very good paper. It created a good deal of attention at that time, having been proposed as a substitute for cotton during the cotton famine. It is not, however, available in large quantity, and contains very little fibre. The algæ generally contain no fibre, but, as far as my experiments have gone, nearly every species yields a very pure cellulose, which makes a tough, rather transparent paper. The tissue of the plant consists of simple cells of various shapes laid end to end, and in the fuci containing a dark pigment. This cellulose fabric, which forms the paper material, amounts, when quite dry, to 10 per cent. of the air-dry plant. In working on the fuci and the laminariæ my attempts to make a paper pulp were much impeded by a peculiar substance common to both these species, which was found at first difficult to remove, and the presence of which rendered the paper brittle. In fact this appeared to be always the case unless the cellulose was obtained quite pure. This substance is present in large quantity, and forms the bulk of the plant after the salts are removed.

Any one observing the long flat fronds of the laminaria lying on the sea shore must have noticed two things. 1st, that these are easily bleached by exposure to light; 2nd, that, after exposure to rain, the fronds contain in their interior sacs of fluid. These are derived from the endosmosis of the water through the outside membranes, dissolving a peculiar glutinous principle. Upon opening one of these sacs, a neutral glairy, almost colourless, liquid escapes. Sometimes it may be seen partially evaporated on the surface of the frond as a jelly-like substance, which may be drawn out by the fingers in long, tenacious strings. This fluid contains a unique substance of remarkable properties, and to which, from its source, I have given the name of algin. The vesicles are only seen in the long fronds of the various laminaria, especially *L. stenophylla*, known in the Highlands as bar-darrig, or red-top. The large stems or tangle, and the fuci, although containing it in considerable quantity, do not exhibit this appearance.

If the liquid be evaporated to dryness, the scales so produced resemble albumen, and are not all soluble in water, but very soluble on the addition of a little alkali. Several other instances of the solubility of substances when endosmosed or dialysed are well known. The fluid thus naturally obtained is miscible with water, but coagulated by alcohol and by mineral acids. It cannot be obtained in sufficient quantity for exhaustive analysis, but it contains calcium, magnesium and sodium, in small quantity, in combination with algin. If the laminaria fronds are cut up and macerated in dilute hydrochloric acid, the liquid in the vesicles assumes the form of a colourless, insoluble jelly. If the laminaria fronds are immersed in water containing a little alkali—by preference sodium carbonate—the whole plant becomes disintegrated, and presents a gelatinous mass, consisting of a thick, glutinous, gummy liquid, containing the cellular fabric of the plant completely broken up. This occurs in twenty-four hours in the cold. The mass, although it only contains 2 per cent. of the algin, is so glutinous that it cannot be poured out of the bottle. It is very difficult to deal with, on account of its extraordinary thickness. In fact, as it is, no method of filtration is possible (all known methods, with and without pressure, have been tried). The cells to be removed are so minute that, if pressure be applied, the whole mass passes through any filter or not at all. By cautiously heating the mass, it can, however, be filtered. The medium employed is a coarse linen sacking in the form of a Taylor's filter. The cellulose is left behind as a gelatinous mass, amounting, when dry, to about 10 per cent. of the air-dried plant.

The algin solution is then evaporated in a somewhat similar manner to gelatin, and, when dry, presents an appearance which is not unlike gum-tragacanth; but it may also be obtained in thin transparent flexible sheets. The solution is slightly alkaline; but care must be taken that no great excess of sodium carbonate is present, or the solution decomposes, and in a week, if dilute, becomes quite thin, and contains no algin. This action of the alkali I cannot yet clearly explain. The solution can be neutralized by the careful addition of hydrochloric acid without gelatinizing; but an excess at once precipitates it. A solution of only 2 per cent. becomes semi-solid, treated in this way. The following reactions are obtained with various reagents. For some of these the solution must be carefully neutralized with acetic acid, which does not gelatinize it.

Dilute hydrochloric, nitric, sulphuric, sulphurous, phosphoric and mineral acids generally, coagulate it. Boracic acid has no effect.

Lime water, baryta water, and salts of calcium, barium and strontium, give white precipitates.

Salts of magnesium do not affect it. Acetic, formic, citric, tartaric and benzoic acids do not affect it.

It is precipitated by alcohol.

Perchloride of iron gives a dark brown coagulum.

Salts of copper, zinc, aluminium, tin, antimony, cobalt and nickel, all precipitate it.

Protonitrate of mercury forms a white precipitate, but bichloride of mercury and silver nitrate have no effect.

Acetate and subacetate of lead both give white precipitates.

Potassium silicate and bichromate, sodium biborate* and potassium ferrocyanide, permanganate, sodium tungstate, stannate and succinate do not affect it. No precipitate is produced by tannin.

Concentrated sulphuric acid dissolves it; concentrated nitric acid converts it into oxidation products, amongst which are oxalic acid.

It is distinguished from albumen by not coagulating on heating, and by not precipitating silver nitrate—from gelose by not gelatinizing on cooling, and by containing nitrogen, which gelose does not; and being soluble in cold, weak, alkaline solutions, which gelose is not; and being insoluble in boiling water, in which gelose is soluble. The laminaria has been boiled in water for a month without effecting any solution, and for a week under 40 lbs. pressure with a similar result.

It is distinguished from gelatine by not giving any reaction with tannin—from starch by giving no reaction with iodine; from dextrine, gum-arabic, gum, tragacanth and pectin, by its insolubility in dilute alcohol and in dilute mineral acids.

I notice as particularly remarkable that it should precipitate all the salts of the alkaline earths except those of magnesium, and most of the metals except silver and mercury, and with regard to the latter that it should precipitate the protonitrate but not the bichloride; and that it gives no precipitate with potassium silicate.

The gelatinous precipitate produced by a mineral acid represents the algin in its pure insoluble form. It dries up to a hard, horny substance. A specimen can scarcely be distinguished from horn. I have not yet succeeded in getting it pure and definite enough to be certain of its composition; but I am indebted to Professor Ferguson for a combustion of the soda compound. This had been carefully dialysed to avoid the presence of excess of alkali, and gave the following numbers:—

Carbon	35·65
Hydrogen	4·40
Nitrogen	3·03
Oxygen	37·23
Ash	19·69
	100·00

This gives the following composition for the algin. I have appended also that of gelatin, isinglass, gelose, and chitin. In nitrogen it is intermediate between gelose and gelatin, but it approaches nearer to chitin than any other substance. Fremy, however, denies the presence of nitrogen in this substance. It differs entirely from algin in being insoluble in alkalies.

	Algin.	Gelatin.	Isinglass.	Gelose.	Chitin.
Carbon	44·39	50·0	50·1	42·77	46·64
Hydrogen	5·47	6·5	6·6	5·77	6·60
Nitrogen	3·77	17·5	18·3	—	6·56
Oxygen	46·37	26·0	25·0	51·46	40·20
	100·00	100·0	100·0	100·00	100·00

(Sulphur, ·12.)

The percentage of ash in the soda compound does not materially vary. The two following were made—one with sodium hydrate, and the other with sodium carbonate, and yielded almost the same amount of ash:—

Sodium hydrate—percentage of ash	31·51
Sodium carbonate, do.	31·37
Mean	31·44

* It can be extracted by a solution of borax.

Although I believe the composition to be stated correctly, I cannot construct a formula from these figures; and all attempts to procure definite compounds for analysis have as yet been unsuccessful. The following compounds have been prepared and investigated with this view:—Compounds with calcium, aluminium, barium and lead—but the results have not been uniform enough to show that we have been examining definite compounds.

The sodium carbonate appears to be unaltered in the compound, but completely masked. The carbonic acid comes off only when acidified with an excess of hydrochloric acid, and heated.

The acid has also some decomposing effect, and produces a small quantity of a substance which precipitates Fehling's solution, but does not appear to be glucose.

A solution, 1000 grs. measure, containing 13·2 grs. of algin, was precipitated by standard sulphuric acid, and redissolved by standard sodium hydrate, six times in succession.

1st precipitation took of sulphuric acid (SO_3), grains	5·430
2nd „ „ „	4·070
3rd „ „ „	3·086
4th „ „ „	1·975
5th „ „ „	0·617
6th „ „ „	0·617
1st resolution took of soda (Na_2O), grains	3·778
2nd „ „ „	2·871
3rd „ „ „	2·052
4th „ „ „	1·530
5th „ „ „	0·670
6th „ „ „	0·478

As the precipitate is not soluble in sodium sulphate, there appears to be some decomposition continually going on, and this has not yet been sufficiently investigated to enable me to ascertain the exact action of the hydrochloric acid.

The process proposed to deal with the seaweed is first of all to wash out the salts by simple maceration in cold water. This is very easily done, the salts being almost entirely removed, even by two macerations. On account of the bulk of the material it is, however, advisable to wash a number of vats exhaustively in turns, in the usual manner of lixiviation common in alkali works. The water removes about a third of the weight of the seaweed, and when evaporated to dryness presents a treacly mass containing the salts and a considerable quantity of a saccharine matter which resembles mannite, but which precipitates Fehling's solution equal to 15 per cent. of glucose. It is, however, unfermentable, and I have not yet succeeded in getting it pure enough for analysis, on account of the great difficulty of separating it from the alkaline chlorides which are soluble in alcohol. By the use of sulphate of silver I have separated a small quantity, but still not sufficiently pure. If this can be separated commercially, and is a sugar having sweetness but unfermentable, it would be available for replacing glycerine in some of its applications. Until, however, more is known of its properties it must be sacrificed by carbonizing the salts, the charcoal, of which it yields about 50 per cent., being then treated in the usual manner for separating the iodine and salts. The salts vary from 35 to 55 per cent. of the whole; or 12 to 18 per cent. of the original air-dry weed in the laminaria. This is more than is obtained by burning the weed into ash, which does not, as a rule, yield more than 10 per cent. of salts on the air-dried weed.

It is interesting to notice the way in which these salts come out, and analyses have been made with this view. The results are shown in the following tables:—Calcium sulphate and magnesium chloride are both present in the aqueous solution of the laminaria and in the residue of the fuci—carbonates generally in the salts of the fuci and the residue of the laminaria. In the latter, which is always submerged, the relation of the magnesium to the calcium is singularly like that existing in sea water.

Within certain limits the composition of the salts differs considerably, the age of the plant and the time of gathering both affecting it.

(*To be continued.*)

THE PRESERVATION OF SYRUP OF IODIDE OF IRON.*

BY C. VAN WISSELINGH.

Some time ago J. de Groot published a paper in the *Pharmaceutisch Weekblad* (Sept. 17, 1882), in which he states that syrup of iodide of iron which has been kept in an open burette, and which was protected from contact with air by a layer of oil, was found to have lost 3 per cent. of its ferrous iodide. This statement induced the author of the present paper to examine the subject carefully, and his results are detailed below.

Three burettes of 100 c.c. capacity were nearly filled with freshly-prepared syrup of iodide of iron, and a layer of 5 c.c. of some fixed oil poured on top of each, the following oils being selected: almond oil, olive oil and castor oil. A small quantity of fixed oil would have served equally well to prevent contact with the air. I took a larger quantity to see what effect the oil itself would have on the syrup.

The percentage of ferrous iodide was determined by titration with a solution of mercuric chloride. As is well known, the addition of this reagent to a solution containing ferrous iodide in excess produces a red precipitate of mercuric iodide which is dissolved on stirring, as it forms a soluble double salt with the still undecomposed ferrous iodide. Whenever the precipitate no longer redissolves on stirring no more ferrous iodide remains undecomposed, and the reaction is completed. The solution of mercuric chloride is made of such a strength that 10 c.c. of it are required, in presence of 1 gram of ferrous iodide, to reach the point when a further addition will produce a permanent precipitate. In the actual titration I employed 5 grams of the syrup carefully weighed and afterward diluted with 5 c.c. of distilled water. In order to convince me that the above method yields correct results, the percentage of iodine was also determined by distillation with ferric chloride, by titration with hyposulphite of sodium and also with nitrate of silver, chromate of potassium being used as indicator in the last named case. The results of all these methods of assay were found to agree well among themselves, and with that above detailed.

Immediately after being prepared, the syrup in the different burettes contained, theoretically, 19 per cent. of ferrous iodide. The different assays gave figures varying from 19 to 19·2. Several times during each week, in the course of one month, the assay of the syrup in each burette was renewed, and no diminution of the percentage noticed. After four months the assay again yielded from 19 to 19·2 per cent. of ferrous iodide.

Now I determined to examine that portion of the syrup which was immediately below the layer of oil. Enough syrup was drawn from each burette to retain about 10 c.c. of which two separate assays were made. The mean results obtained were the following.

Syrup kept under almond oil . . .	19·17 per cent.
Syrup kept under olive oil . . .	19·17 per cent.
Syrup kept under castor oil . . .	19·13 per cent.

Finally the oils were examined. They all had acquired a more or less brown colour; the castor oil was very dark, less so the olive oil, and the almond oil had assumed only a brown tint. To estimate any iodine present in the oils, I used the following method. The oil was saponified with alcoholic solution of potash, by the aid of a few hours' heating on the water-bath, in a porcelain capsule. The soap was then carefully heated and carbonized in the capsule, the mass lixiviated with water, the solution acidulated with hydrochloric acid, and any iodide of potassium present determined by solution of mercuric chloride, three times more dilute than that mentioned above. A preliminary experiment convinced me of the reliability of this method. Although in all three solutions the presence of traces of iodine could be detected by chlorine water and chloroform as well as by nitrate of silver, yet the quantity was so minute that I could not estimate it quantitatively.

These results show that de Groot's statements cannot be correct. He states that he found a diminution of 2·941 per cent. of ferrous iodide in a syrup standing two months. I could not detect any diminution of the percentage even after four months, and only noticed the syrup becoming somewhat lighter of colour, while the oils took up only a minute trace of iodine.—After *Nieuw Tijdschrift voor de Pharmacie*, 1883, 77.

Note.—Many years ago, we have made experiments on the keeping of syrup of iodide of iron, and have found that it may be kept in bulk, in any quantity, if it be protected from contact with air by a layer of oil on the surface. A large stone jar with a glass faucet at the bottom will be found a useful receptacle. Or a glass siphon may be kept in the jar, reaching nearly to the bottom, the outer arm being provided with a short piece of rubber tubing and a pinchcock.—*Ed. N. R.*

* From *New Remedies*, May, 1883.

TESTING EXTRACT OF LICORICE.*

Professor C. L. Diehl, of Louisville, Ky., having had occasion to examine some commercial licorice paste as to purity, devised a modified method for the estimation of its constituents, and published the same in the February issue of the *Pharmazeutische Rundschau*.

I. Expose 1·0 gram of the mass to a gentle heat until it experiences no further loss in weight. Calculate this loss as moisture.

II. Digest 10·0 grams of the mass contained in a flask with 100·0 grams of distilled water until it is fully disintegrated; when cold cautiously pour on 200·0 grams of alcohol and vigorously shake the flask. By this procedure the precipitate produced will be prevented from adhering to the sides of the vessel. Allow it to stand for several hours, shaking occasionally, then pour on a double thick filter of sufficient size, and wash the remaining dregs with a mixture of two parts of alcohol and one part of water until the filtrate begins to pass colourless.

III. After the foregoing residue has become air-dry, exhaust the same with distilled water, so that the filtrate may pass colourless; reduce the latter to a small volume and then transfer to a small tared porcelain capsule, being careful to remove any residue from the larger evaporating dish by means of a little warm distilled water, adding the rinsing to the contents of the small capsules. Evaporate to dryness by means of a gentle heat, and calculate the residue as gummy matter.

IV. Carefully dry the dregs remaining on the filter under III., employ the outer filter as counterbalance and calculate as insoluble substance.

V. Carefully concentrate the alcoholic filtrate obtained under II. to the consistence of syrup and redissolve in distilled water. Then, to the clear solution, add dilute sulphuric acid gradually until a precipitate (glycyrrhizin) ceases to be produced. Wash the glycyrrhizin with cold water, allow to dry at the ordinary temperature, and dissolve in strong alcohol, whereby about fifteen per cent. of insoluble tastless residue will remain, which, however, is soluble in ammonia. Now filter the alcoholic solution of glycyrrhizin, wash the filter with alcohol, evaporate the combined filtrates to dryness, then redissolve the residue in a small quantity of ammonia, again evaporate to dryness in a tared capsule, and estimate as ammoniated glycyrrhizin.

* From *New Remedies*, May, 1883.

The Pharmaceutical Journal.

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THE "CRITICAL POINT" OF GASES.

NOTWITHSTANDING the many able investigators who have studied the phenomena attending the liquefaction of gases under the influence of pressure there are several points which are still imperfectly understood, and especially has there been a divergence of opinion respecting the significance of one of the most curious of them, the peculiar appearance manifested at what has been designated by Dr. ANDREWS the "critical point." It is well known that this distinguished physicist's experiments led him to think that under certain conditions of temperature and pressure there is a point at which matter exists in a condition that cannot be described either as liquid or gaseous, but is intermediate between the two states, and from which, under a definite variation of the conditions, it is capable of passing almost imperceptibly into either. This view has not gone unchallenged, and only a short time since Dr. HANNAY, after making a large number of experiments wherein hydrogen was submitted to pressure over various liquids in which it is insoluble, deliberately expressed his opinion that the gaseous and liquid states of matter are not more continuous than the liquid and solid states.

The success which has recently attended the efforts of two Polish experimenters to effect the liquefaction of oxygen, nitrogen and carbonic oxide, under conditions in which the resulting liquid can be retained for observation, has redirected attention to the general subject, and M. JAMIN has seized the opportunity to lay before the French Academy of Sciences some conclusions at which he has arrived. M. JAMIN, who maintains that gases are liquefiable at any temperature if the pressure be sufficient, gives the following explanation of the "critical point." Taking one of the earlier experiments of CAGNIARD-LATOUR, where a thick glass tube, two-thirds full of water under the pressure of its own vapour, is sealed and heated to 300° or 400° C., he points out that according to known laws the quantity of vapour lying above the liquid augments very rapidly, and that its density increases in the same ratio as its weight, while, on the other hand, the remaining portion of the liquid undergoes a growing expansion which eventually exceeds that of the gas: it follows therefore, as a consequence of these inverse variations, that a limit of temperature is reached where equal volumes of the liquid and the vapour have the same weight. At this point they cease to remain separate; the meniscus disappears; the liquid and vapour become mixed, presenting undulating striæ such as are characteristic of a mixture of liquids of different densities, and finally the whole takes a homogeneous form which has been supposed to be gaseous. This is the "critical point," which M. JAMIN defines as the "temperature at which a liquid and its saturated vapour have the same density." Although no liquid is now perceptible it still remains diffused through the gas at its boiling point and maximum tension in virtue of its equal density; but as the temperature rises the tension continues to increase until the entire volatilization of the liquid, when, and not till then, there remains only a dry vapour or gas above its point of liquefaction. The inability to recognize the presence of the liquid in the gas is attributed to the fact that the conditions which ordinarily allow of a saturated vapour being distinguished from the liquid from which it is generated are not present, there being no difference in the density of the two, whilst no heat becomes latent, since there is no change of volume and consequently no expansion. So also the experiments of Dr. ANDREWS have shown that when a gas is submitted to gradually increasing pressure in a closed tube a definite limit is reached, the maximum tension, upon passing which the gas is condensed; this is the point of liquefaction, or boiling point at this pressure, and this pressure of liquefaction augments rapidly with the temperature without any known limit.

M. JAMIN argues that this theory of the equalization of the densities brings the phenomena into accord with all the laws as to the formation and condensation of vapours and explains the apparent anomalies in connection with the "critical point." For instance, in 1880, M. CAILLETET had stated that in submitting to pressure, in his apparatus, a mixture consisting of one part of air and five parts of carbonic acid, it was observed the latter gas took the liquid form at a moderate pressure; but upon increasing the pressure to one hundred and fifty or two hundred atmospheres the liquid already formed entirely disappeared. This observation had remained unexplained; but M. JAMIN, applying his theory to it, inferred that a portion of the carbonic acid having become liquefied at a moderate pressure, it was not further affected by continued reduction of the volume of the containing vessel, having already attained its maximum density, whilst the pressure upon the gaseous air increased, and with that its density, until this equalled the density of the liquefied carbonic acid, and intermixture followed. If this inference were correct, it would follow that upon substituting a gas of less density, such as hydrogen, for the air in the mixture, the equalization of the densities, and the consequent disappearance of the liquified carbonic acid, would be retarded. The question was submitted to the crucial test of experiment by M. CAILLETET, who obtained results quite in accord with M. JAMIN'S theory. M. CAILLETET made two mixtures, one containing five volumes of carbonic acid and one of air, the other five volumes of carbonic acid and one of hydrogen, and submitted them to pressure. In both cases he obtained the liquefaction of the carbonic acid under moderate pressure, and the total disappearance of the liquid under more powerful compression. First the meniscus disappeared at the moment when the densities of the liquid and the air became equal, and afterwards the liquid disappeared, and, in conformity with the theory, at a pressure very different and much more considerable with the mixture containing hydrogen than with that containing air. Thus whilst at a temperature of 15° C., a pressure of one hundred and thirty-five atmospheres was coincident with the disappearance of the carbonic acid first liquefied from a mixture containing air, a pressure of two hundred and forty-five atmospheres was reached before a similar phenomenon occurred with a mixture of carbonic acid and hydrogen. At 20° C. the pressures at which the liquid disappeared were with carbonic acid and air, one hundred and eight atmospheres, and with carbonic acid and hydrogen, one hundred and ninety-nine atmospheres; whilst at 25° they were seventy-nine atmospheres and one hundred and fifty-three atmospheres respectively. When the mixture was less rich in carbonic acid, M. CAILLETET found that the evident liquefaction of this gas was retarded and sometimes unattainable. The explanation offered is that when a mixture of air and gas is reduced to a smaller volume by pressure they undergo equal reduction, but not the same increase of tension; that of air being directly as the decrease of volume, whilst that of carbonic acid augments less rapidly, since MARIOTTE'S law no longer applies. Liquefaction of the carbonic acid does not therefore take place relatively at so early a period, and when eventually it does attain its maximum tension, its density may be the same, or sometimes below, that of the air above it. It is consequently in a state in which it will readily become diffused through the air and escape recognition as a liquid; this might lead to the supposition that under such conditions carbonic acid gas is incapable of liquefaction, whilst it has only lost the property of collecting at the bottom of the containing vessel in virtue of a relatively greater density. M. JAMIN hoped that by increasing the pressure the carbonic acid would continue to liquefy, and that as in so doing its density would vary only slightly, whilst that of the air would augment indefinitely and eventually become superior, a point would be reached at which separation would take place, and the curious result would be obtained that the liquefied carbonic acid would float above the denser, but still unliquefied air. At present, however, all attempts made M. CAILLETET in this direction have been unsuccessful.

We are requested by the Secretary, Mr. Bremridge, to say that he will be glad to receive votes for the election to the London Orphan Asylum, on the 25th inst., in order to secure the admission of an orphan in whom the Society is interested.

* * *

Once more the second reading of the Medical Acts Amendment Bill has been postponed, and it is now set down for Monday next. On Thursday, in reply to a question put by Lord Randolph Churchill, as to the intention of the Government with respect to this Bill, Mr. Gladstone declined to say anything which would lead to the supposition that it would interfere with the Tenants' Compensation Bill. He remarked, however, that the Bill had been the product of very great labour and he believed it had received the very general consent of the medical profession; under these circumstances, he thought it would be favourably received in the House of Commons and he looked forward to seeing it passed during the present session.

* * *

According to the "Votes and Proceedings," petitions for the alteration of the Medical Bill were on Tuesday presented from the "Chemists', etc., Association and Glasgow." If, as appears possible, petitions from two associations of chemists and druggists in respect to the proper representation of pharmacists upon the Pharmacopœia Committee are indicated under this curt description, it is regrettable that their presentation was not delayed until a period nearer to the time when this particular subject is likely to come under the notice of the House, during the passage of the Bill through Committee.

* * *

In reply to a deputation of "Medical Herbalists," who were afraid that the Medical Acts Amendment Bill, if passed, would be prejudicial to their interests, Mr. Mundella said, on Tuesday last, that the Bill would not affect them at all, as long as they abstained from using improper titles.

* * *

By the courtesy of the Secretary of State for Foreign Affairs we are informed that a dispatch has been received from Her Majesty's Ambassador at Rome, reporting that in answer to representations addressed by him to the Head of the Italian Commercial Department respecting the restrictions on the sale of patent medicines in Italy, that officer has explained that the object of the Medical Board was to prevent the introduction of patent medicines containing drugs injurious to health, and that if it could be shown that the medicines for which admission was applied for were sanctioned in any properly authorized pharmacopœia, there would probably be no difficulty as to their admission.

* * *

It will be seen from a letter published on another page that Mr. R. Barrington Cooke, to whose remarks on the necessity for placing the sale of butter of antimony under more stringent regulations we referred last week, has been in communication with Mr. Mundella on the subject, and has "every reason to believe" that his suggestion "will be carefully considered and probably adopted." Whilst gratified to observe this practical endorsement of the recent action of the Council, we are unable to think that the point which was refused to the body charged by the Legislature with the initiative in making additions to the poison schedule will be conceded to a private individual.

* * *

Sanitary reformers may well be satisfied with the increased attention now paid by the general public to their teachings. A few years since they were looked upon as visionary, and rather troublesome, enthusiasts, but on Saturday last, the occasion of the opening of an exhibition of hygienic dress and sanitary domestic appliances and decoration at Knightsbridge, under the auspices of the National Health Society, attracted a distinguished company of civic dignitaries, leaders of the medical profession, and others. Mr. Ernest Hart described the nature and object of the exhibition, and in doing so incidentally presented some statistics that were sufficiently remarkable to arrest the attention of those of his audience whose municipal position may enable them to exercise a salutary influence in favour of improved hygiene. Briefly, Mr. Hart estimates that the saving of life effected in the metropolis during the last ten years by improved sanitation at 480,000 lives, or 48,000 lives annually, which means a yearly money saving with respect to sickness and funerals alone of at least a quarter of a million sterling. Some further figures quoted respecting the buildings of the Artizans' Improved Dwellings were so remarkable as almost to suggest some other explanation of them than the one implied; for, according to Mr. Hart, in these buildings the death rate has been reduced, in the case of infants, from 47 to 24 per 1000, and in the case of adults, from 17 to 10 per 100. The Lord Mayor formally declared the exhibition open, and whilst it was in accordance with a very prevalent idea that his thoughts should flow towards the subject of good dinners, he was undoubtedly quite right in pointing out that much remains to be done in the direction of teaching people how to cook their food without spoiling it and depriving it of its nutritious properties.

* * *

The first subject of research in connection with the quadrennial Discovery Prize of £1000 recently instituted by the Grocers' Company (see before, p. 807) has now been announced by the Committee, and the problem set lies quite within the field of experiment open to many of our readers. It is "to discover a method by which the vaccine contagium may be cultivated apart from the animal body, in some medium or media not otherwise zymotic: the method to be such that the contagium may by means of it be multiplied to an indefinite extent in successive generations, and that the product after any number of generations shall (so far as can within the time be tested) prove itself of identical potency with standard vaccine lymphs." Competitors for the prize, who may belong to any nation, must submit their treatises on or before December 31, 1886, and the award will be made not later than May, 1887. The Scientific Committee, under whose advice the Grocers' Company is acting, consists of Dr. Simon, Professor Tyndall, Dr. J. Burdon Sanderson and Dr. George Buchanan. The Grocers' Company has issued a circular stating the conditions of candidature and award, copies of which may be obtained from the Clerk to the Company.

* * *

The report of a case of prosecution by the Inland Revenue authorities, which was published in this Journal last week, shows that notwithstanding all that has been said there still exists misapprehension as to the sale of quinine wine. It cannot be too clearly understood that the permission to sell quinine without a licence or stamp only extends to it when prepared of the strength and according to the directions of the Pharmacopoeia, and supplied as such. If the "wine" sold does not represent the Pharmacopœia preparation, the seller must hold a wine licence, whilst, in any case, if it be recommended for the cure of disease, it must be stamped as a "patent medicine."

* * *

Another subject upon which we have reason to believe some misconception exists is the extent to which rectified and methylated spirit may be supplied by chemists and druggists. It is not likely that the excise authorities will attempt to interfere with the supply within reasonable limits of ordinary alcohol as medicine on the prescription of a medical man. But this tolerance must not be assumed to extend to the supply without a licence of methylated spirit, the use of which in the preparation of any medicine capable of being used internally is expressly forbidden under the 130th section of the "Spirits Act, 1880."

* * *

The use of liquefied carbonic acid in the preparation of carbonated beverages is recommended by Mr. Apotheker Volk, of Ratzeburg, who states that experiments have proved it to be the purest, most suitable and best method of impregnating mineral waters. It is also claimed that by using the carbonic acid in this form the more expensive part of the apparatus now used in the manufacture could be dispensed with. It is evident, however, that even should a sufficiently cheap supply of pure liquefied carbonic acid be forthcoming, special precautions will have to be adopted as to the containing vessels and the manner in which they are stored, as the gas requires at 0° C. for its liquefaction a pressure of 36 atmospheres, which increases rapidly with a rise of temperature. It would be worth while to carry the experiment a little further and try the solidified acid, the relatively slow evaporation of which, even when exposed to the air, might facilitate manipulation.

* * *

An extraordinary dispensing mistake is recorded by the *St. Louis Druggist* as having occurred in the City Hospital, St. Louis. Two patients were ordered to be supplied with "30 drachms of sulphate of magnesia in cinnamon water," and a third with 25 drachms. In some unexplained way the hospital dispenser substituted chloral hydrate for sulphate of magnesia, with the result that within an hour of taking the medicine two of the patients were dead and the other in a dangerous condition. A coroner's jury returned a verdict of "death through culpable negligence," and the dispenser has been lodged in prison to await his trial.

* * *

At the Second Annual Meeting of the Virginia State Pharmaceutical Association, held last month in the city of Norfolk, Professor Attfield was unanimously elected an Honorary Member of the Association.

* * *

The name of Sir Frederick Augustus Abel, K.C.B., F.R.S., occurs in the list of names of gentlemen upon whom it is proposed that the University of Oxford shall confer the degree of D.C.L., at a Convocation to be held on Wednesday next.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, June 6, 1883.

Present—Messrs. Andrews, Atkins, Borland, Bottle, Butt, Carteighe, Churchill, Greenish, Hampson, Hills, Radley, Richardson, Robbins, Savage, Schacht, Squire, Symes, Williams, Woolley and Young.

Mr. Carteighe having taken the chair, the minutes of the Council meetings of May 2 and 23 were read and confirmed.

Election of President.

A ballot having been taken in the usual way—

MR. MICHAEL CARTEIGHE

was re-elected President.

The President thanked the Council for this renewed mark of its confidence, and said he hoped he should be able to continue to serve the Council and the Society with satisfaction to all concerned.

Election of Vice-President.

On a ballot being taken—

MR. SAMUEL RALPH ATKINS

was re-elected Vice-President.

The Vice-President also briefly thanked his colleagues for the honour they had done him.

Election of Treasurer.

A ballot having been taken—

MR. JOHN ROBBINS

was re-elected Treasurer.

Mr. Robbins expressed his thanks, and said it was always gratifying to anyone who filled such a position to find that he had an ample reserve to draw upon and that he left office at the end of the year with the finances in a better state than when he commenced his duties.

Standing Orders.

The Standing Orders were then adopted for the ensuing year.

Secretary and Registrar.

Mr. Elias Bremridge was unanimously re-appointed Secretary and Registrar.

Assistant Secretary and Deputy Registrar.

Mr. Richard Bremridge was also unanimously re-appointed Assistant Secretary and Deputy Registrar.

Elections.

PHARMACEUTICAL CHEMIST.

Joshua David Pidgeon, of New Cross, having passed the Major examination and tendered his subscription for the current year, was elected a "Member" of the Society.

CHEMISTS AND DRUGGISTS.

The following registered chemists and druggists, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Bowman, William..................Liverpool.
March, William............Queenstown, Cape Colony.
Williams, Edward ....Mold.

ASSOCIATES IN BUSINESS.

The following, having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Alpe, Robert Bird ....Wymondham,
Beck, Albert Neve ....Hastings.
Ellis, George Waddington ......Birkdale
Furness, Thomas ....Chesterfield.
Hewitt, John Richard............London.
Mansergh, William ....Manchester.
Swift, Philip Dickerson ....Tottenham.
Thresh, Arthur.....................Buxton.
Waddington, John William ...Hungerford.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Brunt, George Henry ....Norwich.
Campion, Martin Hand ....Louth.
Fitzjohn, Francis ....Whittlesea.
Fraser, John ....Edinburgh.
Hickson, Robert William ......Hull.
Low, David ....Hexham.
Norman, William Francis ......Towcester.
Pearson, William Jackson ......Little Gonerby.
Richards, Arthur..................Swansea.
Simpson, Charles ....Aberdeen.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Cox, Frederick Hudson ....Southampton.
Day, John Thomas ....London.
Denham, Albert Shaw ....Preston.
Ellerington, John Parker ......Hexham.
Hallawell, Joseph L. ....Ayr.
Hollis, Henry ....Birmingham.
Jackson, Harold ....Manchester.
Lees, James ....Leighton Buzzard.
McLanachan, John ....Sheffield.
Metcalf, Rowland Alfred ......Uxbridge.
Muskett, Frederic James ......Newport Pagnel.
Ogdon, William ....Derby.
Peacock, George ....Heslerton.
Ryall, Frederick John.............Devonport.
Scholey, John ....Burnham.
Scott, Sack Noy ....St. Austell.
Smith, Edwin Wells ....Sheffield.
Stark, George Miller ....Gatehouse.
Thacker, Harry Ransby ....Nottingham,

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Restorations to the Register.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

William George Clapperton, 610, Myrtle Avenue, Brooklyn, U.S.A.
John Henry Hateley, 4, Shawclough, Rochdale.

Additions to the Register.

The Registrar reported that—
David Fairbrother, 2, Flitcroft Street, Manchester;
Joseph Woods, Tunstall, Staffs;
Sarah Craig, Howgate, Kilwinning, Ayrshire;
having made statutory declarations that they were in business before the passing of the Pharmacy Act, 1868, and these declarations having been supported by duly qualified persons, their names had been placed on the Register.

Appointment of Committees.

The Council went into committee to receive suggestions and discuss details of the committee arrangements. On resuming the following were appointed:—

General Purposes.—The whole of the Council To meet at six o'clock on the evening before the Council meeting and at such other times as may be required.

Finance.—Messrs. Andrews, Gostling, Hills, Savage, Schacht, Squire and Symes. To meet at half-past four o'clock on the afternoon preceding the Council meeting.

Library, Museum, Laboratory and House. — Messrs. Andrews, Bottle, Butt, Gostling, Greenish, Hampson, Hills, Richardson, Robbins, Schacht, Squire and Williams. To meet at eleven o'clock on the second Wednesday in every month except August and September.

Benevolent Fund. — Messrs. Bottle, Butt, Borland, Churchill, Greenish, Radley, Richardson, Robbins, Williams, Woolley and Young. To meet at half-past three o'clock on the day preceding the Council meeting.

Law and Parliamentary. — Messrs. Bottle, Butt, Greenish, Hampson, Hills, Robbins, Squire, Symes, Williams, Woolley and Young. To meet as occasion may require.

The President and Vice-President are *ex officio* on all the above committees.

Evening Meetings.—The President, Vice-President, the three Professors, the Editor and the Curator of the Museum.

Freehold Investment Committee.—The President, Vice-President, Treasurer, and Mr. Butt.

Spurious Drugs Committee.

Mr. WILLIAMS asked if it were desirable to appoint a Spurious Drugs Committee.

The President and other members having expressed the opinion that it was necessary to have such a committee ready to act at any time required, the following gentlemen were appointed:—The President, Vice-President, Messrs. Greenish, Hampson, Richardson, Symes, Williams, Woolley and Young, with power to add to their number.

APPOINTMENT OF EDITOR AND SUB-EDITOR OF THE JOURNAL.

Dr. PAUL was re-appointed Editor of the Society's Journal for the ensuing year, and Mr. PASSMORE the Sub-Editor.

APPOINTMENT OF CURATOR.

Mr. HOLMES was re-appointed Curator for the ensuing year.

LOCAL SECRETARIES.

The PRESIDENT said he was informed by the Secretary that the number of towns eligible last year to have a Local Secretary was three hundred and two. This year the number of towns eligible was three hundred and ten, thirteen having been added and five removed from the list. From two hundred and fifteen of them nominations had been received, whilst ninety-five had made no nominations.

The appointment of Local Secretaries was referred to the Library, Museum, Laboratory and House Committee for consideration and report.

THE NORTH BRITISH BRANCH.

Mr. J. B. STEPHENSON was unanimously re-elected Honorary Treasurer to the North British Branch.

Mr. P. MACEWAN was re-appointed Secretary to the Branch.

REPORTS OF COMMITTEES.

LIBRARY, MUSEUM, LABORATORY, AND HOUSE.

The report of the Committee was read.

Librarian's Report.

This report of the Librarian had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
April	Day	701	35	16	28
	Evening	203	16	4	9

Circulation of books.	Town.	No. of Entries. Country.	Total.
April	181	116	297

Carriage paid, £1 10*s.* 10½*d.*

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Canning (W.), The Chemists' and Dispensers' Vade Mecum, 1882. From the COMPILER.
Collin (Eug.), Recherches sur l'Origine et la Nature de la Rhubarbe de la Chine, 1882.
— Revue des Médicaments Chimiques, 1882.
— Revue des Médicaments d'Origine Végétale, 1882.
— Des avantages que peut offrir l'Emploi du Microscope pour l'Analyse des Denrées Alimentaires, 1883. From the AUTHOR.
Hérail (J.), Les Fumariacées, thèse, 1883. From the AUTHOR, through Prof. SOUBEIRAN.
City of Boston, Report of Inspector of Vinegar, 1883. From Dr. B. F. DAVENPORT.
Nicklès (Adr.), Notes Linguistiques à propos du Recueil des Travaux du Bureau Ethnologique publié par la Smithsonian Institution à Washington. From the AUTHOR.
Méhu (C.), Remarques sur les Variations de la Composition du Sperme. From the AUTHOR.
Brozowsky (W.), Waarenkunde, 1869.
Nieuw Tijdschrift voor de pharmacie in Nederland, Jan.–April, 1883.
Parrish (E.), Treatise on pharmacy, 4th ed., 1874. From Dr. JUL. MOREL.
Mueller (F. v.), Systematic Census of Australian Plants, part 1, Vasculares, 1882. From the VICTORIAN GOVERNMENT, through the AUTHOR.

The Committee approved of the purchase of two more copies of British Pharmacopœia, and also recommended that two copies of the undermentioned work be purchased:—

United States Dispensatory, 15th ed., 1883.

Curator's Report.

The Curator had reported that the attendance in the Museum during the month of April had been:—

	Total.	Highest.	Lowest.	Average.
Morning	546	36	5	20
Evening	115	10	2	5

The following donations to the Museum had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimen of Green Ginger. From Dr. SYMES, Liverpool.
Specimens of Cinchona barks cultivated in Ceylon, with herbarium specimens of *C. officinalis*, *C. succirubra*, *C. Ledgeriana* and a *hybrid Cinchona*. Forwarded through HER MAJESTY'S SECRETARY OF STATE FOR THE COLONIES.

A series of duplicate specimens of medicinal plants had been forwarded to the York Chemists' Assistants' Association; labels had also been supplied to the Leeds School of Medicine, and to Mr. Martindale.

The Professors had attended and reported satisfactorily on their respective classes.

The Committee had considered the working of the bye-law relating to payments in commutation of arrears of subscriptions, and it was deemed desirable that the amount should not as a rule exceed two guineas; but if in any case the Secretary considered a larger amount should be paid, the particulars of the case should be submitted to the Finance Committee.

The President, in pursuance of a resolution of the Council, had sent a letter to Mr. Mundella on the subject of the Medical Acts Amendment Bill, with special reference to the Pharmacopœia, in which he had asked if Mr. Mundella would receive a deputation on the subject. Mr. Mundella had replied, saying, that as it was not proposed to alter the Bill he did not think it worth while for a deputation to attend, but he should be happy to see the President after the Whitsuntide holidays. The Committee had thereupon desired the President and Mr. Hampson to arrange for an interview, and if they thought it expedient to issue to Local Secretaries and others circulars and forms of petition to the House of Commons.

The Committee had also considered the form of amendment to the Medical Bill which it was desirable should be proposed in the House of Commons.

The Council went into committee and discussed the action to be taken with regard to the Medical Acts Amendment Bill.

On resuming, it was moved by Mr. Schacht and seconded by Mr. Churchill, that the paragraph of the report referring to the fine to be imposed on members seeking re-admission be referred back to the Committee for reconsideration.

The motion was lost by a large majority, and the report and recommendations of the Committee were received and adopted.

FINANCE.

Messrs. Butt, Carteighe, Hills and Schacht had acted as a Finance Committee, and examined the receipts and accounts sent in during the month, which were recommended for payment.

The report and recommendations were adopted.

Freehold Investments.

The Council went into committee to consider a proposal for purchasing freehold ground rents.

On resuming, the report was received and adopted.

BENEVOLENT FUND.

The President, Treasurer, and Mr. Butt had considered an application for relief from the widow of a registered chemist and druggist (who had been in business twenty-three years), and recommended that a grant of £10 be made.

The recommendation was adopted.

Pharmacopœia Revision.

The Council then went into committee to consider a communication from Mr. Miller, the Registrar of the Medical Council, enclosing a printed memorandum from the Chairman of the Pharmacopœia Committee of the Medical Council, which was laid before the Council at its meeting on the 23rd inst. (see before, p. 963). After a long discussion it was resolved that the receipt of the communication should be acknowledged, and that Mr. Miller be informed that it had been submitted to the Council.

The Sessional Address.

On the suggestion of the President it was remitted to the Library, Museum, Laboratory and House Committee to arrange for the delivery of the Sessional Address in October next.

The Pharmacy Act Amendment Bill.

Resolutions and communications in reference to this Bill had been received from various associations and individuals, and were remitted to the Law and Parliamentary Committee.

Preliminary Examination.

The Council resolved to accept the following Certificates in lieu of the Society's Preliminary Examination:—

Royal University of Ireland:—
- Matriculation.
- First University Examination.
- Second University Examination.
- Examination for a degree in Arts.

Provincial Transactions.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION.

Pharmacopœia Revision.

A meeting of the Council of this Association was held on Friday evening, June 1, to consider a communication from the Chairman of the Pharmacopœia Committee of the General Medical Council, inviting suggestions respecting the proposed new edition of the British Pharmacopœia. After full discussion, the following resolution, proposed by the Chairman and seconded by Mr. A. H. Jackson, B.Sc., was carried unanimously:—

"That whilst thanking the Pharmacopœia Committee for the opportunity afforded to the Manchester Chemists and Druggists' Association to offer suggestions regarding the proposed new edition of the British Pharmacopœia, this Council is of opinion that for the full appreciation and useful application of such suggestions as the Association might be able to make, it is essential that the Pharmacopœia Committee should include representatives of pharmacy, and it therefore awaits such an alteration in the constitution of the Committee as will give to pharmacy and pharmacists a recognized position therein."

The Secretary was instructed to forward a copy of this resolution to the Registrar of the General Medical Council and also to the *Pharmaceutical Journal* for publication.

Arrangements were made for obtaining signatures to a petition for presentation to the House of Commons in support of the memorial addressed by the Council of the Pharmaceutical Society to the Privy Council, urging the importance of establishing a Pharmacopœia Committee containing pharmacists as well as medical practitioners.

A deputation was also appointed to wait on one of the members of Parliament for the city soliciting his support.

Proceedings of Scientific Societies.

SOCIETY OF CHEMICAL INDUSTRY.

Chemistry and Analytical Examination of Fixed Oils.*

BY ALFRED H. ALLEN.

(*Continued from page* 1009.)

The oils of class D exemplify the generality of composition of products of the most varied origin, oils from seeds, fruits, and the fat of both terrestrial and marine animals having practically identical saturation-equivalents. A slight but well-defined distinction is observable between these oils and those of class E. The results yielded by pilchard and cod oils require verification, but the figures referring to rape and castor oils have been fully confirmed by Mr. L. Archbutt. Evidently, their high equivalents are a consequence of their chief constituents being the glycerides of brassic and ricinoleic acids respectively. The calculated equivalent of the glyceride of brassic acid, existing in the oil from rape and other cruciferous seeds, is 322·67, while that of ricinolein contained in castor oil is 310·67.

In drawing conclusions from the results obtained by Kœttstorfer's process, it must not be forgotten that many of the oils of commerce contain a very sensible quantity of free acid, the presence of which, if not duly taken into account, may seriously invalidate the analysis. The free acid may be sulphuric or other foreign acid, in which case it should be removed by agitating the oil with a dilute solution of sodium carbonate before taking the known quantity for saponification. More frequently the free acid of commercial oils consists of oleic or other fatty acid, either liberated by the method employed for refining the oil, or resulting from the fermentative action

* Paper read before the London Section of the Society.

of mucilaginous or albuminous matters in the crude oil. The proportion of free acid present in commercial oils is often very large, far larger than, I believe, is commonly supposed. Thus, six samples of palm oil contained respectively 12, 21, 24, 52, 53 and 79 per cent. of free acid, calculated as palmitic acid. In fifty-five samples of olive oil intended for lubricating use, Mr. Archbutt found from 4·9 to 23·8 of free (oleic) acid, the mean being 10·5. In porpoise oil, which has been brought home in contact with the blubber, and which had drained therefrom at the ordinary temperature, I found 9·02 per cent. of free oleic acid, and in oil (from the same cargo) extracted by boiling the blubber with water, the free acid amounted to 22·65 per cent. In rape oil the proportion of free acid is generally less, ranging from 2 to 5 per cent. Cotton-seed oil, which is refined by means of alkali, is usually free from any trace of free acid.

The presence of free acid in an oil is doubtless the main, if not the only, cause of its tendency to act on metals. Hence the results published by Mr. W. H. Watson and others, showing the amounts of iron and copper dissolved in equal times by different oils, have no interest or meaning apart from the particular samples of oil examined, the action on the metals being simply a function of the free acid the oils happened to contain.

Interesting results can be obtained by exposing different samples of oils in small metal cups or shallow depressions turned out of metal plates; or the oils may be placed in small porcelain dishes, and coils of bright iron or copper wire immersed in them. When copper is employed, in the course of a day or two many samples of oil acquire a bright green colour from dissolved oleate of copper. The results are only rough, as the brown colour of many samples wholly conceals the green tint. But if the oils be shaken with ether and dilute sulphuric acid, the copper passes into the acid liquid. On separating this from the ethereal layer and adding excess of ammonia, the depth of the blue coloration produced is a fairly accurate measure of the action of the oil on the copper. This method of procedure, which was devised by Mr. L. Archbutt, is capable of being applied quantitatively, and gives very useful comparative results when employed under constant conditions.

Several rough but more or less tedious methods have been described for detecting and estimating free fatty acids in oils, but the simplest and best, and one which readily yields accurate quantitative results, is as follows:—Weigh into a 10 oz. bottle 50 grams of the sample of oil to be tested, and add to it 100 c.c. of redistilled methylated spirit, containing a little phenolphthalein, and previously treated with just sufficient caustic alkali to render it faintly pink. The oil and spirit are then shaken together, when, if the sample be free from rancidity, the pink colour will remain unchanged. If it be destroyed, standard caustic soda is cautiously added and the mixture again shaken, the addition of alkali being continued until a pink colour is obtained, which persists after vigorous shaking. It is easy to read to a single drop of normal alkali, each c.c. of which corresponds to 0·282 grams or 0·564 per cent. of free oleic acid in the sample. The reaction is as definite, and the neutralization point as easy to perceive, as in the titration of mineral acids; but owing to the very high combining weight of the fatty acid, great care is necessary. In assaying palm oil, which is itself often of a rose-red colour, the titration may still be made by employing a smaller quantity. In this case 5 grams of the oil and 20 c.c. of spirit are convenient quantities, and the bottle should be placed upon a white surface. It might be supposed that the proportion of free fatty acid found would be liable to be in excess of the true amount present, owing to the alkali having a tendency to partially saponify, and therefore be neutralized by the neutral oil; but this suspicion is negatived by the fact that an oil once freed from acid by the process of titration, when again treated shows no trace of free acid.

Before leaving the subject of free acid in oils I may point out that I believe that many cases of so-called "clogging" or "gumming," commonly attributed to oxidation of oils, are really due to the action of the free acids on the metal bearings of the machinery, with consequent production of soaps. One notable instance of this sort, communicated to me by Mr. Archbutt, is that of a very viscous oil which came out of a carriage axle-box. After removing a good deal of hair and dirt, the clarified oil was very green in colour, and still viscous. On shaking with ether and dilute acid the metals were readily removed, and on distilling off the ether the residual oil was found to have the same colour and viscosity as the original oil before use. In the acid liquid much copper and zinc were found. The oil was a mixture of 1 part of neutral mineral oil with 9 of olive oil containing 4·7 per cent. of free acid. It had probably been in the bearing about three weeks, yet no corrosion was "noticed." But corrosion of bearings by oils rarely is noticed, the fact seeming to be that the wear and tear of the metal and the thickening of the oil has been attributed to other causes. Liquid oils appear to corrode metals very evenly, so that the effect is not readily observed, but with solid fats it is very different. Thus, a steel rod which was immersed in axle-grease made with soap, water, tallow and palm-oil, containing a good deal of free acid, was deeply pitted in several places in a few days, and stained all over. The pittings were quite deep, and the grease after use contained only 2·8 of free palmitic acid.

The question of the action of free fatty acids on metal becomes still more important in the case of oils used for lubricating engine cylinders, or otherwise exposed to a high temperature. Under the influence of high-pressure steam all the ordinary fat oils undergo decomposition more or less readily, with formation of free fatty acids and glycerin, and the action of the acids on the metal speedily produces an iron soap which clogs up the machinery in a very troublesome manner. It is a curious fact that the iron and magnesium soaps, and some other metallic compounds of the fatty acids, are soluble in hydrocarbon oils, though insoluble in water, the reverse being the fact with the soaps of the alkali metals. As a consequence of this, the iron soap produced in engine cylinders lubricated with tallow, castor oil, or other fat oils, gets dissolved out whenever a change is made to a mineral lubricating oil, a fact which is well known to engineers, but which has sometimes been mistaken for an abundant production of gummy matter by the mineral oil itself.

Returning for a moment to Kœttstorfer's saturation process, it is evident that the presence of any foreign matter, incapable of undergoing saponification, or otherwise neutralizing alkali, would tend to reduce the proportion of alkali required. Hence, if the nature of the oil under examination were known, the abnormal result of the titration would enable the presence of the foreign matter to be inferred, and its amount approximately estimated. But the process would give no further indication of the nature of the admixture, and hence it is frequently desirable to effect an actual separation of the adulterant or admixture from the products of the saponification of the oil itself. This can be done with great ease and accuracy by a process which I have described in detail elsewhere,* the capabilities of which have been thoroughly tested in my own laboratory, and which has given results equally satisfactory in the hands of other chemists.

The process in its most generally applicable form consists in saponifying the oil by alcoholic potash, evaporating off the alcohol, dissolving the soap in water, and removing the unsaponifiable matter by repeatedly agitating the solution with ether.† On separating the

* *Chemical News*, 44, 161.

† It is very rarely that the third treatment with ether extracts more than traces of unsaponifiable matter. The

ethereal layer from the aqueous liquid, evaporating off the ether, the residual unsaponified matter may be weighed and submitted to further examination. The following table indicates the chief probable constituents of the aqueous and ethereal layers on saponifying various fatty matters:—

Dissolved by the Ether.	*Remaining in the Aqueous Liquid.*
Hydrocarbon oils, including	Fatty acids } In the form of potassium salts.
Shale and petroleum products.	Resin acids
Resin oil.	Carbolic and
Coal-tar oil.	Cresylic acids
Vaseline.	
Paraffin wax and ozokerite.	Glycerin.
Neutral resins.	
Unsaponified oil or fat.	Excess of caustic alkali.
Unsaponifiable matter, as cholesterin.	
Myricyl alcohol, from beeswax	
Cetyl alcohol, from spermaceti.	
"Spermyl alcohol," from sperm oil.	
Colouring matters, as from palm oil.	

Of the bodies which pass into solution in ether, the hydrocarbon oils are of course intentional admixtures, and hence may vary from a trifling proportion up to a very large percentage; but when a pure animal or vegetable oil is subjected to the process, mere traces of non-volatile matter commonly pass into the ethereal solution. As a rule, the ethereal residue is under 1 per cent. of the weight of oil employed, and it very rarely exceeds 1·5 per cent. Its nature depends chiefly upon the character of the oil examined. Thus, in the case of palm oil, some of the red colouring matter is found in the ethereal extract. Butter and cod-liver oil give ether-residues which consist mainly of cholesterin, which may be obtained in characteristic crystalline tablets by warming the ethereal extract with alcohol and allowing the solution to cool.

The waxes, as a class, are well known to differ from the true fixed oils or fats, in the fact that they are not ethers of glycyl, and hence do not yield glycerin on saponification, but, on the other hand, furnish fatty acids and certain higher monatomic alcohols of the ethyl series. Thus, on saponifying beeswax, myricyl alcohol, $C_{30}H_{62}O$, is obtained; Chinese wax yields ceryl alcohol, $C_{27}H_{56}O$; while spermaceti gives cetyl alcohol, $C_{16}H_{34}O$. In the course of an investigation as to the accuracy of the process of saponification and ether-treatment for estimating hydrocarbon oils in fatty oils, I was struck with the anomalous results yielded by sperm oil. Samples of oil from several different sources, in some cases obtained direct from the importer, and of undeniable authenticity, yielded proportions of ether-residue very different from those obtained from the majority of fatty oils. Thus, while, as already stated, ordinary oils yield at most some 1 or 2 per cent. of matter to ether, sperm oil gave ether residues varying from 38 to 42 per cent., the fatty acids ranging from 60 to 65 per cent., instead of fully 95, as in the case of other fatty oils. This startling result was fully borne out by the results obtained when using Kœttstorfer's process for the examination of sperm oil, the proportion of alkali neutralized being much less than in the case of ordinary oils. Of course the analytical results yielded by sperm oil pointed to a very different constitution from that of ordinary oils, a fact which was observed by Chevreul as long ago as 1823, who writes of sperm oil as yielding, by saponification, margaric acid, oleic acid, and "a non-acid fatty matter fusible at about 20°, which appears to be a congener of ethal"—the monatomic alcohol of spermaceti.*

From these results it appears probable that sperm oil ought to be classed with the waxes rather than with the true fixed oils. Until recently sperm oil was the only natural product known to me which was fluid at ordinary temperatures and yet had a constitution apparently similar to that of the waxes; but during the last autumn I was called on to make an examination of the oil from the bottle-nose whale, several cargoes of which have been recently disposed of. The blubber is brought home in tuns, and the oil is extracted from it in the ports on the eastern coast of Scotland by boiling with water, heated by means of steam. The oil is run off and allowed to stand so that the water may separate. On cooling to about 10° C. it gives a notable quantity of "foots" or deposit. This "foots" consists in reality of crude spermaceti, and a sample which I examined yielded me 60 per cent. of the refined wax. I have also a specimen, broken off a large cake, of very finely crystallized spermaceti, which was extracted from bottle-nose oil by a well-known firm. I may here remark that the statement often met with in books that spermaceti is found simply in the head cavities of the sperm whale is a mistake, the fact being that it is obtained from the oil of the blubber and all parts of the body whenever there is a sufficient reduction in the temperature. Specimens of sperm oil and bottle-nose oil, which are quite clear at 10° C., give a further deposit of spermaceti at a lower temperature, but the separation appears to be almost wholly complete at 4° C. The oil from the bottle-nose whale gives, on subjection to saponification and ether extraction, results almost absolutely identical with those yielded by the oil from the true sperm whale, the ether residue varying from 38 to 41 per cent., and the fatty acids from 60 to 65 per cent. In viscosity, behaviour with sulphuric acid, and in fact generally, bottle-nose oil gives results practically identical with sperm oil. It is, however, worthy of remark that the blubber of the sperm whale is commonly boiled down for extraction of the oil immediately after the death of the animal, whereas the bottle-nose oil which has hitherto appeared in the market has been prepared by boiling the blubber after it has arrived in England, and when it has undergone more or less putrefactive change. As a consequence, commercial bottle-nose oil commonly contains from 1 to 2 per cent. of free fatty acid, which causes it to act somewhat vigorously on copper, but when properly refined this objectionable tendency is wholly removed. Such oil would appear likely to prove a very valuable substitute for sperm oil. At the same time it is worthy of attention that in certain cases in which sperm and bottle-nose oil are said to have been used under strictly parallel conditions, the bottle-nose oil has been found defective, but the oil thus found wanting had undergone no refining beyond simple filtration, and was probably more or less rancid. Besides, there is the significant fact that bottle-nose oil has been extensively mixed with or substituted for sperm oil without acknowledgment, and yet the users do not appear to have found fault with it.†

The exact nature of the ether extracts from saponified bottle-nose and sperm oils is an interesting subject for future investigation. The two products differ slightly in fusibility, but appear to be almost identical. They distil at a high temperature, apparently without decomposition, and condense to a liquid as colourless as water, which, on cooling, forms a white crystalline solid. From the ether

fact that repeated treatment is requisite at all is probably due to the very considerable solubility of ether in solutions of soap. Petroleum spirit and chloroform do not readily separate from alkaline liquids.

* *Recherches Chimiques sur les Corps Gras d'Origine Animale*, p. 238.

† The curiously-close resemblance in the chemical and physical characters of sperm and bottle-nose oils renders their anatomical relationship of interest. Huxley classes the true sperm whales (*Physeter*) and the bottle-nose whales (*Hyperoodon*) in the same family of *Physeteridæ*; the dolphin, porpoise, grampus and narwhal belonging to a separate family (*Delphinidæ*).

residue of bottle-nose oil I have obtained a body giving on combustion figures agreeing fairly with the formula $C_{12}H_{26}O$, but this is not the only substance present.*

The oils from the sperm and bottle-nose whales having yielded such curious results, it appeared of interest to ascertain the chemical nature of the oils from other cetaceans. As a preliminary guide the specific gravity of the oil is a useful indication, for while the great majority of fixed oils have a density exceeding ·914, sperm and bottle-nose whale oils show a density of about ·880 only, and hence the gravity may be regarded as showing whether the oil is a glyceride or a liquid wax. On applying this test, it is found that northern and southern whale oils and porpoise oil have a density of fully ·920, and on saponification they yield about 95 per cent. of fatty acids, and only 1 per cent. or so of ether residue. They may therefore be safely regarded as triglycerides. There are, however, two oils known in the market as "shark-liver oil" and "African fish oil." In the former case the name sufficiently indicates its origin, but I am not certain of the animal or animals which yield the latter oil. The basking-shark or sunfish (*Squalus maximus*) is the species from which shark oil is most commonly obtained. As far as I have at present ascertained, "African fish oil" has a constitution similar to that of shark-liver oil. These two oils are fully as light, and even lighter, than sperm and bottle-nose oils. Although in the case of shark-liver oil, at any rate, the oil is not derived from a cetacean, I fully expected it would prove to have a constitution similar to that of sperm and bottle-nose oils. I am not yet prepared to say anything definite respecting it, for the simple reason that it has hitherto resisted every attempt to saponify it. I have tried to effect its decomposition by aqueous potash, by a solution of potash in absolute alcohol, by heating it with solid potash to 200° C., and by treatment with moderately strong sulphuric acid. In some cases the experiments have been made under the ordinary atmospheric pressure, and in others in sealed tubes at temperatures varying from 100° to 150° C. So far I have been unsuccessful; at least the shark oil has yielded over 80 per cent. of unsaponifiable matter to ether. Whether this result be due to the remarkable difficulty of saponifying the oil remains to be seen; but I am inclined to suspect the anomalous behaviour to be due to quite another cause, namely, that the oil consists in large proportion of a body allied to cholesterin, but fluid at ordinary temperatures. That an oily liquid obtained from the liver of an animal should contain a large proportion of a cholesterinoid body is not on the face of it improbable.

(*To be continued.*)

* Cetyl-alcohol produced by the saponification of spermaceti contains $C_{16}H_{34}O$; but there is some evidence that lower and higher homologues are also present. Similarly, the alcohol from bottle-nose oil appears to consist chiefly of $C_{12}H_{26}O$. At the time I read this paper I imagined the discovery of this alcohol, and of the constitution of bottle-nose oil, to be new, but my attention has since been called by Mr. W. H. Deering, to the researches of Scharling, who in 1847 described the oil as consisting mainly of the doeglate of doeglyl, having the composition $C_{12}H_{25},C_{19}H_{35}O_2$. This formula corresponds curiously closely with the proportions of ether residue and fatty acid yielded by the saponification of bottle-nose oil. I intend to make a further examination of the constituents of sperm and bottle-nose oils.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At the Annual Meeting of this Association held on Wednesday, May 16, the following Report of the Council for the session ending April 30, was read and adopted.

REPORT.

"The Council has pleasure in presenting the Annual Report of the sixth session. The Association numbers 90 ordinary and 17 honorary members, 55 new members having been enrolled du-ing the session, showing an increased numerical strength of 29 for the current year.

"It is gratifying to note, that the financial position of the Association is highly satisfactory, as will be seen by the accompanying balance sheet.

"Your Council perceives with satisfaction that the departure from the custom of past sessions and the adoption of more frequent meetings have realized its most sanguine expectations; it is enabled to chronicle 22 ordinary meetings, with an aggregate attendance of 508 being an average of 23.

"The issuing of the programme in two parts (Octob and January) has also proved advantageous, and with one exception the papers have been contributed by members of the Association, as follows:—W. Elborne, H. H. Millhouse, F. H. Alcock, H. Cracknell, R. Winfrey, C. E. Stuart, B.Sc., W. A. Wrenn, W. T. Cooper, jun., C. Thompson, C. E. Palmer, C. L. Wyatt, W. R. Dodd, R. W. Giles.

"Five social meetings have also been held, and an evening devoted to the discussion of a resolution approving in the main of the Draft Pharmacy Acts Amendment Bill.

"A Conversazione held at St. James's Hall in November was well attended, and the Annual Dinner held in February, under the Presidency of Michael Carteighe, Esq., supported by Dr. Langdon Down and several leading pharmacists, was successful in a marked degree.

"Your Council, taking into consideration the expense incurred each session by hire of pianoforte, has thought it wise to purchase one, and trusts this addition will be fully utilized and appreciated.

"In conclusion, your Council tenders its sincere thanks to the authors of papers, and to all those who have in any way contributed towards making the session so successful. The primary object of the Association has been in a large degree attained, and it is hoped the incoming Council will receive that support from members generally which will enable it to maintain and augment the usefulness of the Association."

The following gentlemen were elected members of the Council for the ensuing year:—Messrs. F. A. Alcock, J. O. Braithwaite, W. T. Cooper, jun., H. Cracknell, W. R. Dodd, J. H. Hartridge, H. H. Millhouse, C. Parkinson, T. F. Perkins. G. S. Snow, C. Thompson, R. Winfrey, and W. A. Wrenn.

Obituary.

Notice has been received of the death of the following:—

On the 3rd of February, Mr. Nicholas Curry, Chemist and Druggist, Spennymoor, Durham. Aged 24 years. Mr. Curry was an Associate in Business of the Pharmaceutical Society.

On the 15th of May, Mr. William Waples Leete, Chemist and Druggist, Herne Hill. Aged 46 years.

On the 20th of May, Mr. Charles Hadfield, Chemist and Druggist, Mill Street, Macclesfield. Aged 68 years.

On the 20th of May, Mr. Thomas Thompson, Pharmaceutical Chemist, Market Place, Richmond, Yorkshire. Aged 61 years. Mr. Thompson had been a Member of the Pharmaceutical Society since 1850.

On the 24th of May, Mr. William Hutchings Brooks, Chemist and Druggist, Shadwell, E. Aged 49 years. Mr. Brooks had been a Member of the Pharmaceutical Society since 1869.

On the 27th of May, Mr. John Hampton Davies, Chemist and Druggist, Kensington, Liverpool. Aged 38 years.

On the 27th of May, Mr. George Henry White, Chemist and Druggist, Mountain Ash, Glamorganshire. Aged 44 years. Mr. White had been a Member of th Pharmaceutical Society since 1870.

Review.

THE MEDICAL MAN'S HANDY BOOK. Edited by WILLIAM SHEPPERSON. London: J. and A. Churchill.

This is a little compilation for which we see no *raison d'être*. The bulk of the book is made up of a list of incompatibles and a table of doses. Thrown in with these are three tables from Barber and one from Attfield, a posological table for different ages, and some antidotes to poisons.

Mere lists of incompatibles are simply useless. A knowledge of incompatibility should depend upon a knowledge of the principles on which incompatibility depends, and it is often the case that those things which are put down by an author as incompatible are designedly brought together by the medical man who knows his work. Thus in Mr. Shepperson's table we find that "hydrargyri perchloridum corrosivum" is incompatible with iodide of potassium. We venture to say thousands of gallons of mixture containing these two substances are during the year prescribed, and advisedly prescribed, by medical men. What does it matter to the prescriber if iodide of potassium and perchloride of mercury give a red precipitate when mixed in certain proportions? He knows that when mixed in the proportion in which he always prescribes them they will form a clear solution and that that solution has a definite effect. The following are singularly useless statements of incompatibility:—"Cassia fistula with alcohol;" "camphora with strong sulphuric and nitric acids;" "ferri sulphuretum with acids which unite with iron;" "sulphur with boiling solution of soda;" "benzoinum with the acids and alkalies;" "cannabis indica with waters and watery infusions." The author surely does not mean that no preparation of cannabis indica can possibly be prescribed in a watery vehicle.

Another absurdity in the book is making some antidotes absolute which are simply retardants. Thus vegetable astringents are given, without qualification, as antidotes for antimony and its salts, and hydrated peroxide of iron (recently made) for arsenic and its compounds. Soon after this we are told to use the stomach pump for barium and its salts. The only inference to be drawn from this is that a cup or two of tea is all that is required in antimony poisoning and that doses of ferric hydrate given freely destroy the poisonous activity of arsenic.

The table of doses looks useful from the fact that doses of unofficial drugs are given; but its value is greatly impaired by the fact that the strengths of the unofficial preparations, such as tinct. lactucarii, tinct. gelsem. semper., etc., are not given with the doses. The full dose of croton chloral is given as 3 grains. We have much more frequently seen 10 grains prescribed.

The pill excipients are not worthy of notice, excepting perhaps that ung. resinæ is recommended as a pill excipient for ferri et quin. cit. Altogether the book is fairly harmless, but absolutely useless to any pharmacist worthy of the name. It is addressed to medical men, and the editor expresses a hope that it "may find a place among other books of reference on the consulting-room table." We can only hope that our own family doctor's knowledge is not of such a kind that he has to run to a production like this for information.

BOOKS RECEIVED.

LECTURES ON PRACTICAL PHARMACY. By BARNARD S. PROCTOR. Second Edition. London: J. and A. Churchill. 1883. From the Publisher.

THE VEGETABLE MATERIA MEDICA OF WESTERN INDIA. By W. DYMOCK. Part I. London: Trubner.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF BUTTER OF ANTIMONY.

Sir,—In your issue of June 2, I observe an editorial note calling attention to the case of poisoning by butter of antimony, recorded by me in the *Lancet*, of May 19, in which death followed within two hours after the poison was swallowed.

In the report of the case, I ventured to call attention to the importance of restricting the sale of this corrosive fluid, and mentioned the fact that it was not scheduled under the "Poisons Act." Since then I have been in communication with Mr. Mundella, in reference to the subject, and I have every reason to believe that although as you remark "the Privy Council has recently refused to sanction its introduction into the second part of the schedule," my suggestion will be carefully considered, and probably adopted.

Under present circumstances, it is possible for a farm labourer to purchase for a few pence a sufficient quantity of this dangerons article to poison a mistress or illegitimate child, if he be so disposed, under the pretext of using it for "foot rot" in sheep.

It is a "dynamite" of its own for evil purposes, and may easily be administered to murder unsuspecting persons, in milk, gruel, tea or treacle without their being sensible of its deadly properties.

R. BARRINGTON COOKE,
Consulting Surgeon, Royal Northern Sea Bathing Infirmary.
Scarborough.

THE PURITY OF SODIUM NITRITE.

Sir,—In the "Month," in your last week's issue, you quote, from the *Practitioner* for March, some remarks of Dr. Matthew Hay on the purity of sodium nitrite, which he recommends for angina pectoris. Dr. Hay states that he has some difficulty in obtaining the salt pure, that even when obtained from a London manufacturer of the highest eminence he only found it to contain 33 per cent. of nitrite, and that another specimen only contained a trace.

This experience is the more remarkable because as a matter of fact sodium nitrite is one of the purest salts to be met with in commerce. I buy and use many tons annually and have no difficulty in obtaining it guaranteed to contain 98 per cent. of real nitrite, the 2 per cent. of impurity consisting chiefly of moisture.

Dr. Hay says that the purity of the salt is easily estimated by means of a standard solution of permanganate of potassium. This is, of course, perfectly true, but the estimation gives unreliable results if certain essential precautions, which will readily suggest themselves to the experienced operator, are not taken into account. Even supposing, however, the possibilty of error in the estimation, this will hardly account for the presence of only a mere trace.

With reference to the contemplated new edition of the Pharmacopœia, and considering the purity and cheapness of sodium nitrite as now met with in commerce, I suggest the return to the old process of making spirit of nitrous ether from it as giving better results and presenting other advantages over the present B.P. process.

CHARLES EKIN.

"Inquirer."—(1) *Cardamine pratensis*; (2) Probably *Cochlearia angelica*: send lower leaves; (3) Send another specimen; (4) *Vicia sativa*; (5) *Lathyrus macrorrhizum*; (6) *Asperula odorata*; (7) Send a better specimen, in fruit; (8) *Ballotta fœtida*, probably: send a specimen in flower; (9) *Lotus corniculatus*; (10) *Polygala vulgaris*; (11) *Viola tricolor*; (12) Send a specimen, in flower.

R. Roberts.—Nos. 1 and 2 are named correctly; No. 3 is *Saxifraga granulata.*

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Postans, Davies, Summers, N.D.

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 838.)

Oleum Morrhuæ, U.S.P.; Oleum Jecoris Aselli, P.G.—The U.S.P. permits the use of oil derived from other species of *Gadus* besides *G. Morrhua*, L., but without specifying their names. The P.G., on the other hand, gives only *G. Morrhua* as the source of the oil, omitting the other species named in the last edition. The P.G. does not give the sp. gr., but in the U.S.P. it is given as 0·920 to 0·925. With nitric acid the oil should give a purple colour changing to brown. It is said that seal oil has lately been largely used to adulterate cod liver oil, and a test for detecting the presence of it would be desirable in any future Pharmacopœia.

Oleum Myrciæ, U.S.P.—This oil, which forms the chief ingredient in bay rum, is obtained from the leaves of *Myrcia acris*, and is described as a brownish or dark brown liquid, with an aromatic, somewhat clove-like odour and a slightly acid reaction; sp. gr. 1·040. It should be soluble in half its weight of alcohol and form a semi-solid mass with a concentrated solution of potash.

Oleum Myristicæ, U.S.P.; Oleum Macidis, P.G.—The U.S.P. directs that it be obtained from nutmeg and the P.G. from mace, the fatty oil known in this country as oil of mace being the "oleum nucistæ" of the P.G. It should be remembered, therefore, by English pharmacists, that "oleum macidis," when occurring in a German prescription, refers to the volatile oil.

Oleum Nucistæ, P.G.—The P.G. gives as a test of its purity that caustic ammonia should not give a reddish, or, if any, only a slight brownish colour to the pale yellowish tincture made by heating the oil with ten times its weight of spirit and subsequently cooling it. This appears to be intended to detect turmeric, with which an artificial product might be coloured.

Oleum Olivæ, U.S.P.; Oleum Olivarum, P.G.—Both Pharmacopœias give the same sp. gr., 0·915 to 0·918. The elaidin test by which cotton seed and other oils giving a coloured mass with nitric acid may be detected is given. Under *Oleum olivarum commune*, the P.G. gives a test which is apparently intended to detect the presence of crude rape oil. This consists in strongly shaking 5 grams of the oil with 2 drops of sulphuric acid, when the mixture should have a greenish colour, which when the vessel is immersed in boiling water should not turn to black.

Oleum Rapæ, P.G.—Refined rape oil is apparently intended, since unrefined oil would become bluish-black when the sulphuric acid test is applied.

Oleum Picis Liquidæ, U.S.P.—The sp. gr. should be about 0·970, and the oil should be readily soluble in alcohol and have an acid reaction.

Oleum Ricini, U.S.P. and P.G.—The sp. gr. should be 0·950 to 0·970. The U.S.P. states that it should be soluble in an equal weight of alcohol. According to the P.G., it should be soluble in 1 to 3 parts of spirit. Three grams of castor oil mixed with 3 of bisulphide of carbon, and shaken with 2 grams of castor oil for a short time, should not give a blackish brown colour.

Oleum Rosæ, U.S.P. and P.G.—The P.G. does not refer the oil to any particular species; the U.S.P. refers it to *Rosa damascena*, Mill. The U.S.P. gives the sp. gr. as about 0·860, and the other tests given are chiefly those of Baur ('Pharmacographia,' 1st edit., p. 238). The P.G. directs that, when 1 part is diluted with 5 parts of chloroform and 20 parts of spirit added, the spirituous solution should not redden moistened litmus paper, indicating the absence of solid fatty acids soluble in alcohol.

Oleum Santali, U.S.P.—The sp. gr. is given as about 0·945. The oil is to be derived from *Santalum album*. Although this species yields an oil which has been used in native Indian practice for gonorrhœa, the oil which was recommended by Dr. T. B. Henderson, who appears to have been the first to introduced it into medical practice, was derived from *S. myrtifolium* (*Med. Times and Gaz.*, June, 1865, p. 571).

Oleum Sinapis volatile, U.S.P.; Oleum Sinapis, P.G.—As there is a fixed oil of mustard which is occasionally used in embrocations, the designation used in the P.G. is unfortunate. The U.S.P. requires that on heating the oil to 50° C. (122° F.), in a flask connected with a well-cooled condenser, no liquid having the odour and characteristics of disulphide of carbon should pass over.

Ononidis Radix, P.G.—The time for collection of the root (*O. spinosa*) is now omitted.

Phellandrii Fructus, P.G.—The dimensions of the seeds are now added, and the warning against the use of the sub-globular or ovate fruits of *Cicuta virosa* and *Sium latifolium* is omitted.

Pimpinellæ Radix, P.G.—The roots of *P. magna* and *P. Saxifraga* are still official, but the caution against the use of the root of *Peucedanum Oreoselinum*, Moench, and *Heracleum Sphondylium*, L., is now omitted.

Prinos, U.S.P.—Black alder bark, *Prinos verticillatus*, L., is retained from the secondary list, probably in deference to the esteem in which it is held as a domestic remedy for cutaneous diseases and sluggish ulcers. In spite of its name it bears no relation to the alders, although it grows in similar situations, but is nearly allied to the holly.

Prunus virginiana, U.S.P.—*Prunus serotina*, Ehrh., is now given (*Cerasus serotina*, Lois.), instead of *Cerasus serotina*, Dec., as the name of the tree from which the bark is derived. The bark is to be collected in autumn, at which time it contains more prussic acid (*Amer. Journ. Pharm.*, xxiv., iii.), and gives a darker infusion (*ibid.*, July, 1872, p. 304). The bark of the small branches is to be rejected. The bark from the old wood deprived of its corky layer is admissible. The bark is apt to deteriorate on keeping and is best preserved in a tin box or closed vessel.

Pulsatilla, U.S.P.—Under this name the herb of *Anemone Pulsatilla*, L., *A. pratensis*, L., and *A. patens*, L., var. *Nuttalliana*, Gray, are official. The plants should be collected soon after flowering, carefully preserved, and not be kept longer than one year. This remedy appears to have been borrowed from the homœopaths, although the first-named plant is not official in the Homœopathic Pharmacopœia. The attention which has recently been directed to *A. pratensis* and *A. Pulsatilla*, L. (*Practitioner*, July, 1882, p. 32) may perhaps have led to the adoption of the last-named species.

Pyrethrum, U.S.P.—The root of *Anacyclus Pyrethrum*, D.C., is now adopted from the secondary list and a tincture of pellitory introduced. The German pellitory root, *Anacyclus officinarum*, Hayne, is omitted from the new German Pharmacopœia.

QUILLAIA, U.S.P.—Probably introduced on account of its use in certain skin diseases and as an emulsifying agent for oils and oleoresins, etc. (*Pharm. Journ.*, [3], vol. x., pp. 187, 236).

RESINA, U.S.P.; COLOPHONIUM, P.G.—The U.S.P. gives the melting point as 135° C. (275° F.), and the sp. gr. as 1·070 to 1·080. According to the P.G. the sp. gr. is 1·068 to 1·070. American colophony is specially ndicated in the P.G., although that from other sources is admissible.

RESINA COPAIBÆ, U.S.P.—This should be soluble in alcohol, benzol, or amylic alcohol. Its recommendation by Dr. S. Wilks (*Lancet*, June, 1873), as having certain therapeutic advantages over the oleoresin, may have had some influence in obtaining it a place in the new Pharmacopœia.

RESINA DAMMAR, P.G.—This is new to the German Pharmacopœia, and is given as the produce of *Dammara alba* (*Agathis alba*), *Dammara orientalis*, *Hopea micrantha*, *Hopea splendida*, and other trees of southern India. The powder should not soften at 100° C., but should be easily soluble in ether, chloroform and bisulphide of carbon and less so in spirit and petroleum benzin.

RESINA JALAPÆ, U.S.P. and P.G.—The additional tests now given in the U.S.P. are that it is insoluble in bisulphide of carbon, but that one part is soluble in 50 parts of warmed water of ammonia and that the solution when cooled does not gelatinize and remains clear after being supersaturated with acids. The ammoniacal solution quickly evaporated should leave a residue soluble in water. Similar tests are given in the P.G., except that it is there stated that the resin is soluble in 5 parts of warm solution of caustic ammonia.

RESINA PODOPHYLLI, U.S.P.; PODOPHYLLINUM, P.G.—Although podophyllin is now official in the P.G., the rhizome from which it is derived is not so. The U.S.P. now allows the powdered root to be macerated before percolation for forty-eight hours only instead of four days. The quantity of hydrochloric acid to be used in precipitating the resin has been lessened and the resin is directed to be dried by exposure to the air in a cool place. It gives no description of the resin of podophyllin, but states that it is partly soluble in ether, and the residue when dissolved in solution of potash is precipitated by the addition of dilute hydrochloric acid in excess. No use appears to have been made of Messrs. Power's* or Podwissotzki's† researches on the constitution of podophyllin to improve the process for its manufacture, although they have shown that the portion insoluble in ether has no action on the system and that the pains in the intestine produced by podophyllin are due to podophyllo-quercetin and that podophyllotoxin is the active principle. The P.G. describes podophyllin as a yellow powder or loose friable mass of a yellowish or brownish-grey colour, this latitude as regards appearance being perhaps dependent on the researches of Senier and Lowe and others which showed that the colour is in great measure dependent on the fineness of division of the powder and does not affect the physiological activity of the preparation (*Pharm. Journ.*, [3], viii., 444). According to the P.G., at a temperature of 100° C., podophyllin gradually assumes a darker colour, but does not melt; when shaken with water and filtered it gives a liquid almost free from colour, of a bitter taste, turning brown on the addition of sesquichloride of iron. When solution of subacetate of lead is added to it it assumes a yellow colour and slight opalescence, reddish-yellow flocks subsiding after a time. The yellowish brown solution made by dissolving podophyllin in 100 parts of caustic solution of ammonia does not become turbid when diluted with water, but if neutralized deposits brown flakes. The intensely brown solution made by dissolving podophyllin in 10 parts of spirit throws down greyish-brown flakes on the addition of water. Podophyllin should be only partly soluble in ether and still less so in bisulphide of carbon.

RESINA SCAMMONIÆ, U.S.P.—This is omitted from the P.G., which does not now contain the drug in any form. The U.S.P. remarks that it is entirely soluble in ether and dissolves in solution of potash, and the heated solution is not precipitated by the addition of hydrochloric acid.

RHAMNI CATHARTICÆ FRUCTUS, P.G.—The distinction between the fruits of *R. Frangula* and *R. cathartica* is now omitted.

RHEUM, U.S.P.; RADIX RHEI, P.G.—In both the U.S.P. and the P.G. rhubarb is now stated to be the produce of *Rheum officinale*, Baillon, and other undetermined species, by which and by the accurate description of Chinese rhubarb it may be supposed that the cultivated rhubarbs of commerce are intended to be excluded, although the wording apart from the description would leave the dispenser at liberty to use any rhubarb of unknown source. The "white, elongated meshes," characteristic of Chinese rhubarb, may be sought for in vain in the *Rheum officinale*, as cultivated in this country. The directions forbidding the use of Austrian or English rhubarb are now omitted from the P.G., being apparently deemed superfluous when Chinese rhubarb is directed to be used.

RHUS GLABRA, U.S.P.—The gender of the specific name is now changed from the neuter to the feminine, and a short description of the fruit, which is the part of the plant used, is now given. The drug was in the secondary list in the last edition.

RHUS TOXICODENDRON, U.S.P.—This has been retained from the secondary list of the last edition, where it appeared as *Toxicodendron*. From the P.G. it is now omitted. *R. radicans*, L., which differs in having entire and glabrous leaflets, is also official. The leaves of these species should not be confounded with those of *Ptelea trifoliata*, which have sessile leaflets. The drug is apt to lose its properties when kept.

ROSA CENTIFOLIA, U.S.P.; FLORES ROSÆ, P.G.—The U.S.P. remarks that when it is desired to keep fresh "pale rose" for some time, it may be preserved by mixing it well with half its weight of chloride of sodium, pressing the mixture into a suitable jar, and keeping it well closed in a cool place.

ROSA GALLICA, U.S.P.—Not official in the P.G. In the U.S.P. the petals are now directed to be collected before expanding.

RUBUS, U.S.P.—The bark of the root of *Rubus trivialis*, Mich., as well as of *R. villosus*, L., and *R. canadensis*, is now official.

RUBUS IDÆUS, U.S.P.—The fruit of this species is one of the additions to the United States Pharmacopœia. The closely allied light red fruit of *R. strigosus*, Mich., and the purplish black fruit of *R. occidentalis*, L., may be employed in place of the

* 'Proc. Amer. Phar. Assoc.,' 1877, p. 420; *Amer. Jour. Phar.*, 1878, p. 369.

† *Ph. Journ.*, [3], xii., pp. 217, 1012.

above. The official preparation is a syrup, but it would be scarcely politic to use the purplish syrup of *R. occidentalis* in a mixture in which the red syrup of the other species had previously been dispensed. In any case it would be advisable for the prescriber, in order to prevent doubts arising, to indicate which syrup he intends to be used.

Rumex, U.S.P.—This is retained from the secondary list of the last Pharmacopœia. A description is given, which, it may be supposed, refers only to the root of *R. crispus*, but other species are also now official.

Sabina, U.S.P.—A description is now given, but the time for collection of the tops is not indicated.

Salix, U.S.P.—Other species besides *Salix alba*, L., are now official, but a description is given which may be presumed to apply to the bark of *S. alba* only.

Salvia, U.S.P.; Folia Salviæ, P.G.—The time of collection (before the plant opens its flowers) is now omitted from the P.G.

Sambucus, U.S.P.; Flores Sambuci, P.G.—The flowers of *S. canadensis*, L., are official in the U.S.P., but in the P.G. those of *S. nigra*. The latter should not be of a brown colour.

Sanguinaria, U.S.P.—A fluid extract prepared from the rhizome of *S. canadensis*, L., is now added to the official preparations, and a description of the crude drug is given.

Santalum rubrum, U.S.P.—The drug should not impart any red colour to water when macerated in it. It is to be regretted that the erroneous name of *Santalum* should be perpetuated, more especially as the drug itself is hardly ever ordered in prescriptions, and that there is therefore less reason for the retention of the name.

Santonica, U.S.P.—The botanical source is now stated to be *Artemisia maritima*, var. *Stechmanniana*, Besser, and a description of the drug is given.

Sarsaparilla, U.S.P.; Radix Sarsaparillæ, P.G.—The root of *S. medica*, Schlecht, is now official in the U.S.P. as well as that of *S. officinalis*, Kth., and other species. In the P.G. Honduras sarsaparilla is official, but no botanical source is given. Both Pharmacopœias direct that the rhizome should be rejected.

Sassafras, U.S.P.—A description of the official parts, which are the root-bark and pith, is given. The mucilage obtainable from the pith should not be precipitated by alcohol.

Scammonium, U.S.P.—Ether should dissolve at least 75 per cent. of the drug. Scammony is stated to yield a greenish emulsion when triturated with water.

Scilla, U.S.P.; Bulbus Scillæ, P.G.—*Urginea Scilla*, Steinheil, is now given in the U.S.P., and *Urginea maritima* in the P.G. as the botanical source of the drug.

Scoparius, U.S.P.—Koch is now given as the authority for the botanical name, *Sarothamnus scoparius*, instead of Wimmer, and a description of the twigs is given.

Scutellaria, U.S.P.—A description of the plant, *S. lateriflora*, L., is now given. The drug, which was official in the secondary list of the previous Pharmacopœia, appears to have increased in estimation, since a fluid extract of it is now official. It is highly appreciated as a nervine tonic in domestic medicine in the United States, and by herbalists in this country.

(*To be continued.*)

RECENT PROGRESS IN THE OZOKERITE INDUSTRY IN THE EAST.*

BY E. SAUERLANDT.

Ozokerite or mineral wax frequently accompanies petroleum, and traces of it are found in many places in Eastern and Western Galicia, and in the Caucasian and American petroleum territory, but it is rarely found in such quantities as to furnish a remunerative source of this valuable mineral. It is highly probable that many more workable deposits of ozokerite will be discovered yet, but hitherto the discovery of deposits that yield paying quantities have been so rare that we are greatly pleased to be able to announce that the past year did not pass without some success in this direction.

At the baths of Truskawiec, some five miles from Boryslaw, a deposit of this substance was found at a slight depth, of such extent that 50 tons have already been taken out and sold. The wax contains sulphur, and hence the oils produced in making paraffine from it must be used with some special precautions. This discovery of ozokerite in Truskawiec is the more interesting because Leo Strippelmann several years ago, in his well-known work on the petroleum industry of Galicia, had referred to this place as particularly worthy of examination for the occurrence of ozokerite.

The same mineral is also reported as occurring in the neighbourhood of Agram in Croatia, and investigations made there have proved the existence of deposits of considerable extent and tolerable thickness. Whether the hopes based thereon will be actually realized, the future must decide. At all events, this notice and the announcements of recent discoveries of ozokerite in Russia, must be received with caution, for such announcements have frequently been made and no important results followed.

Other places in Eastern Galicia which may be looked upon as sources of ozokerite, besides Truskawiec, are Boryslaw, Dwiniacz, and Starunia, with Boryslaw at the head as hitherto. In all three of these places the wax is found in Miocene clay shales and clay marls with the intermediate sandstone, and frequently it accompanies rock salt and gypsum. While shafts have been sunk in Boryslaw to the depth of 200 metres (nearly 700 feet), they have not penetrated deeper than 30 or 40 metres (100 or 130 feet) in Starunia and Dwiniacz.

In Boryslaw the majority of the shafts are at present in the possession of three large companies, the oldest of which, "The French Mineral Wax and Petroleum Society," has been in existence for years, while the "Lemberger Credit Bank" and the firm of Gortenberg, Liebermann and Co. have commenced operations within the past year by the purchase of numerous shafts. In the first half of last year the first-named society could point to a large production, but they have almost completely exhausted their present horizon and are now going deeper, but with a smaller yield. The two other societies had, and still have, to contend with the drainage of their long-neglected shafts, and hence their production is not as large as could be desired.

In Boryslaw-Wolanka the production of mineral wax in the year 1882 was less than in the preceding year, but in view of the difficulties to be overcome, it must be considered relatively speaking as favourable, and cannot be much less than that of 1877, which was 8300 tons.

The price fluctuated from January, 1882, when it was $27\frac{1}{2}$ Austrian florins (about £2 15*s.*) per 100 kilos, to 25 florins in May, then steadily rose until the highest point ($31\frac{1}{2}$ florins) was reached in November, and there it remains. It is very questionable if the manufacturers can use it profitably at this price, and several establishments have already imported American paraffine to take its place, and with good results. As it may be expected

* From the *Chemiker Zeitung*. Reprinted from the *Scientific American*, May 19, 1883.

that the production of ozokerite will increase in the immediate future, we may predict a fall in the price.

Dwiniacz and Starunia yield about 25 tons per month, which at present prices pays well.

Before passing to the method of working it up, we must first consider how it is obtained, as one of the methods yields a product already partially purified. We refer to the extraction of the wax from the gangue called "lep." By melting it under water the greater part of the ozokerite is removed, but the residue still contains as much as 12 per cent. of wax. These residues collect in enormous quantities, and hitherto were only considered as a nuisance, although the wax still in them represented an enormous capital. It is surprising that this capital was allowed to lie idle so long. It cannot be due to the small quantity of wax in it, because at the Brown coal works in Halle it pays to work coal which only yields 10 per cent. of tar, or 12 to 15 per cent. of tarry resins. The cause may be sought chiefly in the difficulty of working the residues, since the high price of fuel prevents them being liquated or distilled on the spot, and there is no suitable apparatus for extracting so dense a substance as clay and shale. According to the *Neue Freie Presse*, an ozokerite mechanic made an apparatus in 1879 that would make 6600 to 7700 pounds of pure wax from ten times that quantity of ore daily, yet this apparatus of the unnamed workman has never been in operation.

In the past year J. Merz, in Boryslaw-Wolanka, first succeeded in working these residues in his extraction apparatus, which has been patented in most countries. If the extractors now in use have not been constructed on so large a scale and capable of so large a daily yield as the one made in 1879, they have the undeniable advantage that they work, not merely on paper, but in reality.

About one-third of the ozokerite that comes into the market is worked into paraffine, and two-thirds into ceresine. The use of mineral wax for making paraffine has increased, especially in Galicia, and here, too, distillation in superheated steam is commonly employed. A large portion of the paraffine made is consumed there for making the Sabbath candles used in their religious rites by the Jewish inhabitants. It is not so carefully purified for this purpose as is done elsewhere.

The Galician factories for the most part refine the largest possible quantity (50 to 70 per cent.) of the waxy distillate directly with fuming sulphuric acid and without pressing it. Of course the resulting paraffine is not free from oil, but it is tolerably white in colour and useful for the purpose mentioned.

Very little has been made public concerning improvements in making paraffine from ozokerite, and manufacturers keep their experience as secret as posible.

In 1881 E. Van Haecht and J. Schreier obtained a patent for purifying paraffine by blowing out the contaminating oils with superheated steam. It can be used for paraffines containing as an impurity light oils, as is the case, in careful distillation, with the first portion of the wax distillate and só long as the paraffine already present in the wax goes over undecomposed. The crude paraffines resulting from the decomposition of resinous bodies, as for example in the dry distillation of brown coal, or of the resin obtained by distilling ozokerite, cannot be purified by this method, as they contain oils specifically heavier than and often having as high a boiling point as the paraffine itself.

In 1881, H. Ujhely took a patent for refining and hardening paraffine. According to the English specification, the crude paraffine was melted with a mixture of petroleum benzine, and alcohol (methylic, ethylic, or amylic), and after cooling slowly it was expressed. The advantages gained in this way over the common use of benzine (photogen) alone, in our opinion, consists merely in obtaining an oil more free from paraffine, since paraffine is considerably less soluble in alcohol than in benzine. Whether this is sufficient to counterbalance the disadvantages of working with alcohol, we will not attempt to say. We know, however, that in 1873 a paraffine factory added fusel oil to the paraffine for pressing, but after a few months returned to the use of benzine.

The yield of paraffine is essentially increased when superheated steam is employed in the distillation of the ozokerite, and in working a wax suitable for making paraffine it amounts to 60 or 70 per cent. Hence we can no longer adhere to the data hitherto published, which place the limits at 36 to 50 per cent.

In making ceresine the chief improvements consist in a profitable utilization of the residues. Two methods are chiefly employed in the factories themselves. The first and simpler consists in heating the ozokerite with fuming and common oil of vitriol to 200° C. (392° Fahr). until the greater part of the acid is removed either by decomposition or evaporation, and then treating it at a suitable temperature with neutralizing and decolorizing agents such as alumina, silicates, bone coal, the refuse of prussiate factories, etc. By the second method the resinous and discolouring constituents of the wax are also removed with acid, but at a relatively low temperature, thus avoiding so thorough a decomposition.

To bleach ozokerite perfectly on a large scale without the use of acids has as yet remained an unfulfilled desire, although in 1879 a method for accomplishing it was announced as a new discovery of H. Ujhely in Vienna. Without going into a discussion of priority, we must remark that George Gwynne in his English patent of 1871 for "treating fatty and hydrocarbon bodies," etc., describes a process for bleaching ozokerite which possesses a striking resemblance to that of Ujhely. Gwynne removes the mechanical impurities and then dissolves it in benzine, filters through bone black, and removes the solvent by blowing in air. This method is identical in principle with Ujhely's. Gwynne did not obtain any practical results, nor has Ujhely, nor Ofenheim, who took a patent on the same thing in 1879. The statement made then, that a factory was being built with a large apparatus on Ujhely's system, was based on facts; but it must be added that the building stopped before it was finished, and that the unfinished building has been in that state for two years, while the large apparatus remains in the workshop awaiting payment by the man who ordered it.

Even if the difficulties that beset the working of Ujhely's patent on a large scale were overcome, and the consumption of decolouring agents reduced to a minimum, the product obtained would find only a very limited field of sale. Ujhely's "bleached mineral wax" would not be in much demand as an independent illuminant, owing to the large quantity of oxygenated resin in it, most of which is removed by the present method of treating it with sulphuric acid.

Finally, we may be permitted one short remark about a circumstance which has hitherto received too little attention.

Ceresine and paraffine are largely employed, as everyone knows, for adulterating beeswax, and the methods in use for the detection of such adulterations are frequently based upon a determination of the specific gravity of the specimen in question. A short time ago a table was published (*Chemiker Zeitung*, vi., page 74), giving the specific gravity of different kinds of wax and their mixtures, but in our opinion it is of very little use because it sets out with false premises in assigning a definite specific gravity to paraffine and ceresine. The specific gravity varies from 0·869 for that which melts at 100° Fahr. to 0·943 for that melting at 180° Fahr., as was shown by the author as early as 1878.

The following table shows the melting points of ozokerite paraffine:—

Solidifying points.		Spec. gravity.
56° C.	133° F.	0·912
61° „	142° „	0·922
67° „	153° „	0·927
72° „	162° „	0·935
76° „	169° „	0·939
82° „	180° „	0·943

Since the specific gravity of paraffines that solidify at different temperatures is different, ozokerite and the ceresine made from it must differ in specific gravity. Then we must consider that commercial ceresine frequently receives an addition of paraffine, resin, carnauba wax, etc., by the manufacturers themselves.

ALGIN: A NEW SUBSTANCE OBTAINED FROM SOME OF THE COMMONER SPECIES OF MARINE ALGÆ.*

BY E. C. C. STANFORD, F.C.S.

(Concluded from page 1022.)

The following samples are from a considerable bulk of mixed salts evaporated:—

Analyses of the Salts.

	Laminaria Stenophylla.	Fucus Vesiculosus.
Calcium sulphate	1·69	4·33
Potassium sulphate	11·29	23·62
Potassium chloride	19·90	13·71
Sodium chloride	60·96	58·20
Magnesium chloride	4·35	—
Sodium carbonate	·53	—
Sodium iodide	1·26	·12
	99·98	99·98

In the following tables the composition of the salts is shown as they come out in six successive macerations in cold water.

The residues are always carbonized, and then washed and again ignited—that being the only way to insure perfect combustion in the presence of such an excess of saline constituents.

Laminaria Stenophylla—Air dried, containing 14·8 moisture. 4 oz. = 1750 grains. Six macerations in cold water—all evaporated, and residues weighed:—

	Grs.	Per cent.	Grs.	Per cent.
1st water weight of residue	288	16·45	499	= 28·5
2nd ,, ,,	211	12·05		
3rd ,, ,,	40	2·28	77·2 =	4·4
4th ,, ,,	37·2	2·12		
5th ,, ,,	21·1	1·20	39·7 =	2·26
6th ,, ,,	18·6	1·06		
	615·9 = 35·16 per cent.			

	1	2	3	4	5	6
Volatile matter	23·4	28·0	29·3	40·0	54·5	69·1
Salts	67·1	60·1	55·5	40·0	31·8	22·5
Fixed carbon	3·91	4·97	4·1	4·56	2·23	·96
Ash	5·59	6·93	11·1	15·44	11·4	7·44
	100·0	100·0	100·0	100·0	100·0	100·0

Composition of Salts.	1	2	3.	4	5	6
Calcium sulphate	2·91	1·02	Nil.	Nil.	Nil.	Nil.
Potassium sulphate	7 53	10·08	19·48	20·80	Trace.	Trace.
Potassium chloride	34·05	30·95	24·81	23·78	,,	,,
Sodium chloride	45·55	53·00	53·57	51 04	,,	,,
Sodium iodide	1·95	1 58	2·00	1·25	,,	,,
Sodium carbonate	Nil.	Nil.	Trace.	3·30	,,	,,
Magnesium chloride	8·55	3·40	Trace.	Trace.	,,	,,
	100·54	100·03	99·86	100·17	,,	,,

* Read before the Chemical Section of the Glasgow Philosophical Society, April 2, 1883. Communicated by the Author.

Laminaria Stenophylla—Air dried (calculated percentage on original weed):—

	Per cent.	Volatile.	Salts.	Carbon.	Ash.
1st water	16·45	3·85	11·04	0·64	0·92
2nd ,,	12·05	3·35	7·26	0·60	0·84
3rd ,,	2·28	0·68	1·26	0·09	0·25
4th ,,	2·12	0·86	·85	0·09	0·32
5th ,,	1·20	0·656	·38	0·027	0·137
6th ,,	1·06	0·732	·24	0·010	0·078
	35·16	10·128	21·03	1·457	2·545

Composition of Salts:—

	1	2	3	4	5	6	Total.
Calcium sulphate	0·321	0·074	Nil.	Nil.	Nil.	Nil.	0·395
Potassium sulphate	0·831	0·731	0·245	0·177	Trace	Trace	1·984
Potassium chloride	3·759	2·247	0·312	0·202	,,	,,	6·520
Sodium chloride	4·970	3·846	0·678	0·432	,,	,,	9·926
Sodium iodide	0·215	0·115	0·025	0·011	,,	,,	0·366
Sodium carbonate	Nil.	Nil.	Trace	0·028	,,	,,	0·028
Magnesium chloride	0·944	0·247	,,	Trace	,,	,,	1·191
	11·040	7·260	1·226	0·850	0·38	0·24	21·030

Laminaria Stenophylla—Air-dried (Residual weed—Weight 2 oz., or 50 per cent.):—

		Calculated on original weed per cent.
Volatile matter	74·2	37·1
Charcoal	25·8	12·9
	100·0	50·0
Charcoal:—		
Salts	18·0	2·32
Fixed carbon	50·7	6·55
Ash	31·3	4·03
	100·0	12·90
Salts:—		
Potassium sulphate	35·27	·818
Potassium chloride	6·72	·156
Potassium carbonate	5·00	·116
Sodium carbonate	49·97	1·169
Sodium iodide	2·63	·061
Alkaline earths	Nil.	Nil.
	99·49	2·320

Fucus Vesiculosus—Dried (containing 2·11 per cent. moisture:—

4 oz. = 1750 grs. Six macerations in cold water—all evaporated, and residues weighed.

	Grs.		Per cent.	
1st water-weight of residue	174·5		= 9·45	11·90
2nd ,, ,,	43·0		= 2·45	
3rd ,, ,,	11·2	0·64	= 0·99	
4th ,, ,,	6·15	0·35		
5th ,, ,,	Trace.			
6th ,, ,,	Trace.			
	234·85		= 12·89	

	1	2	3	4
Volatile matter, etc. . .	37·78	68·4	47·48	62·86
Salts	49·03	27·62	29·22	25·71
Fixed carbon	8·09	1·17	3·78	·74
Ash	5·10	2·81	19·52	10·69
	100·00	100·00	100·00	100·00

Salts:—

	1	2	3	4
Potassium sulphate . .	27·25	48·19	Trace.	Trace.
Sodium sulphate. . .	4·03	·57	„	„
Sodium chloride . . .	61·50	37·62	„	„
Sodium iodide . . .	·026	·02	„	„
Sodium carbonate . .	7·42	13·36	„	„
	100·226	99·76	„	„

Fucus Vesiculosus—dried (calculated on original weed)* :—

	Per cent	Volatile.	Salts.	Carbon.	Ash.
1st water . .	9·45	3·58	4·63	0·76	0·48
2nd „ . .	2·45	1·68	0·67	0·03	0·07
3rd „ . .	0·64	0·304	0·187	0·024	0·125
4th „ . .	0·35	0·221	0·089	0·003	0·037
5th trace . .	—	—	—	—	—
6th „ . .	—	—	—	—	—
	12·890	5·785	5·576	0·817	0·712

Composition of Salts: —

	No. 1.	No. 2.	No. 3.	No. 4.	Total.
Potassium sulphate . . .	1·262	0·343	Trace	Trace	1·605
Sodium sulphate . . .	0·186	0·004	„	„	·190
Sodium chloride	2·8378	0·2337	„	„	3·0715
Sodium iodide .	0·0012	0·00013	„	„	·00133
Sodium carbonate . . .	0·343	0·0895	„	„	·4325
	4·630	0·6700	0·187	0·089	5·576

Residual Weed—Fucus Vesiculosus (Weight 3 ounces 175 grains = 85 per cent.) :—

		Calculated on original weed.
Volatile matter	65·65	55·81
Charcoal	34·35	29·19
	100·00	85·00

* This specimen was abnormally low in salts.

		Calculated on original weed.
Charcoal:—		
Salts	18·63	5·24
Fixed carbon	58·53	17·53
Ash	22·84	6·42
	100·00	29·19
Salts:—		
Potassium sulphate . .	29·41	1·5420
Sodium sulphate . . .	47·58	2·5030
Calcium sulphate . . .	9·34	0·4760
Magnesium sulphate . .	11·76	0·6160
Magnesium chloride . .	1·30	0·0680
Sodium carbonate . . .	·45	0·0235
Sodium iodide	·22	0·0115
	100·06	5·2400

After the salts have been removed, the weed is bleached by a weak solution of chlorinated lime, about 2° Twad. The laminaria bleaches easily in a few hours, but the fuci require prolonged and repeated treatment. I would call attention to the extreme beauty of some of the algæ when thus bleached; even in the common *Fucus vesiculosus*, or black wrack, you can trace the spores in the cells and the lining of the air-vessels. The specimen of *Sargassum bacciferum* (gulf weed) is beautifully transparent. Other specimens shown are *Laminaria digitata*, stems and fronds, the former looking like sticks of ivory, *L. stenophylla, Fucus nodosus, F. serratus, Aliaria esculenta, Halidrys siliquosa, Rhodomenia palmata, Rhodomela pinnastroides, Zostera marina, Enteromorpha compressa*, etc. When sufficiently white, the weed is soured by a very weak solution of sulphuric or hydrochloric acid, and well washed. If the acid be added with the bleach the action is quicker. It is then acted on in the cold by about a tenth of its weight of sodium carbonate for twenty-four hours, then heated, filtered, and evaporated. The residual cellulose is pressed into cakes for use as a paper material. It is already bleached, and has only to be put at once into the paper beater. There are plenty of fibrous materials in the market, but there is no real substitute for rags, as, I believe, this will to a great extent prove to be.

The whole of the plant is thus accounted for; in the laminaria, the average yield is as follows:—

On the air-dried plant—

Extracted by water	30
Extracted by acid	5
Extracted by sodium carbonate = algin . .	35
Cellulose	10
Moisture	20
	100

This plant is the only one now employed in making kelp; the least exposure to rain washes out the salts, and renders it useless for this purpose. It does not, however, interfere with its use for extracting the algin, which is insoluble in water. For this purpose, if the salts are sacrificed, it is improved by exposure to rain and light. The wet weed, however, keeps perfectly well if access of air be prevented, for instance in a properly constructed "silo," and there is no reason that any of it should be lost.

Applications of Algin.

Algin has properties which should make it useful for several applications in the soluble form. As a stiffener of fabrics, although not so rigid as starch, it fills the cloth better, is tougher, more elastic, and more transparent. It mixes in all proportions with starch and dextrine, and imparts to the mixture these properties. Unbleached, it forms a cheap material for dressing winseys and such dark goods. Passed through an acid bath, the coating becomes glossy and insoluble, and thus a vegetable mordant is available for dyeing. Lime-water, and salts of calcium, barium, and several metallic salts, may be employed for a similar purpose; one of its peculiarities being the ease with which it is rendered insoluble.

I shall only just refer to its probable value as a food material on account of its nitrogenous character, as I have no edible specimens on the table which can be passed round for immediate consumption. As a cattle food there is a large opening for such a material. The agglutinating power of algin enables us to convert into solid blocks many substances which are with difficulty made to cohere. Silica, lime, magnesia, oxide of zinc, phosphate of lime, alumina, chalk, plumbago, charcoal, and many other such substances can be converted into solid hard blocks. All of these and many more are exhibited. Some of these compounds may be made by mixing the algin with a solution, where both form a joint precipitate with another solution — *e.g.*, sodium silicate, and calcium chloride. One application of this agglutinating character has already assumed importance. Charcoal has been long known as our best solid non-conductor of heat, and no doubt it would have been employed long ago as a covering for our steam-boilers, had any medium been known capable of agglutinating it. That is now attained by this substance. My "carbon cement,"* for this purpose, contains 97 per cent. of charcoal, 3 per cent. of algin being sufficient to make it cohere; and as that charcoal is made from seaweed, it is a remarkable fact that the whole covering is derived from that material. My friend Mr. Spiller, a high authority on the subject, has also found the solution of algin the best thing yet discovered for arresting incrustation in steam-boilers. We are not much troubled with this in Glasgow, but in the south, where the waters are hard, many such fluids are employed. Most of these are organic compounds combined with alkalies. One of the earliest and best was introduced some years ago by Mr. Spiller himself, and I am entirely indebted to him for suggesting the application of algin to this purpose. He speaks of it as highly efficient in precipitating the lime in such a fine state of division that it can easily be blown off from the cock. So that we now propose seaweed in one form or other as a most comfortable internal and external application to our steam-boilers. In fact several large steamers are already ploughing the ocean, assisted in their daily conflicts with heavy seas by weapons borrowed from these opponents.

The insoluble form of algin is very like horn, and as it can be pressed into moulds of any size it may be used instead of that article.

It also appears to be an excellent non-conductor of electricity, and in combination with certain other substances may assist in providing the cheap non-conducting material, which shall be impervious to moisture, now so much required for underground telegraph and telephone wires.

It is an efficient agent for emulsifying oils, and, being coagulated by alcohol, for fining wines and spirits.

These are some of the probable applications of algin, and, seeing that the substance is new, and the source abundant, I shall not be bold enough to predict what it may *not* be used for.

PHARMACEUTICAL PREPARATIONS OF CORN SILK.†

BY GEORGE W. KENNEDY, PH.G.

During the past year several physicians of Schuylkill county have been using different preparations of the stigmata of Zea Mays for catarrh of the bladder and similar diseases, with very good results. The preparations should be made from the fresh article, as the dried seems to be worthless, at least that is the experience of those who have had the subject under investigation; cases under treatment, which were not benefited by the powder or other preparations made from the dried article, yielded to a tincture prepared from the fresh or green stigmata. It would be advisable to gather the drug before it begins to change in colour, or select only that portion having a green or greenish-yellow colour. The writer manufactured a quantity of the tincture last September, which has all been prescribed and used by our physicians, and is now compelled to purchase the fluid extract to supply the demands. One of our medical practitioners, who is very particular, has great confidence in the curative properties of corn silk; his choice of all the preparations is the syrup which I have made and would recommend to be made from the fluid extract. This is an expeditious mode of making the syrup, and one which is entirely satisfactory, the syrup containing only a very small percentage of alcohol. The diseases for which corn silk is recommended are of such a nature — generally of an inflammatory character — that the patient should not use alcohol in any form, because it produces irritation, and irritants should be left out of the preparations as much as possible.

Should the drug prove to be as valuable a remedy as some medical men consider it to be, there is no doubt but its use would become general. Either the fluid extract or the syrup, or both, would be the best preparations to recommend for introduction, although the tincture gave fair satisfaction; yet I do not believe it to be the most suitable preparation.

It should be remembered that the fresh drug contains a large amount of moisture; it contains certainly not less than 50 per cent., and likely considerably more. I would suggest that not less than double the quantity of the drug be used; for example, if 100 parts of syrup or tincture was to represent 12 parts of the dried material, then 24 parts of the fresh or green corn silk should be used. I would recommend the following formulas: —

Tincture of Corn Silk.

Take of—

Corn silk, green, twenty-four parts . . .	24
Diluted alcohol, sufficient to make one hundred parts	100

Cut the silk into small pieces, either with a large pair of scissors or a tobacco cutter; after which, place in a mortar and beat into a pulp with a small quantity of the diluted alcohol. Prepare a cylindrical glass percolator, by closing the lower orifice with a cork; transfer the silk pulp to the percolator, and add sufficient of the menstruum to form a layer over the pulp; cover the percolator closely and allow to macerate for forty-eight hours; then loosen the cork enough to permit percolation to proceed at the rate of 40 drops per minute; add enough diluted alcohol and continue the percolation until 100 parts are obtained. The tincture possesses the characteristic odour of corn silk, is of a yellow-straw colour, and of a pleasant, sweetish taste. Dose for an adult, 1 or 2 fluid drachms (gm. 4 to 8).

Fluid Extract of Corn Silk.

Corn silk, green, two hundred grams . .	200
Glycerin, twenty grams	20
Diluted alcohol, a sufficient quantity to make one hundred cubic centimetres .	100

Cut the silk into small pieces. Mix the glycerin with 80 grams of diluted alcohol. Place the cut corn silk into a mortar, and beat into a pulp with a portion of the menstruum; after which, pack in a cylindrical glass percolator; add sufficient of the mixture to cover the pulpy mass, and when the liquid commences to drop

* Carbon cement forms a very light, inodorous, and cheap material for covering steam-boilers. Over 20,000 square feet have already been applied to boilers and piping.

† From the *American Journal of Pharmacy*, May, 1883.

from the percolator close the lower orifice; cover the percolator tightly, and allow to macerate for forty-eight hours; then permit percolation to go on slowly, about 40 drops per minute; add the remainder of the glycerin mixture, and then diluted alcohol until the drug is exhausted, reserving the first 70 cubic centimetres of the percolate; evaporate the remainder to 30 cubic centimetres, and mix with the reserved portion, making in all 100 cubic centimetres. The odour and taste is similar to that of the tincture, but much stronger, and the colour is a shade or two darker. Dose for an adult, from ½ to 1 fluid drachm (gm. 2 to 4).

Syrup of Corn Silk.

Fluid extract of corn silk, twelve parts	12
Syrup, eighty-eight parts	88
To make one hundred parts	100

Dose from 1 to 2 fluid drachms (gm. 4 to 8).

CALCIUM IODIDE.*

BY R. ROTHER.

As there are always new medicinal agents coming into use which are not often found in the market until the demand becomes quite general, the pharmacist is occasionally called upon to exercise the primitive function of preparing compounds obtainable in no other way. For such and similar cases only, the Pharmacopœia gives processes, in connection with those that are pre-eminently pharmacopœial. These are, however, rapidly improved in most cases, so that the early official method is not always the best after a ten years' period of general progress.

Calcium iodide is one of those compounds occasionally called for, which is not generally kept nor very easily prepared in a proper form. When caustic lime is triturated with iodine, a peculiar black combination is obtained in which chemical union of some kind is exerted. Similar compounds are produced when dry iodides are mixed with iodine in a like manner. Some of these bodies are soluble in alcohol, and then yield crystals of definite superiodide even of the monad metals. Water decomposes them, however, with the liberation of iodine. On boiling the black calcium oxide and iodine compound with water, a colourless solution of calcium iodide and iodate is obtained, whilst the excess of lime remains as hydrate. There is no convenient way of separating these salts, neither is the reduction of the attendant iodate practicable. Hence this process does not answer for the preparation of calcium iodide.

Calcium iodide may be prepared by dissolving calcium hydrate, or better, carbonate in hydriodic acid. The difficulty in this case is the preparation of the acid by a practical and convenient method, which so far has not been found. The usual process for preparing calcium iodide consists in decomposing ferrous iodide or ferric iodide with calcium hydrate. In the first instance the iron is precipitated as ferrous hydrate, and in the second as ferric oxy-hydrate. Both precipitates are excessively bulky, and require much washing to secure all of the generated calcium iodide. A correspondingly large volume of water will then have to be evaporated.

The process which embodies the most advantage consists in decomposing ferric iodide with calcium carbonate. In this case the iron is precipitated as the compact non-gelatinous ferric hydrocarbonate, according to the following reaction :—

$$2(FeI_3) + 3(CaCO_3) + 2(OH_2) = 3(CaI_2) + Fe_2CO_3(OH)_4 + 2(CO_2).$$

* From the *American Journal of Pharmacy*, May, 1883.

A very concentrated solution of calcium iodide is thus obtained, which cannot be properly filtered through paper in an undiluted condition. Its destructive action upon the paper results in soluble coloured products, which interfere with the whiteness of the dried salt. The affinity of calcium iodide for water is so great that when a very concentrated solution of it is mixed with an equally strong solution of dipotassic carbonate, no double decomposition occurs, but the potassic carbonate separates as a gelatinous magma. No calcium carbonate results until more water is added, when the calcium is immediately thrown down as white carbonate.

The calcium iodide on evaporation of its solution is obtained as a white or colourless crystalline salt containing water. The solution must be concentrated until a dense pellicle forms over the surface. The fused mass is then poured on a smooth surface and well covered to prevent deliquescence. On cooling, the salt is readily detached in large fragments. These may then be broken into smaller pieces and preserved in well-stopped bottles. Large, shallow capsules or ordinary dinner plates with bright smooth surfaces are the most suitable vessels for cooling the fused salt. During this part of the operation it is essential that moist air be excluded to prevent deliquesence. For this reason the salt is best dried under a bell-glass over sulphuric acid.

In the preparation of calcium iodide the use of iron filings is not admissible, because of the large amount and the peculiar form of the carbon contained in them. In this instance, a yellow organic acid is generated, which yields colourless ferrous salts and orange ferric salts not precipitable by calcium carbonate, but decomposable by calcium hydrate. The resulting calcium salt of this acid is also orange tinted, but is destroyed on fusion of the iodide, the carbonaceous residue imparting to this a greyish, unsightly appearance. Re-solution of the fused mass and filtration of the solution now produces a colourless salt. Iron wire also contains some carbon, but in a different state of combination, so that none of the peculiar acid is produced. With its use the iron is wholly precipitated by calcium carbonate, even in the presence of excess of iodine, and a white salt is directly obtained on evaporation. The contact of organic matter must, however, be carefully prevented in the manipulation, and the filtration of a too concentrated solution through paper must be avoided.

From these considerations, the following formula is derived:—

Iron in fine wire	56 parts.
Iodine	381 „
Calcium carbonate	150 „
Water sufficient.	

Mix 56 parts or any moderate excess of iron wire with 1200 parts of water and 254 parts of iodine gradually added. When the reaction is completed and a light green solution is obtained, filter this and add to it the remainder of the iodine. Then, when this has all dissolved with the formation of a brown-red solution, add the calcium carbonate (150 to 160 parts) by degrees, and warm the mixture when the effervescence slackens, until the evolution of gas has ceased and all the iron is precipitated. Let the dense precipitate subside and decant the supernatant liquid. Mix the residue with enough water to restore the original weight; let subside, and again decant. Mix the two decantates, pour the solution upon a filter, and when all has passed through, pour the sediment into the filter and wash it with water until practically free from calcium iodide. Unite all the filtrates and evaporate the mixture until a dense pellicle forms over the surface and boiling continues only at a narrow vent. Now pour the fused salt into a shallow plate of suitable size, cover it well, and when cooled, detach the hardened mass, break it up and preserve it in well-stopped bottles.

The Pharmaceutical Journal.

SATURDAY, JUNE 16, 1883.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PROVIDENT DISPENSARIES AND PHARMACY.

THE occurrence of "Hospital Sunday" in the metropolis since the issue of the last number of this Journal has been the occasion of many earnest appeals and not illiberal responses on behalf of the sick poor of this great city. As a result many of the noble institutions of which the dwellers in London have just reason to be proud will receive timely help in tiding over financial difficulties such as are almost necessarily the chronic accompaniments of their every-day work. No one with a human heart would think of saying a word that would tend in the least degree to check the outflow of benevolence towards the vast amount of helpless suffering that is to be found on every side; and all will rejoice should it turn out that contributions this year reach a larger amount than in any previous year since this movement has been started. But many who will have done all that lies in their power to meet the urgent necessities pressed upon them, will know that there are some very unsatisfactory features recognizable in the hospital system, or perhaps, more correctly, want of system. One of these, in which the readers of this Journal are not very remotely interested, is the extent to which people of the working class, and even some of the tradesman class, are becoming educated to seek and receive medical advice and medicine gratuitously, long before the pinch has been reached at which, with a proper amount of self-respect, they would allow themselves to enter into competition with the really destitute for a share in available charitable medical relief. We use the word "educated" advisedly, because not only is that the tendency of the free and frequently indiscriminate relief which, up to a certain point, can be obtained by almost everybody that chooses to ask for it, but the practice is also sometimes inculcated by the very language in which appeals for subscriptions are couched. This point was well illustrated recently by the *Lancet*, when alluding to an appeal on behalf of a well-known metropolitan hospital, which was based on an assumption that it was necessary to provide for the medical relief of a number equal to the whole population of the quarter of the metropolis in which the institution was situated. Nevertheless, it was estimated that amongst that population there were at least as many persons capable of subscribing five shillings a year as might thus make up a sum more than double the amount of the entire ordinary subscription of the hospital. Whilst, however, the number of patients receiving free relief in this particular district goes on increasing rapidly, attempts to cultivate more self-reliance in this direction among the working classes in the district have not been successful, and in the words of a clergyman who has made the trial, "it is hopeless to expect that they will put "aside even a penny a week for medicine and a "doctor's attendance when they can obtain as much "for the mere asking."

Like the results from most evil practices the influence of this demoralization, for such it undoubtedly is, cannot be confined to those with whom it originates; in fact its effects upon the practice of medicine, as well as of pharmacy, are most injurious. It is in just the localities where it obtains that medical men are to be found eking out an insufficiency of inadequately remunerated practice by dabbling in a business for which they have had no training and competing with neighbouring chemists—not for the dispensing of prescriptions, since there are none—but for the privilege of supplying the public with drugs and chemicals and even the "et ceteras" which are looked upon as excrescences of the chemists' stock-in-trade. In doing so they assimilate their establishments in every respect to a shop, and obliterate every characteristic feature that would help the general public to distinguish between the doctor and the druggist. It is not, therefore, surprising that, as one result of this confusion, the British workman, and many above him in the social scale, should fail to discriminate between the "doctor" who is always to be found behind his coloured bottles and the "doctor" who goes out visiting, or that they should resort to the chemist's shop for remedies in such cases of illness as do not seem to them to necessitate the loss of time involved in attendance at a hospital or the expense consequent upon consulting a regular medical practitioner. Neither is it to be wondered at that the chemist in the absence of occupation with his legitimate work, and pressed by the trade competition of his medical neighbour, should sometimes put a rather wide construction on the phrase "simple ailments." At any rate it is in respect to districts where the barriers between medicine and pharmacy are thus thrown down that complaints are loudest from medical men concerning what they are pleased to term "chemists' prescribing." In saying this we do not lose sight of the fact that for the existing confusion between medicine and pharmacy the "apothecaries" are largely responsible, in that their acquisition of the privileges of the medical profession did not induce them to curb more effectually their trading instincts. For this reason we are inclined to think that some of the arguments used in the recent petition of the Society of Apothecaries to Parliament for reinstatement on the Divisional Medical Board, especially those relating to the supply of medicine, were just such as should militate against the granting of the request.

There is no immediate prospect of pharmacists in Great Britain obtaining the same amount of protection as is afforded their *confrères* in down-trodden Ireland, where the right of a medical man to dispense prescriptions is strictly limited to the dispensing of those written by himself. It is true that, as may be seen from a report on another page, just now the continuance of this protection is endangered by an alteration made in the Medical Bill now before the House of Commons during its passage through the upper House; but the committee of the Irish Pharmaceutical Society that has the business in charge will probably—*more Hibernico*—succeed in impressing Parliament with the justness of its claims. But British pharmacists can only hope to attain at some future day to the privileges already enjoyed by the pharmacists of the sister isle. Meanwhile, we are glad to welcome any movement that, by helping to diffuse sounder notions among the public as to the reasonable remuneration of medical services rendered, will also tend to remove the conditions which are so detrimental to the best interests of medicine and pharmacy; for we are strongly inclined to believe that every retrogression from the questionable position taken up by many medical practitioners upon the domain of pharmacy will be at least balanced by an equal abandonment of doubtful points by pharmacists. It will probably be only in proportion as medical men find themselves able to confine their operations within the limits to which their studies have been particularly directed, and pharmacists are left to do the work for which they are specially qualified, that the jealousies and bickerings concerning "counter prescribing" *et hoc genus omne* will disappear.

As indirectly promoting the attainment of this end we think it is very satisfactory to find that considerable progress has been made lately in establishing self-supporting medical institutions for the industrial classes in London under the auspices of the Provident Medical Association. At a meeting of the supporters of this movement, recently held at the residence of Sir CHARLES TREVELYAN, it was stated that since 1881 six new provident dispensaries have been established in different parts of the metropolis, three others that were previously in existence have been taken over by the Association, and arrangements are being made for the starting of four more. Of the nine provident dispensaries at present in operation, three have already become self-supporting, four are making steady progress towards that position, and concerning the other two, notwithstanding that they are heavily weighted through having to compete with medical charities in the same neighbourhoods, hopes are entertained that they will eventually pay their own way. About fifteen thousand persons of both sexes and all ages are now entitled, in virtue of a money payment, to medical aid, when required, from these dispensaries, and the number is increasing daily. We hope that the progress will be maintained until the objects of the Association are fully attained. Apart from the fact that, in the words of the Chairman of the meeting, "there could "be no greater misfortune happen to the country "that that men should lose the sense of inde-"pendence and self-reliance, and seek to obtain all "they require by State-aided schemes, municipal "government and public charity," the creation of a more healthy tone in the public mind in regard to responsibilities in respect to the receipt of medical assistance must help to improve the position of a large number of medical practitioners, and this, for the reasons before hinted at, cannot happen without conferring a similar boon upon the practitioners of pharmacy.

We understand it has been decided by the Council of the Pharmaceutical Society to extend a privilege until now limited to Members and Associates in Business, and supply gratuitously to each Associate and Registered Apprentice of the Society who chooses to apply for it a copy of the Catalogue of the Society's Museum. We hope that this boon will be widely appreciated, for the volume is of much wider interest than is implied by the title, and would prove a valuable addition to the library of any student of materia medica, even though he might never enjoy the privilege of seeing the museum to which it specially refers.

* * *

On Monday the second reading of the Medical Acts Amendment Bill was postponed until Thursday, but at the time of going to press it has not been reached, and judging from its position on the business paper it is hardly likely to be. Two deputations have been received this week by Mr. Mundella on the subject of the constitution of the proposed Medical Boards, one from Scotland urging the predominant claims of universities to representation, and the other from Ireland seeking the restoration of the Apothecaries' Society of Ireland to the position it originally held in the Bill. Replying to the latter, Mr. Mundella said that there had been great opposition to either the English or the Irish Society of Apothecaries being empowered to send representatives to the respective Medical Boards, to which also the report of the Royal Commission had been unfavourable, and eventually a compromise had been arrived at in the House of Lords between Lord Cairns and the Lord President to eliminate both those bodies. He promised to lay the views of the deputation before Lord Carlingford, but said he was unable to hold out any hope of the desired reinstatement in teeth of the agreement made.

* * *

The Commission appointed by the French Chamber of Deputies to examine the Pharmacy Bill introduced by M. Faure, has just agreed upon its report, and the principal recommendations in it have been communicated to the public press by M. Naquet, by whom it was drawn up. These are

(1) the suppression of pharmacists of the second class and of herbalists; (2) liberty of sale by any person of a series of harmless plants and drugs, included in a list to be inserted in the Codex; (3) liberty to pharmacists to sell, upon their own responsibility and that of the buyer, any substances, whatever may be their nature, which are expressly demanded by the purchaser, but not to grant consultations or practise medicine, unless they possess the double qualification; and (4) that any person possessing the diploma of a pharmacien shall have the right to prepare, advertise, and sell by wholesale and retail any medicine that is not "secret," in the grammatical sense of the word, that is, of which the composition is known. Whilst the subject was under consideration the Commission refused categorically to hear any outside opinions; but after the report had been drawn up, it gave an audience to the Minister of Commerce, and made some modifications to meet his wishes in favour of the retention of certain existing regulations as to the sale of poisonous substances and the inspection of pharmacies.

* * *

It is announced that Professor Lord Rayleigh has been nominated by the Council of the British Association as President for the meeting at Montreal in 1884. It has been suggested in an American contemporary that if next year's meeting of the American Association for the Advancement of Science could be fixed for some north-eastern city in the States, sufficiently near to Montreal, and could be timed so as to occur a week before or after the meeting of the British Association in the latter city, many members of each Association would be able and willing to attend both meetings.

* * *

A case is undergoing investigation at Partick, near Glasgow, in which the death of a young man followed the administration of a medicine made up from a prescription under conditions appearing to indicate that the man was poisoned. It has been suggested that a mistake was made in dispensing the mixture, but the information received up to the present time is not sufficient to justify us in offering any opinion on the subject.

* * *

The Edinburgh Chemists' Assistants and Apprentices Association has issued a circular announcing its intention to offer for competition among the Apprentice members two prizes, one of the value of £2 2*s.*, and the other of 12*s.* 6*d.*, and to these the President of the Association has added a third. The subjects of the examination, which is to take place in October next, are—Latin, English, Arithmetic, Elementary Chemistry, and some questions on the processes by which the official decoctions, infusions, pills and tinctures are made.

* * *

The Council of the Sanitary Assurance Association had before it this week a resolution asking it to consider whether it could not recommend legislation making it compulsory on builders of all new dwellings to obtain an authoritative certificate as to the sanitary condition of such houses before it shall be lawful for them to be used as habitations. Eventually, a sub-committee was appointed to draw up a Bill, if it should be deemed desirable, and report to the Council.

* * *

While referring to this subject it may be mentioned, that on Saturday, the 16th inst., Mrs. Buckton will give, in connection with the Health Society's exhibition at Knightsbridge, the last of a series of three demonstrations upon models of a sanitary and an unsanitary house.

* * *

A conference between a committee representing the interests of proprietary medicine manufacturers and dealers and a representative of the Massachusetts Pharmaceutical Association has resulted in agreement in respect to a plan to be recommended for adoption as likely to prevent the continuance of the "cutting system" in selling such articles. The proposition is that all proprietary articles shall be sold by the jobbers in the first place at a reduction of two-pence in the shilling upon the retail price, each package having a coupon attached to be removed at the time of sale by the retailer, and which shall entitle him to a further specified rebate, provided that he does not in the meanwhile render himself liable to complaints for underselling. It is not, however, clear what is to prevent the removal of the coupons and the claiming of the rebate before the goods are sold, if the retailer chooses to make a false statement.

* * *

From time to time reference has been made in this country to the advantages presented by the arrangement under which in the United States imports of drugs of inferior quality are intercepted at the custom house; but in the light of a statement in one of our exchanges this guardianship would appear to be a broken reed to lean upon. According to the *Oil, Paint and Drug Reporter* an application was made recently to the bureau of statistics at Washington for information as to the quantity of "cassia vera" annually imported into the country. The preliminary question, "What is cassia vera?" proved a stumbling block, and after it had been passed from one *employé* to another it was discovered that the sum total of the knowledge on the subject possessed by the custom-house experts was that there are two articles of a similar character, called cinnamon and cassia, the former coming from Ceylon and paying a duty of twenty cents per pound, the other coming from China and paying only half that amount of duty. Inquiries spread over a wider area raised the doubt whether the greater part of the cinnamon imported into the United States during recent years has not been entered—and passed—as cassia, payment of the higher rate of duty being thus avoided.

* * *

We are glad to notice that within about eighteen months of its first publication, Mr. Joseph Ince's capital little 'Latin Grammar of Pharmacy' has reached a second edition. There can be no doubt as to the usefulness of such a book to pharmaceutical students.

* * *

At the meeting of the Chemical Society on Thursday next there will be a ballot for the election of Fellows, and the following papers will be read:—"On Evaporation in Vacuo," by Professor H. McLeod, F.R.S.; "Note on Hydrocarbons from Camphor," and "Note on some Substitution Derivatives of Camphor," by Professor H. E. Armstrong; and "On the Decomposition of Ammonium Nitrate, an Investigation into the Rate of Chemical Change," by V. H. Veley.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council of this Society was held on Wednesday, June 6, in the College of Physicians, Dublin, at three o'clock.

The President, Professor Tichborne, in the chair.

The other members of the Council present were:—The Vice-President, Dr. Aquilla Smith, and Messrs. Allen, Brunker, Doran (Bray), Draper, Grindley, Hayes, Hodgson, McIlwaine (Newry), Simpson and Wells.

Mr. Hugh J. Fennell, the Registrar, read the minutes of the last meeting and of a special meeting, which were confirmed.

Read, a letter from Mr. W. J. C. Miller, Registrar of the General Medical Council, enclosing a printed circular from Dr. Quain, Chairman of the Pharmacopœia Committee of that Council, stating that the Committee was very desirous of enlisting the co-operation of the several medical and pharmaceutical authorities in the bringing out of the new edition of the Pharmacopœia, and inviting suggestions with that view, which it was stated would receive most attentive consideration.

Mr. Draper said the office of making suggestions was a very thankless one.

The President: I think it should be courteous to reply to the letter.

Mr. Brunker: I think it would be well to appoint a Committee on the subject, which could report to the Council.

The Vice-President: The book will not be published for two years.

Mr. Hodgson: How did the Pharmaceutical Society of Great Britain take it up?

The President: We should be rather stultifying ourselves if we took any action on this letter when we are memorializing the Government to give us representation on the Medical Council.

Mr. Hodgson: I do not see how we can give suggestions to a committee on which we are not represented and of which we think we ought to be a component part.

The President: I would suggest that for the present, Mr. Fennell be directed to acknowledge the receipt of this letter. We can take up the matter afterwards, if necessary.

An order was made accordingly.

The President submitted a correspondence with Mr. Carteighe, President of the Pharmaceutical Society of Great Britain, showing the action which that Society had taken for the purpose of obtaining the insertion in the Medical Acts Amendment Bill of a clause providing that pharmaceutical authorities shall be represented on the Committee intended to be established under the Bill for the revision of the Pharmacopœia. The correspondence included copies of the memorial and petition which the English Society has adopted on the subject.

The President said that the Council had already discussed this point about the representation and the English Society was pressing on. It was requested, however, that no petition should be sent in until the Bill was going into Committee. But there was another point which the English Society did not seem to have taken cognizance of. One of the clauses of the Medical Bill provided that the "general medical practitioner," who had passed the State examination, should have a right o compound prescriptions. As the law at present stood medical practitioners were only given the right to compound prescriptions for their own patients. When the Bill in question was in the House of Lords an alteration was made in the clause in question, apparently advisedly, the effect of which would be to give every man who should have passed the State examination, the power of compounding for the public. The Apothecaries' Hall of Ireland had already petitioned against this; and he (the President) thought it was the duty of the Pharmaceutical Society of Ireland, also, to petition against it.

Mr. Brunker: It does not affect the English society so much as it affects us.

The President: It does, because if the clause as it stands becomes law, surgeons may not only compound for themselves but also for the public. I think a committee should be appointed to report on the two matters. It should be done at once. The clause should be altered by the introduction of the words "for their own patients."

Mr. Draper: I think it is a very important point.

On the motion of the President, seconded by Mr. Allen, a Committee, consisting of Mr. Draper, Mr. Hayes and the mover and seconder, were appointed to draw up a petition to the House of Commons, praying for amendments in the Medical Acts Amendment Bill in reference to the revision of the Pharmacopœia and the open dispensing for the public by general practitioners.

As it would be necessary to take action in the matter before the expiration of a month, the President and Registrar were empowered to affix the seal of the Society to whatever petition the Committee drafted.

A letter was read from Dr. J. W. Moore, Registrar of the College of Physicians, stating that as that body were pressed for library space, they were anxious to resume possession of the room rented by the Society; but they wished to afford the Pharmaceutical Society ample time to make the arrangements consequent on its surrender of the room.

The President said a committee had better be appointed to consider what should be done.

Mr. Hodgson observed that if they rented premises for themselves they would have to incur a considerable amount of expense in fitting them up so as to make them suitable for their purposes. They would have to buy furniture for an examination room. The £400 they had in hand would go a very little way towards that. Why should they not follow the example of the College of Physicians and raise funds by the issue of debenture stock for the erection of a building suitable for their requirements?

The Vice-President said that the College of Physicians raised first £6000 and afterwards £2000 more by the issue of debenture stock, and now it was all paid off.

Mr. Hodgson said that the Society had sustained a loss in its last year's operations. The income from fees had been £190, and the income from subscriptions, £78. Against that the expenditure had been £238, exclusive of rent and the cost of prosecutions, and some other matters, which would bring it up to £314.

The Vice-President: There has been a falling off in the number of members during the last few years.

The President said the matter was a very important one, and should receive careful consideration. A committee should be appointed with full power to make inquiries as to what premises could be had, and as to whether it would be desirable for the Society to hire rooms or to issue debenture stock for the purpose of providing a building of its own.

On the motion of Mr. Brunker, seconded by Mr. Doran, the following committee was appointed for that purpose:—The President, the Treasurer, Messrs. Draper, Grindley, Simpson, Hayes, and the mover and seconder.

A letter was received from Mr. Henry Webb, of Kanturk, complaining that a person who was neither an apothecary nor a pharmaceutical chemist had opened shop and was compounding prescriptions in that town.

Mr. Hodgson: Mr. Webb is not a member of the Pharmaceutical Society.

The Register was directed to inform Mr. Webb that as he was not a pharmaceutical chemist the Society could not entertain his letter.

A letter was read from Mr. Bernard J. Costello, of Killarney, in reference to his candidature for the office of apothecary of the Killarney Workhouse, and complaining of the result of the election.

The Registrar was directed to refer Mr. Costello to the Local Government Board.

A letter was read from Mr. Samuel Curham, dated May 26, and stating that he had been informed that the Council had passed a resolution that candidates who had not passed the Preliminary examination previous to January, 1883, would have to serve an apprenticeship of four years, but that that resolution was not to come into force until January, 1884. He wished to know whether candidates passing the Preliminary examinations to be held in July and October next would be admitted after two years' service. He also asked for information on another point. Mr. Hardy, who was a partner of Mr. Beater, of Sackville Street, and who passed the pharmaceutical examination some time ago had, by agreement with the firm, opened on his own account and responsibility, a compounding department in the premises of the said Beater and Co. Would an apprenticeship served to him, and his certificate thereof, be accepted by the Council?

The Registrar said he had already answered the first of the questions asked by Mr. Curham by informing him that any candidate who had not passed the Preliminary examination before April, 1883, would have to spend four years in the study of practical pharmacy.

The President: I think our best course with reference to the other question is to inform Mr. Curham that we cannot give a legal opinion. You have refused a certificate in the case of Mr. Middleton; he has appealed, and you are awaiting the result of that appeal.

Mr. Hodgson said it was hard upon Mr. Curham not to be able to give him an answer at once.

Mr. Brunker: We are not in a position to say that we cannot accept his certificate.

Mr. Hayes: I think we are in a position to say that we must refuse his certificate; and then he can appeal to the Castle as Mr. Middleton did.

Mr. Hodgson moved the following resolution:—

"That having refused a similar application, and as an appeal has been carried to the Privy Council, we await the result of that appeal before giving Mr. Curham a decided answer."

Mr. Brunker seconded the motion, which was passed unanimously.

The President gave the following notice of motion:—

"That on and after the 1st of October, 1883, the office of President of the Society shall not be held for more than three consecutive years by the same person."

A letter was received from Mr. Thomas S. Hance, of Limerick, in reference to the refusal of the Council to accept certificates given by him on the ground of his not keeping an open shop. He maintained that he did keep an open shop for the compounding of medical prescriptions and the preparation of medicine in general. The Local Government Board had sanctioned his taking pupils in pharmacy, under prescribed rules, a copy of which he enclosed. He had been giving certificates for four years and these had never been questioned by any other medical board in the three kingdoms. Between 40,000 and 50,000 prescriptions, he said, were prepared annually under his personal superintendence, and he submitted that the Act of Parliament did not mean that because a qualified man kept an open shop within certain gates and did not receive money over the counter he was not to have his legal rights.

Mr. Brunker: I think we are right in our decision. He does not keep an open shop. He keeps the dispensary of the workhouse.

Mr. Wells: If he only has a shop within the workhouse walls it is not an open shop.

The consideration of the letter was postponed in order that inquiries might be made.

A report from the Certificate Committee was adopted.

Mr. Hodgson said he had been requested on the previous day by an apprentice, who was about being bound, to obtain an answer to the following question:—The 32nd section of the Pharmacy Act provided that upon the decease of a pharmaceutical chemist or chemist and druggist, his executor, administrator, or trustee, might carry on his business so long as it was *bonâ fide* conducted by a duly qualified assistant who should be a pharmaceutical chemist or a chemist and druggist. Would the certificate of the party carrying on the business in such a manner, given to an apprentice, be accepted for the Major examination?

Mr. Brunker: As a matter of fact such certificates have been recognized and have never been questioned.

Mr. Hayes: If the establishment is kept open regularly and according to the requirements of the Act, I do not see how we can refuse the certificate. I think you may definitely answer that the certificate will be accepted.

The Council then adjourned.

Provincial Transactions.

BRISTOL PHARMACEUTICAL ASSOCIATION.

The annual meeting of the above Association was held at the "Museum and Library," Bristol, on Friday, June 1, the President, Mr. G. F. Schacht, in the chair.

The report of the Council was read by the Honorary Secretary, Mr. Warren, and the statement of accounts, which showed a balance in hand of £2 5*s*., by the Treasurer, Mr. White.

These were approved and formally adopted.

The new Council was then elected. It consisted of Messrs. Allen, Berry, Pitman, Schacht, Stroud, Warren, White and Wretts.

A communication, addressed to the President and members of the Bristol Pharmaceutical Association by the Registrar of the General Medical Council, and accompanied by a "memorandum" signed by the Chairman of the Pharmacopœia Committee, was submitted for consideration and was fully discussed.

It was unanimously resolved that the incoming President be requested to reply upon the following lines:—

"To W. J. C. Miller, Esq.,
"Registrar of the General Medical Council.

"Sir,—As President of the Bristol Pharmaceutical Association, I duly received on the 19th ult. a communication from yourself and a circular signed by the Chairman of the Pharmacopœia Committee, in which the Association was invited to 'offer suggestions with a view to rendering a new edition of the British Pharmacopœia as complete and accurate as possible.'

"The documents were in due course laid before the Association and were fully considered.

"I am now requested to reply that the Bristol Pharmaceutical Association is of opinion that the Pharmaceutical Society of Great Britain is the recognized centre of pharmaceutical activity in this country, its claims thereto being identical with those by virtue of which the General Medical Council represents medicine, namely, the decrees of Parliament, and, therefore, that any application on the part of the Pharmacopœia Committee for practical pharmaceutical co-operation in the construction of a National Pharmacopœia ought to be made primarily, if not solely, to the Pharmaceutical Society of Great Britain.

"I am further requested to say, on the part of the individual members of this Association, that they would feel disinclined to offer any suggestions upon the important subjects submitted to them except at the request and through the medium of their official representative the Council of the Pharmaceutical Society of Great Britain.

"I have the honour to be, Sir,
"Your obedient servant,
"
"*President, Bristol Pharmaceutical*
"*Association.*"

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

A meeting of the General Committee of the above Association was held at 23, Burlington Chambers, New Street, Birmingham, on May 31, 1883. The President (Mr. Joseph Lucas) in the chair.

Mr. Stokes Dewson having tendered his resignation as Honorary Secretary to the Association, the following resolution was unanimously carried, "That Mr. Charles Thompson and Mr. Alfred Wright be requested to act as joint Honorary Secretaries to the Association *pro tem.*"

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of this Association was held on Thursday, June 7. Mr. R. H. Parker, Vice-President, in the chair. Mr. C. Ranken read a paper upon :—

Some Old and New Theories concerning the Vegetable Cell.

After pointing out the necessity of a knowledge of the elementary parts of vegetable tissues in physiological botany, the author proceeded to review some of the most important theories which have been advanced to account for the different phenomena presented by cells, starting with Robert Hooke's observations, which showed that tissues were composed of a continuous homogeneous substance, permeated by innumerable cavities, but did not recognize the individuality of cells. Malpighi first pointed out that cells were separable one from another, and gave to each the name "utriculus." Wolff in 1780 again enunciated the homogeneous theory, which was held by some physiologists for a considerable period, Huxley writing in its favour in 1853. The discovery of the *nucleus* by Robert Brown gave rise to an amount of controversy; some botanists doubted its existence, whilst Schleiden made the belief in its existence the "first article of the faith botanical." Nägeli contended that it was a universal and unexceptional phenomenon in vegetable cells. Huxley looked upon both protoplasm and nucleus as accidental anatomical modifications of the primordial utricle. It is only within a comparatively few years that histologists have been able to demonstrate clearly the true distinctions which exist between the cell-wall and the cell-contents; most agree with Beale's definition which describes cells as consisting of three parts: (1) germinal matter or bioplasm; (2) formed matter or tissue; (3) nutrient matter. The bioplasm or protoplasm, being the most important part of the cell, is the immediate cause of cell formation and every process of organic life. The theories advanced to account for the growth of the cell-wall were next noticed, and a detailed account of Nägeli's intussusception theory was given, which shows that the substance—probably some soluble carbohydrate readily converted into cellulose—is diffused between the micellæ of the cell-wall, where it becomes deposited in the solid state either upon the pre-existing micellæ, or it forms new micellæ, by which means the wall increases in size and thickness. An account of the growth of starch granules was also given.

In the discussion that followed, the Chairman, Secretary, Messrs Crow and Sewell took part. A vote of thanks was passed to Mr. Ranken.

The Reporter upon Materia Medica, Mr. W. Elborne, then made a Report upon Commercial Rhubarbs, which was copiously illustrated by specimens from the Museum of the Pharmaceutical Society.

Commercial Rhubarbs.

BY WILLIAM ELBORNE,

Assistant Curator of Pharmaceutical Society's Museum.

Rheum is the botanical name of the genus of plants yielding the important drug familiarly known as rhubarb. The genus, a member of the Polygonaceæ, consists of twenty species, natives of the Siberian Himalayas and the East. They are perennials, with large root-stocks, from which the large sheathing leaves and flower stalks are given off. The inflorescence consists of much-branched panicles bearing a great number of white or pinkish flowers which have a petaloid six-parted perianth, enclosing nine stamens attached to its base. The three-sided ovary is surmounted by three spreading styles. The three-cornered fruit is winged and encircled at the base by the withered remnants of the perianth.

The fact of rhubarb being one of the most ancient valuable remedial agents of our materia medica will perhaps admit of a few preliminary remarks concerning its history.

The properties of rhubarb, which appear to have been known from a very remote period, find their earliest record in the Chinese herbal called 'Pen-king,' supposed to have been written about 2700 B.C.

As regards the ancient literature of Western Asia and Europe, it also occurs in the early writings of Dioscorides and Pliny; but whether then produced in the regions of Asia Minor or merely received thence from remoter countries, is a question which cannot be solved. A sketch of the history of rhubarb would be comparatively incomplete without some reference to the various routes by which the drug has been conveyed to Europe from the Western provinces of the Chinese empire and which have given rise to the familiar designations of Russian, Turkey and China rhubarb.

The first route is that over the barren steppes of Central Asia by way of Yarkand, Turkestan and the Caspian, to Russia; the second by the Indus or the Persian Gulf to the Red Sea and Alexandria, or by Persia to Syria and Asia Minor; and the third by way of Canton, the only port of the Chinese empire which previous to the year 1842 held direct communication with Europe. In 1653 China first permitted Russia to trade on her actual frontiers. The traffic in Chinese goods was thereupon diverted from the line of the Caspian and Black Sea further north, taking its way from Tangut across the steppes of the high Gobi and through Siberia by Tobolsk to Moscow.

Consequent on the rectification of the frontier in 1728, a line of custom houses was established by treaty between Russia and China, whereby the commerce, previously restricted, was limited only to the Government caravans which passed the frontier at Kiachta and Maimatchin, which towns ultimately became the staple depôts of rhubarb. In 1704, the Russian Government monopolized the trading in this drug and caravans fitted out by the Crown alone brought the drug to Moscow.

Under the surveillance of the Russian Minister of War, a special office was established at Kiachta, where the whole of the drug was submitted to careful inspection and examination by competent apothecaries, with the object of removing inferior and spurious pieces and to improve the selected drug by trimming, paring and boring. It was then dried and packed in chests which were sewn up in linen and rendered impervious to wet being pitched.

So long as China kept all her ports closed to foreign commerce, except Canton in the extreme south, most of the finest rhubarb consequently found its way to Europe by way of Russia. Owing, however, to the unpleasant accompaniments of the Russian supervision being so rigorously exercised, the Chinese were very ready to accept any easier and more reasonable outlet for their goods: consequently we find that the opening of a number of ports in the north of China exerted a most depressing influence on the trade of Kiachta. Thus the overland rhubarb trade became gradually destroyed, inasmuch as the Chinese, tempted by the increased demand from the trading ports, became negligent in the art of growing and collecting the root with such scrupulous care as formerly insisted upon by the Russian Government. Thereby the so-called Russian, Muscovite, or Crown rhubarb, which, from its uniformly good quality long enjoyed the highest reputation, has become a thing of the past and can only now be found in museum collections.

The second route is by the Indus or Persian Gulf to the Red Sea and Alexandria, or by Persia to Syria and Asia Minor.

From the Levant ports of Aleppo, Tripoli, Alexandria and Smyrna, it reached Europe and became known as "Turkey" rhubarb. This, however, did not long survive the Russian route; and as the imports in this direction ceased, the same name of "Turkey" was erroneously applied to the drug brought again by the original route through Russia.

The third line is by way of Chinese ports, hence our supplies from these quarters being known as Chinese, "Canton" or East Indian rhubarb.

With the view of classifying the numerous varieties of the drug the rhubarbs may be divided into two great classes, namely, those which are produced in Central Asia, and those which are cultivated in Europe.

Asiatic Rhubarbs.

Chinese	Russian, Muscovy or Turkey. Canton or East Indian. Batavian or Dutch, trimmed.	yielded by	*Rheum palmatum* var. *Tanguticum?* or *Rheum officinale?*
Siberian		"	*R. rhaponticum.*
Himalayan (large)		"	*R. Emodi.*
" (small)		"	*R. Webbiani.*
Bucharian		"	*R. undulatum.*
European.			
English		"	*R. rhaponticum.* *R. officinale.*
French		"	*R. rhaponticum.* *R. compactum.* *R. undulatum.*
Austrian (Moravian)		"	*R. rhaponticum.*

Asiatic Rhubarb, Chinese.—Owing to the fact that the greater part of the regions of Shensi, Kansu and Szechuen, where the plants grow, is as yet unexplored by botanists, and, perhaps, owing to the jealous reticence of the Chinese, the exact species yielding the true drug is not known with certainty.

The bulk of the commercial drug imported into this country, however, is considered to be afforded by two species, viz.:—*Rheum officinale* and a variety of *R. palmatum*, called *tanguticum.* The former is a native of the south eastern part of Thibet, and of various parts of West and North-Western China, where it is in a measure cultivated. The second species is said by Prejevalsky, a celebrated Russian colonel, to afford the excellent rhubarb of Thibet.

China rhubarb, as imported into Europe, consists of portions of a massive root which display considerable diversity of form, arising from the various operations of paring, slicing and trimming to which they have been subjected. Thus some pieces are cylindrical or rather barrel shaped, others conical, while a large portion are plano-convex. These forms are not found in the same package, the drug being usually sorted into what are commonly known as "rounds" and "flats." In dimensions we find them from 4 to 6 inches in length, and about 2 inches thick. The outer surface of the root is somewhat shrivelled, often exhibiting portions of dark cortical portions that have not been pared away.

Many pieces are pierced with a hole in which may be found the remains of the string used to suspend the root while drying.

The drug is dusted over with a bright yellowish powder, on removal of which the outer side of the root is seen to have a rusty brown hue, or viewed with a lens to be marked by the medullary rays, which appear as an infinity of short broken white lines traversing a brownish ground. The character which most readily distinguishes the rhubarb of China is, that well-developed pieces broken transversely display these dark lines arranged as an internal ring of *star-like spots.* Although this character is by no means obvious in every piece of Chinese rhubarb, it is of some utility from the fact that in European rhubarb such spots are generally wholly wanting or at most occur very sparingly and isolated.

Although Russian rhubarb has ceased to be an article of commerce since 1860, a few remarks respecting its character will not be out of place when we consider the very high repute it has always maintained and the many attempts made at the present day of slicing and trimming the East Indian drug with a view of simulating it.

The true Russian rhubarb, which is now very scarce, appears as though it had been freely sliced with a sharp knife, and each piece shows evidence of having been rigorously examined and inspected, by possessing a *large* hole (not a string hole) bored to its centre by the authorities at Kiachta. Another very distinguishing character is the net-veined appearance of its outer surface.

East Indian rhubarb of commerce is the variety which is chiefly imported to England. It is supposed to be derived from the same species as the former and distinguished by the small size, dark colour, and irregular shape of the holes with which it is pierced, these holes being generally plugged with the remains of string used in drying; also by the outer surface being frequently marked with whitish reticulations, which are more evident when the powder has been rubbed off, and by the transverse surface showing a number of star-like marks, but no distinct cortical layer. Canton stick rhubarb is probably obtained from the root branches of the same plants.

East Indian rhubarb is now purchased for the European market chiefly at Hankow on the upper Yangtsze, whither it is sent to Shanghai for exportation. The exports from Shanghai in 1878 were 5942 *piculs* (picul = $133\frac{1}{3}$ lbs.), valued at £40,000. Since that date no return, to my knowledge, has been issued.

Batavian or Dutch trimmed differs from the East Indian in having an angular appearance, owing to the surface having been sliced off. It is not now met with in English commerce as a distinct variety, but used to be imported from Canton and Singapore.

Siberian Rhubarb.—Small quantities of this kind have been imported occasionally, and have been proved to be those called by Grassman and others Siberian rhapontic root. This occurs in long, thin, almost cylindrical or spindle-shaped pieces, decorticated and perforated by a hole. Since it is yielded by the same species which is cultivated in England at Banbury, Dr. Pereira has justly compared it with English stick rhubarb.

Himalayan Rhubarb.—The cultivation of rhubarb in India has hitherto been unsuccessful rather than otherwise. The large Himalayan root is, however, furnished by *Rheum Emodi*, a large plant having a thick stem, growing from Bhotan and Sikkim to Kaschmir on the India side of the Himalayas, frequently reaching a height of more than 6 feet, and also indigenous to Western Thibet, but less abundant. In most districts of North-Eastern and Central Asia its efficacy is greatly praised, while in the damp and warm districts of Sikkim and Bhotan the root seems to be inefficacious. The smaller rhubarb of *Rheum Webbianum* is indigenous to the vicinity of Simla, at an elevation of more than 12,000 feet; it was tried by Dr. Royle in both military and civil hospitals at Saharunpore, and found to be of very good quality. Both varieties differ much in appearance from that of the Chinese drug, in that the brown cortical portion of the root has not been removed. The texture is radiated, rather spongy and the colour of the powder a dull brownish yellow.

Bucharian Rhubarb, which makes its way to Vienna by Brody and Nischny, seems, from specimens and information afforded by Faber to Dr. Pereira, to consist of inferior kinds of the Russian drug.

European Rhubarbs.

In various parts of Europe, particularly in England, France and Germany, the rhubarb plants have been cultivated for many years.

English Rhubarb occurs generally in two forms, one in which the root is cut, trimmed and bored in imitation of the Russian; the other in sticks. The former occurs in various sized flat and irregular pieces, commonly about 6 inches long. English rhubarb is lighter and more spongy than the Asiatic, and when broken exhibits a more regular marbling, the pink lines being arranged like rays from the centre towards the circumference. The star-like spots are either wanting or very sparingly scattered. The whole of the English rhubarb in the market is grown by Mr. Rufus Usher, at Bodicote, near Banbury. To him I am indebted for his kindness in having furnished me with authentic specimens of the home-grown roots of *R. rhaponticum* and *R. officinale*, and also with statistics relative to the annual production. He informs me that this amounts to 7000 lbs. of the drug, of which about 4000 lbs. is exported.

French Rhubarbs.—The rhubarbs of France are derived from *R. rhaponticum*, *R. undulatum* and *R. compactum*. That which comes from the department of Doubs is furnished by *Rheum rhaponticum*, and that from Provence by *Rheum undulatum*. French rhubarbs possess somewhat similar characters to those which exist in the Chinese drug. They, however, show such an analogy to each other that it is very difficult to distinguish from which species commercial samples of the drug may have been derived, since in appearance it much resembles the drug grown in England, and occurs in similarly shaped pieces. The remarks concerning English rhubarb will apply equally to the French drug, the cultivation of which is rapidly decreasing.

Austrian.—This rhubarb occurs in smooth decorticated pieces, fairly compact, and weighing about 4 ounces each. It possesses a very clear yellowish appearance, with small reddish-brown spots interspersed. The transverse section of this rhubarb presents a regular radiate structure.

Of these several varieties of rhubarb, nearly all of which still constitute the commercial products of countries abroad, only two varieties occur in English commerce at the present day, they are the Chinese (East Indian) drug (*R. palmatum*, var. *tanguticum*), and that grown in our own country (*R. rhaponticum*).

In the discussion that followed, the Chairman, Secretary, Messrs. Corder, Crow, Hamilton and Ransom took part.

SOCIETY OF CHEMICAL INDUSTRY.

Chemistry and Analytical Examination of Fixed Oils.*

BY ALFRED H. ALLEN.

(*Concluded from page 1031.*)

I fear I owe the Society an apology for dilating so largely on the subject of the oil from marine animals, but the comparative novelty of the subject must be my justification, and in addition I may point out the very important bearing the peculiar chemical constitution of these oils has upon the methods of detecting their adulteration. That bottle-nose oil is now frequently substituted for sperm oil without acknowledgment is a fact well known, and the great similarity between them renders it difficult to devise any method by which the substitution can be positively detected, but the admixture of any of the ordinary oils with sperm or bottle-nose oil would be at once detected by the saponification process, the fatty acids being increased and the ether residue diminished by any admixture of sperm or bottle-nose oil with a glyceride. A properly-contrived mixture of a mineral oil with a glyceride could be made to simulate sperm oil in density, and approximately in the proportion of ether residue and fatty acids, but the sum of these two would be sensibly below 100, instead of several units above, as in the case of genuine sperm and bottle-nose oils.

I have already referred to the dependence of the density of fixed oils on their chemical constitution, and it is of interest to see how far oils of similar chemical character may be correctly grouped by their density. The following table shows the results of such arrangement when applied to the best-known fluid fixed oils:—

A.—OILS OF LESS DENSITY THAN ·883.

1. *Liquid Waxes*:

Sperm oil	·875 to ·883
Bottle-nose oil	·876 to ·880

2. *Unknown Constitution*:

Shark-liver oil	·865 to ·867
African fish oil	·867

B.—OILS HAVING A DENSITY BETWEEN ·883 AND ·912.

Oil from the head-cavity of the bottle-nose whale (specific gravity ·908), giving on analysis figures proving it to be a mixture of a fluid wax and a glyceride.

C.—OILS HAVING A DENSITY BETWEEN ·912 AND ·92 (NON-DRYING OILS).

1. *Vegetable Oils*:

Almond oil	·917 to ·920
Earthnut oil	·916 to ·920
Olive oil	·914 to ·917
Rape or colza oils	·914 to ·917
Mustard oil	·914 to ·920

2. *Marine Animal Oils*: None.

3. *Terrestrial Animal Oils*:

Lard oil	·915
Tallow oil	·916
Neatsfoot oil	·914 to ·916
Bone oil	·914 to ·916

D.—OILS HAVING A DENSITY BETWEEN ·920 AND ·937.

1. *Vegetable Oils*:

(*a*) *Moderately drying*—Density below ·930.

Cotton-seed oil	·922 to ·930
Sesame oil	·923 to ·924
Sunflower oil	·924 to ·926
Niger-seed oil	·926 to ·928

(*b*) *Strongly drying.*

Hempseed oil	·925 to ·931
Linseed oil	·930 to ·935
Poppy seed oil	·924 to ·237
Walnut oil	·925 to ·926

2. *Marine Animal Oils*:

Cod oil	·923 to ·930
Menhaden oil	·929 to ·932
Seal oil	·924 to ·929
Porpoise oil	·920 to ·923
Whale oil	·920 to ·930

3. *Terrestrial Animal Oils*: None.

* Paper read before the London Section of the Society.

E.—OILS HAVING A DENSITY ABOVE ·937.

1. *Vegetable Oils—Purgative*:

Croton oil	·942 to ·943
Castor oil	·960 to ·964

(Boiled linseed oil.)

2. *Animal Oils*: None.

The peculiarity of the composition of the oils of Class A I have already referred to at length, and the single oil in Class B requires no further notice. The oils of Class C present a very close general resemblance. They consist chiefly of the glycerides of oleic acid and its homologues. Thus the oils from almonds, olives, lard, tallow, neatsfoot, and bones, consist mainly of triolein. Arachis or earthnut oil is peculiar in containing the glyceride of hypogœic acid, which stands in the same relation to palmitic acid that oleic does to stearic acid. Rape and mustard oils contain the glyceride of brassic or erucic acid, which is said to be homologous with oleic acid. The lead salt, however, is insoluble in ether, while oleate and hypogœate of lead are soluble. Oleic and hypogœic acids and their respective glycerides agree in yielding isomeric bodies of comparatively high melting point under the action of nitrous acid, while brassic acid does not yield a solid product under the same conditions. Similarly, rape and mustard oils, which in large part consist of the glyceride of brassic acid, give but little elaidin, that which is formed being doubtless due to the true olein present together with the glyceride of brassic acid. In Class D we have several distinct groups of oils. The chemistry of the oils of the cotton-seed group—which are sometimes called the "partially-drying oils"—is very imperfectly understood. The fatty acids obtained on saponifying cotton-seed oil have a remarkably high melting point, but can scarcely contain much palmitic or stearic acid, or the oil would be solid at ordinary temperatures. The true drying oils, of which linseed oil is the type, are well known to absorb oxygen with great facility, especially after being exposed to a high temperature. That they have a distinct chemical constitution from the non-drying oils is indicated not only by this fact, but also by their giving no solid elaidin with nitrous acid, and by their high density and fluidity. They also give a much greater increase of temperature when treated with strong sulphuric acid than is the case with the oils of either of the previous classes. Although, from their general resemblance to linseed oil, the oils of walnut, hempseed and poppy seed may be assumed to consist largely of the glyceride of linoleic acid, I am not aware that this has been definitely proved to be the case. It is worthy of notice that the animal oils which have a density higher than ·916 are in every case of marine origin. They yield but little solid elaidin, and hence contain but little true olein, in which respect they present a marked contrast with bottle-nose oil, which gives a fairly solid product, as also do its separated fatty acids. On the other hand, the "fish oils" do not dry readily; hence their chemistry is still somewhat obscure.

The only fixed oils which in a natural state have a density higher than ·937 are castor and croton oils. Castor oil has properties and constitution which appear to be perfectly unique. It consists chiefly of the glyceride of ricinoleic acid, $C_{18}H_{34}O_3$, is remarkably viscous, and has a density of upwards of ·960. It differs from all the other fixed oils (except croton oil) in its ready solubility in alcohol, being miscible in all proportions with absolute alcohol, and completely soluble at 30° C. in twice its volume of rectified spirit. But a still more remarkable peculiarity is its insolubility in petroleum spirit, which appears to be miscible in all proportions with the generality of fixed oils. Castor oil itself dissolves its own measure of petroleum spirit and somewhat less of the heavier petroleum products, but the mineral oil takes up little or no castor oil. For lubricating purposes it is often desired to effect a mixture of castor with mineral oil, and this is usually done by the addition of an animal olein.

The fixed oils which are solid at ordinary temperatures also vary in density according to their chemical constitution, those which contain glycerides of the lower fatty acids being distinctly denser than the fats consisting wholly of palmitin, stearin and olein. This fact, on the suggestion of Mr. J. Bell, has been utilized for examining butter. The following are the densities of molten fats at 100° C., compared with water at 15° C.

F.—FATS CONTAINING NO GLYCERIDES OF LOWER FATTY ACIDS.

1. *Vegetable Fats.*

Cacao butter	·857
Palm oil	·857
Japan "wax"	·873

2. *Animal Fats.*

Lard	·861
Tallow	·860
Horse fat	·861
Butterine	·859

G.—FATS CONTAINING GLYCERIDES OF LOWER FATTY ACIDS.

1. *Vegetable Fats.*

Cocoanut oil	·868
Palmnut oil	·866

2. *Animal Fat.*

Butter fat	·865 to ·868

The figures referring to the densities of the animal fats are by König, and it is not certain whether water at 4° or at 15° C. was taken as unity.

It will be noticed that melted "Japan wax" exhibits an anomalous density, and this is true also of the solid body. It is alleged to consist of nearly pure palmitin; but this seems highly improbable on several accounts. However, I find only 1·14 per cent. of unsaponifiable matter on saponifying and treating with ether, so that it is not a true *wax*, and the peculiarity probably lies in the nature of the fatty acid.

Although it will be seen that observation of the density of oils is capable of giving much more valuable information than is usually gleaned from the rule-of-thumb application of the test, the conclusions from the experiment are apt to be vitiated by the presence of any large proportion of free fatty acid. This will be evident when it is remembered that free oleic acid has a density not exceeding ·900 at 15° C., and hence rancidity generally tends to reduce the specific gravity of an oil. The error from this cause may be avoided by the troublesome plan of saponifying the oil, and taking the density of the resultant fatty acids. Unfortunately, there are not at present sufficient data to render the plan generally useful, but in taking observations of this kind I should strongly recommend the mode of operating adopted by Mr. L. Archbutt. He takes the density of the oil at a steam heat, and hence is able to compare all fatty acids, whether liquid or solid, at ordinary temperatures. For the experiment, he employs a small Sprengel tube, which is hung by the horizontal capillary portions in the neck of a 20-ounce flask, containing water in rapid ebullition. A watch-glass or porcelain crucible cover is placed over the neck of the flask so as to prevent cooling. Two little mouths on opposite sides of the neck of the flask allow the ends of the Sprengel tube to project, while the flask is pretty tightly closed by the porcelain cover. When no further expansion of the oil is observed to occur, the nose of the Sprengel tube is touched with a piece of filter paper, to remove adhering oil, and the tube is then removed, wiped dry, cooled, and weighed. Operating in this way, Mr. Archbutt has observed the following densities for fatty acids from various sources, compared with water at 100° C. taken as unity. For convenience I add some observations of melting points also observed by him.

Source of Fatty Acids.	Density at 100° C.	Melting Point Deg. F.
Pure olive oil	·8444	75 to 76
„	·8429	—
Earthnut oil	·8475	82·3
Pure rape oil	·8439	65
Colza oil	·8464	65
Cotton-seed oil	·8494	95·5
Niger-seed oil	·8562	76·5 to 80·0
Linseed oil	·8599	52·5
Train oil	·8597	87·0
Palm oil	·8389	—

In observing the melting point of fatty acids and similar substances very good results may be obtained by the capillary-tube method, provided that the following points are rigidly adhered to: (1) To allow the fat to solidify *slowly*, avoiding all artificial means of cooling. (2) To allow at least an hour to elapse after solidification before taking the fusing point. (3) To heat the water extremely slowly.

A convenient apparatus for taking fusing points consists of a 20-ounce flask, from which the neck has been removed. The flask is filled with water, and a small beaker fitted into the mouth, and itself filled with water. The capillary tube should be in close proximity to the bulb of the thermometer.

A good alternative method (due to Dr. Redwood) is to half fill the beaker with clean mercury, and place a small fragment of the fatty acid on the surface of the metal. The thermometer bulb must be wholly immersed in the mercury. The melting point is very readily observed, and several samples can be readily tested simultaneously. When sufficient of the fatty acid is available, Dalican's method of taking the solidifying point is very useful.

I have already pointed out several errors which the unsuspected presence of free fatty acid in an oil is apt to occasion. Another is the vitiation of the colour test for oils, based on the reaction of the sample with polysulphide of barium or calcium. Chateau, who first devised the test, and Muter, who modified it, observed that certain oils decolorized the reagent, whereas others gave a yellow colour. I believe the differences observed were mainly, if not entirely, due to the presence or absence of free acid in the samples of oil examined. Direct experiments made by mixing olive and cotton-seed oils with increasing quantities of pure oleic acid fully confirmed this view. Similar objections apply to the majority of colour tests for oils, the fact being that the albuminous, resinous and other foreign matters, on the presence of which the colour reactions depend, are more or less completely removed by the processes employed in refining the oil. A notable case of this kind is that of cotton-seed oil, which, in the unrefined state, gives a fine violet-blue colour with caustic soda, and a magnificent red with sulphuric acid. The violet colour produced on treating a liver oil with sulphuric acid is one of the most striking and reliable of the colour reactions of oils.

Among Chateau's colour tests for fixed oils is anhydrous stannic chloride, which has been applied by Renard to the detection of resin oil. On adding a drop of stannic chloride to ten or twelve of resin oil and stirring the mixture a fine purple colorization is produced. The test is a good and useful one, but anhydrous stannic chloride is not always at hand, and is troublesome to prepare. I have, therefore, employed stannic bromide instead, and find it to answer equally well. I make it by agitating bromine in a separator with strong sulphuric acid, to remove water, and then allow the bromine to drop slowly on granulated tin, contained in a well cooled flask.

Maumené's test for oils by observing the rise of temperature produced on mixing 50 grams of the oil with 10 c.c. of acid is a useful test dependent on the chemical constitution of the oils examined, and, when carefully conducted, it gives remarkably constant indications. The following are essential conditions of success: (1) Always to use an acid of exactly the same specific gravity, and to preserve it most jealously from the air. (2) To bring the oil and acid to exactly the same temperature before commencing an experiment. (3) To mix the oil and acid thoroughly by means of a thermometer, stirring the whole time, and not reading off the temperature till the mercury begins to fall. (4) To work with the same apparatus, and to prevent loss of heat by enclosing the beaker in a non-conducting substance. In the case of the vegetable oils, the rise of temperature increases very regularly with the drying tendencies of the oil—olive oil developing about the least heat and linseed oil the most. Among the oils from marine animals, sperm and bottle-nose oils give only a moderate rise of temperature, while whale and cod oils develop great heat.

In examining olive oil the elaïdin test is very serviceable, though the result cannot be readily expressed in figures. The elaïdin test depends on the property of olein and oleic acid to yield isomeric bodies of comparatively high melting point under the action of nitrous acid. The reagent may be applied in various ways. Nitrous fumes may be allowed to bubble through the oil; a mixture of dilute sulphuric acid and sodium nitrite may be used; or the oil may be treated with a freshly prepared solution of mercurous nitrate, which has a remarkable power of retaining nitrous acid. The first process I have not personally employed, and the second appears apt to give erratic results. With care the third method gives very constant indications. For the test 12 grams of mercury should be dissolved in 11 c.c. of cold nitric acid of 1·35 specific gravity, and 8 grams of the newly made solution are shaken with 96 grams of the oil, and the agitation repeated every ten minutes during two hours. When treated in this way, olive oil, and other animal and vegetable oils consisting chiefly of olein, give solid elaïdin, while the drying oils remain liquid. Cótton-seed oil and others of the same group give intermediate results. With the exception of bottle-nose or sperm oils the oils from marine animals give little solid elaïdin. The elaïdin reactions of rape and mustard oils have already been described. Olive oil is remarkable for the canary or lemon-yellow colour, and the great firmness of the product, which, after twenty-four hours, is impervious to and sometimes rings when struck with a glass rod, but this peculiarity is common to arachis and lard oils. Of the physical characters of oils, the specific gravity is of the first importance. The solidifying point is not generally capable of accurate observation, and is apt to vary considerably with different samples of the same kind of oil. The absorption spectrum is simply of service in detecting the presence of chlorophyll, and, therefore, by inference, of a vegetable oil; but its indications become less distinct the older an oil is, or the more carefully it has been refined.

The viscosity of an oil is a valuable and highly practical characteristic, but to make the observations of value they must be conducted with more care than is commonly the case. Thus, a sample of rape oil, which will flow out of a tube with a small orifice in three hundred seconds when the temperature is 38° C., will require three hundred and nineteen seconds at a temperature of 37° C. Hence the most scrupulous care is necessary to bring the sample to be tested to the standard temperature, and to keep it at that temperature during the operation.

I have not attempted in this paper to give an account of or even mention all the tests and processes of greater or less value which may be employed for examining oils, but have rather attempted to lay stress on those details of manipulation which have been neglected, and those pecularities of constitution which are likely to prove of practical value in discriminating between different kinds of fixed oils. It must, however, be remembered that a fixed oil is at least only a natural product, varying in character with the age, habitat, and personal idiosyncrasy of the plant or animal which has produced it, and hence is not of absolutely constant composition. Again, oils from different sources, though slightly different in constitution, possess so many properties in common that any proximate separation of the two is out of the question, and the presence of the oil forming the minor part of the mixture is often only a matter of inference from the abnormal physical and chemical characters of the sample. But if chemists can see little hope of detecting in all cases the exact nature of complex mixtures of oils, they are now in a position to indicate with considerable certainty whether a given sample of oil is fitted for its intended purpose, and in this manner may do great service, and relieve the engineer and manufacturer from the crying evils of corrosive lubricating oils, non-drying linseed oils, and objectionable sophistications of all kinds.

In conclusion, I may call your attention to a very ingenious arrangement devised by Soxhlet for extracting oils from seeds, etc., but which is capable of numerous other applications. A flask containing ether or other volatile solvent is heated by means of water contained in an outer vessel of tinned iron or copper. Fitted to the neck of the flask by means of a cork is the Soxhlet tube, which consists of a kind of large test tube furnished with a siphon. The vapour passes into the upper part of this tube by means of the side tube, and thence rises into the Liebig condenser, where it is condensed, and drops upon the sample, which, in my apparatus, is contained in a loose inner test tube, having a hole at the bottom closed by a plug of glass-wool. When the condensed solvent, having the oil in solution, rises sufficiently high, it passes into the siphon, and forthwith runs back into the flask, to be again evaporated, condensed and utilized. When the exhaustion is complete it is only necessary to remove the inner tube, when the apparatus is ready for another extraction.

Reviews.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION at the Thirtieth Annual Meeting; also the Constitution, By-Laws and Roll of Members. Philadelphia. 1883.

This year the annual volume of the American Pharmaceutical Association came to hand later than customary, but not too late to be welcome. As usual the Report on Pharmacy by Professor Diehl constitutes a large portion of the volume, extending over about 440 octavo pages. We have referred in former years to the nature of the arrangement adopted in these reports as bringing into juxtaposition abstracts referring to kindred subjects, and have only to say now that this plan is well carried out in the present volume. The report is very creditably executed, and although it is more inclusive than the corresponding section in the Conference Year-Book, we see little in it to object to on that ground. One valuable feature, in which it certainly has the advantage of its British contemporary, is the extent to which it is illustrated by means of woodcuts, especially in abstracts where any new apparatus may be described.

An epitome of the papers read at the meeting at Niagara Falls in September last has already been given in this Journal. These papers and the discussions following them are now printed *in extenso* in the volume before us. We do not think that the plan of printing the papers in one section and the discussions in another is at all a convenient one, besides which it probably tends to the ignoring of the latter.

We are frequently applied to for information respecting the laws regulating the practice of pharmacy in the United States and have sometimes felt much difficulty in complying with such a request in consequence of the multiplicity of existing laws, and the constant changes that are still being made. But as is well known the American Pharmaceutical Association appoints every year a Committee on Legislation, whose special duty it is to keep the knowledge of the members *au courant* with the legislative changes affecting their calling in different parts of the Union. The last report states that during the previous year new laws regulating the practice of pharmacy had been enacted and approved in the states of Georgia and Wisconsin, and amendments to previously enacted pharmacy laws had received the sanction of the proper authorities in Connecticut, Iowa and West Virginia. Laws intended to prevent the adulteration of food and drugs had been enacted in Louisiana and Massachusetts, and in Connecticut a new licence law contained a clause referring to the supply of alcoholic liquors for medicinal purposes. In pursuing its inquiries the Committee became acquainted with the fact that there were in operation several laws affecting the practice of pharmacy that had escaped notice in previous years, and extracts from these are now given. The present volume, therefore, contains an unusual amount of information on this subject.

THE CHINESE OPIUM SMOKER. London: S. W. Partridge and Co. 1883.

Hitherto we have carefully abstained from introducing the subject of the opium controversy into these pages, and only refer to it now in order to direct the attention of our readers to a pamphlet bearing the above title on account of its artistic merits. It consists mainly of twelve illustrations, fac similes of Chinese drawings, depicting the downward stages of the opium smoker. It is stated in the preface that the pictures were originally published in the form of cartoons in China, and that in that country they have been posted up in the wayside tea-houses, as well as on the walls of public places, and circulated far and wide among the Chinese people at the expense of native gentlemen who have become alarmed at the spread of opium smoking, or who have wished to store up merit for themselves by circulating tracts and leaflets exhorting men to virtue. About six years ago the Chinese Anti-Opium Society of Canton republished a set of these pictures with a descriptive text, and an English resident in Hankow, thinking that people in this country might be reached by pictures who would not read ordinary anti-opium literature, sent home a set coloured by a native artist. It is from this set that the fac similes have been taken; the pictures have been beautifully executed, and each is accompanied by a translation of the original Chinese description. It is not probable that the sum of sixpence, the price at which the pamphlet is published, represents more than a portion of the cost of bringing it out.

CACAO: HOW TO GROW AND HOW TO CURE IT. By D. MORRIS, M.A., F.G.S. London: S. W. Silver and Co.

This little manual contains the substance of a lecture delivered under the auspices of the Institute of Jamaica by the indefatigable Director of Public Gardens and Plantations in that island, which had for its primary object the diffusion of information respecting the cultivation and preparation of cacoa, with a view to a further development of the industry. After historical and descriptive accounts of the cacao plant, the author deals with the methods of cultivation, the gathering of the crop, and the subsequent sweating and curing of the beans, and he also gives some information valuable to intending planters as to the cost of establishing a cacao estate and its relation to the average yield of the trees. We learn that a good cacao tree in good soil yields from fifty to several hundred pods per annum; the average for well cultivated trees at seven years old is between eighty and one hundred pods, about eleven pods being required to yield one pound of cured cacao. Certainly the author holds out a tempting inducement to those in a position to take up the cultivation in Jamaica, for he tells them that by combining on the same plantation the cultivation of the cacao and the banana, sufficient profit may be derived from the sale of the banana fruit to cover the entire expenditure during the first four or five years required for the maturation of the cacao plants. The book contains a considerable amount of interesting reading, though many of the details will be of use only to those who can give them practical application.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Cannabin.

Sir,—Dr. Matthew Hay states in the *Pharmaceutical Journal*, No. 675, 1883, that he has discovered in the Indian hemp an alkaloid, to which, from its action, he gives the name of tetano-cannabine.

This gentleman at the same time remarks that he received, some considerable time ago, from Messrs. T. and H. Smith and Co., of Edinburgh, under the name of cannabine, a preparation which was not pure, but which, probably, consisted of a mixture of resin and varying quantities of the active principle of the hemp, while a cannabine supplied to him by me, apparently prepared in a similar manner to that of Messrs. Smith, possessed very little or no narcotic action.

Replying in self-defence to Dr. Hay's remark, I beg to mention that I have in my price-current two entirely different preparations from Cannabis indica, viz., firstly, cannabin, being the ordinary commercial resin from Indian hemp; and secondly, cannabin. tannic. (Merck).

The first cannabin mentioned, and described by Dr. Hay, is a resinous body which, from long custom, still goes under the name of cannabine, but the action of which, as I had long since discovered, is far from being certain or reliable. In consequence, I have made it the study of many years to isolate the active principle of the Indian hemp, a task in which I have, I flatter myself, after very considerable labour and trouble, succeeded.

This is the cannabin. tannic. (Merck) referred to above, and which glucoside has nothing whatever in common with the ordinary resinous cannabin.

A series of experiments, as to the effect of my cannabin. tannic. has been made, and I give here a few extracts from my report on "New Remedies," of February of this year, on the subject.

"*Cannabin. Tannic.* (*Merck*).—The preparation which I introduced under this name is a glucoside contained in Indian hemp, combined with tannin. Endeavours have been repeatedly made to discover and isolate, in a form suitable for medicine, the active principle of this plant, which has long been treasured for its medicinal properties. A cannabin has long been in vogue, which, however, under this name, was really little more than a very pure extract of cannabis indica.

"After numerous experiments, involving much time and trouble, I succeeded in producing this new preparation, which in the very short time of its existence has gained for itself a considerable reputation.

"As already mentioned, this cannabin is of a glucoside nature, and resembles, in its chemical comportment, solanin and allied preparations, in that it shows an alkaloid reaction. The combination with tannin has been chosen in order to give to the glucoside, which is of a nature very liable to decomposition, a handy and durable form.

"The action of cannabin. tannicum is narcotic, viz., soothing and soporific, without any bad after effects, as is often the case after the use of morphia and other opiates. With regard to its practical use, we have an article by Dr. Fronmüller in the *Memorabilien von Betz*, 1882, No. 51, which says:—'The patients to whom this cannabin was administered were afflicted with almost every variety of disease, and were at the same time suffering to a high degree from nervous sleeplessness, for which they had nearly all taken opium or morphia without effect.'

"The dose of cannabin. tannicum varies in different cases from 0·1–1·5 gram, but the most usual was 0·2–0·5 gram, administered, as a rule, at about half-past nine in the evening. Only in the case of very large doses, 1·0 or 1·5 gram (in the case of very delicate individuals, also, naturally, with smaller doses), were appearances of unconsciousness occasionally observed, which, however, quickly disappeared on the use of acetic ether.

"Most important is the fact, that neither were the digestive organs in any way affected, nor retarded motion of the bowels produced, as is generally the result from the use of other opiates.

"Dr. Hiller (Charité Berlin) also referred, at the January meeting of the 'Verein f. i. Medicin,' to my cannabin. tannic, and his observations agreed with those of Dr. Fronmüller. He described it as a mild and agreeable hypnotic, especially in cases where morphia cannot be administered on account of unfavourable after effects of the latter drug on the patient. It also appears that the use of cannabin. tannic. will have a very large and important field in asylums for the insane.

"I am indebted to Dr. Karrer, of the *Kreisirrenanstalt Erlangen*, for various communications, according to which highly satisfactory results were obtained with my cannabin. tannic. in cases of excited and restless lunatics."

In the interest of myself, and also of others, I deem it advisable to give publicity to the above, inasmuch as Dr. Hay does not seem to be acquainted with my cannabin. tannic., to which he does not in any way refer.

Darmstadt. E. Merck.

Purity of Sodium Nitrite.

Sir,—I am sorry that a mistake in the "Month's" abstract of my paper on the "Nitrite of Sodium in Angina Pectoris" has misled Mr. Ekin in his letter to you in the issue of June 9.

The abstract is so far right in stating that a specimen of nitrite of sodium procured from a London firm of acknowledged eminence contained actually only 33 per cent. of the nitrite, the remainder being nitrate. But it is wrong in attributing to me the statement that in another specimen, purchased two years previously, I found only a trace of the nitrite. What I really said was—a trace of the nitrate.

It is due to the London firm alluded to that I should add that a specimen of the nitrite, which they have recently forwarded to me, is as pure as could be expected.

The purity of the nitrite depends much on the process of its manufacture. Employing the proper process it is not difficult to obtain a comparatively pure nitrite. But I confess I am agreeably surprised to observe that, according to Mr. Ekin, nitrite of sodium is "one of the purest salts to be met with in commerce." It may be so when prepared under a guarantee, as for Mr. Ekin, but I fear it is not commonly so pure.

12, *Hope Street, Edinburgh.* Matthew Hay, M.D.

W. J. Williams.—The Secretary to the Institute of Chemistry is Mr. C. E. Groves, Somerset House Terrace, Strand, W.C.

M. C. Summers.—We cannot refer you to a book such as you describe, neither are we acquainted with the work mentioned.

"*Pharm.*"—(1) "Tinct. Ferri Perchlor. ℥j; Bals. Copaib. ℥j; Sp. Æth. Nit. ℥j; P. Cubeb. ℥ss." This mixture presents no difficulty. The ingredients require only to be mixed; no attempt should be made to emulsify with mucilage. (2) "Potass. Permang. ℈j; Syr. Aurant. ℥j; Aq. ad ℥viij." In this case reduction takes place and the mixture gelatinizes.

R. Modlen.—It has already been observed that a mixture containing spirit of nitrous ether and sodium salicylate becomes discoloured more or less; dependent on the condition of the spirit of nitrous ether.

"*Rhei.*"—"Iodoform, Creasote, aa gr. j: fiat pil." One grain of bread crumb to each pill answers very well as an excipient.

"*Provident*" is recommended to communicate his suggestion to the Council of the Chemists' Assistants' Association.

"*Pill Coater.*"—You do not mention the material you wish to use. For a process of coating pills with gelatine, see before, p. 506. A number of other communications on the general subject have been published in this Journal, references to which may be found in the indexes to the different volumes.

Communications, Letters, etc., have been received from Messrs. Gillman, O. Jones, Cowan, Miller, Mumbray, Kinninmont, Crinis, J. D. N.

THE ANALYSIS OF SOME AUTHENTIC SPECIMENS OF NUX VOMICA.

BY WYNDHAM R. DUNSTAN,
Demonstrator of Chemistry,
AND F. W. SHORT,
Assistant Demonstrator of Chemistry in the Laboratories of the Pharmaceutical Society.

The specimens of the seeds of *Strychnos Nux-vomica* which form the subject of the present communication came into our possession through the kind interest of Professor Bentley,* who had already† laid stress upon the desirability of a chemical examination of the seeds from different districts being made. During the discussion of our paper upon "The Assay of Nux Vomica," at a meeting of the Pharmaceutical Society in February last, Professor Bentley again alluded to the matter, when we promised to make a chemical examination of such authentic specimens as could be obtained (*Pharm. Journ.*, [3], xiii., 677). The seeds of nux vomica appear to come into the English market under three heads: "Bombay," "Cochin" and "Madras." Of these the "Bombay" is the most highly prized by manufacturers. No analysis of these seeds has been published, and in fact, so far as we can find, there is no analysis upon record of an authentic specimen of this important drug. Two series of specimens are in our possession, the one collected in 1877, the other in the present year. The first series were labelled "Bombay Fine," "Bombay Ordinary," "Cochin," "Madras." The second series, "Bombay," "Cochin," "Madras." The seeds labelled "Bombay Fine" had evidently been assorted from "Bombay Ordinary," the selection being apparently based upon the acute edge and satiny texture. The appended table embodies the principal physical characters of the specimens. One of us has spent some time in endeavouring to identify the source or sources of the above specimens, but with little success. The authentic specimens of the entire plant in this country are so scant, often mutilated, and so seldom accompanied by the seeds, that no certain conclusion could be arrived at from their examination. It is unnecessary to enter into a description of the specimens of the plant in this country. The description of the following specimens in the Kew Herbarium may be taken as representative, and are worthy of record:—

Strychnos Nux-vomica—

Large tree, grows from 25 to 40 feet. Larger trees, excepting shoots at base, seem thornless. Smaller, thorny in parts.

On the Kala Nuddi. Dr. Ritchie, December, 1852.

Description by W. R. D.

Leaves: veins, five. Three veins very marked, two indistinct.

[Largest leaf: *breadth*, maxim. 66·54 mm.; *length* from apex to stalk, 127 mm. *Apex*, accuminate, distinct.]

[Smallest leaf: *breadth*, maxim. 57·15 mm.; *length* from apex to stalk, 69·8 mm. *Apex*, indistinct.]

Seeds: concavo-convex, rounded at edge; breadth, maxim. 25·4 mm.

Strychnos Nux-vomica—

From the Herbarium of the late East India Company. Grown at Birmah.

Description by W. R. D.

Leaves: veins, five. Three veins very marked, two indistinct, but more distinct than in K. N.

[Largest leaf: *breadth*, maxim. 10·79 m.m.; *length* from apex to stalk, 69·8 mm. inch.]

Seeds: edges acute, seed very fleshy in centre; *breadth*, maxim. 19·05 mm., *length*, 22·09 mm.

In connection with the physical characters of the seeds, two points should be noticed. Pereira ('Materia Medica,' vol. 2, pt. 1, p. 635), states that the seeds of commerce are scarcely one inch (25·4 mm) in diameter, and also Flückiger and Hanbury ('Pharmacographia,' p. 385). Bentley and Trimen (Med. Pl., 178) state that they are about one inch, averaging seven-eighths of an inch (22·09 mm.): compare the plate of the nux-vomica plant in this work. Many of the seeds at present described have a diameter of 1·1 inch (28 mm.) and average 0·9 inch (23 mm.). The specimens in the Kew Herbarium much more nearly coincide with the descriptions of the authorities above cited.

Again, Pereira ('Materia Medica,' vol, ii., pt. 1, p. 636) describes the cotyledons as "triple ribbed;" but it will be observed that in all the seeds now examined the cotyledons are seven-veined, although in some specimens the two lateral veins are indistinct. Flückiger and Hanbury ('Pharmacographia,' p. 385) state that the cotyledons are from five to seven-veined.

We hope, before long, to obtain some information which will lead to the identification of the plants yielding the seeds which enter the British market and thus to settle the question whether the various seeds originate from different species of the plant.

Method of Analysis.—A difficulty was encountered at the outset when it was attempted to obtain the seeds in a fine state of division. The extreme toughness of the seeds is well known, and upon the small scale, unless special appliances are at hand, a very laborious process is involved in obtaining them as a fine powder by direct pulverization. The method commonly recommended for this purpose, for instance, by the British Pharmacopœia, is to expose the seeds to a process of steaming, and subsequently to dry before powdering. This method answers well as far as the attainment of a fine powder is concerned, but in the present instance was obviously open to objection, for during the steaming condensation of water upon the seeds inevitably occurs, and as boiling water was found to extract no inconsiderable amount of alkaloid it was evident that some other method must be resorted to. The method which we finally adopted was to dry the previously split seeds at a temperature not exceeding 100° C. for three hours and then to reduce to powder in a drug mill. The seeds were found to lose from 10 to 11 per cent. of water when dried at 100° C., and the seeds thus dried very rapidly reabsorbed this amount of water upon exposure to the air. In this way we had no difficulty in obtaining the seeds in a fit state for analysis. Exposure at temperatures from 120° C. to 150° C. was found to effect a decomposition in the constituents of the seeds and thus to complicate matters at a subsequent stage; yet an examination of commercially ground specimens has shown that this procedure is far from uncommon. Some care has to be observed in grinding the seeds, in order that the specimen taken for analysis may be uniform and representative. In grinding, the greater part of the outer

* The seeds were collected in the drug market by Mr. William Hodgkinson, of the firm of Hodgkinson, Stead and Treacher, to whose genuine concern in this matter we are much indebted.

† Bentley and Trimen, 'Medicinal Plants,' 178.

coating of the seeds comes through in the form of light fluffy particles which aggregate together, and if care be not taken these will become separated from the more dense albuminous portions which subsequently comes through the mill. The specimens having been prepared for analysis in the manner above described, the amount of total alkaloid (strychnine and brucine) was estimated by the process proposed by us in a previous paper (*Pharm. Journ.*, [3], xiii., 665). This process consists in the extraction of the alkaloidal salts direct from the seeds by chloroform containing 25 per cent. by volume of alcohol, the extraction of the alkaloids as acid sulphates from this solvent by agitation with dilute sulphuric acid, and finally, the extraction of the alkaloids from the acid solution with chloroform after the addition of excess of ammonium hydrate.

It has been noted above that the powdered nux vomica of commerce has frequently been dried at a temperature exceeding 100° C., with the consequent alteration of certain constituents of the seeds. When this is the case it will be found that the chloroform-alcohol percolate is dark in colour, and often the final alkaloidal residue is brown. Before the cause of this abnormality had been discovered, we had made some experiments with the view of purifying the original percolate. It was found that this could be very effectively done by agitation with a solution of sodium carbonate containing 5 per cent. of the crystalline salt, the dark colour of the chloroform-alcohol percolate being by this means entirely removed. In ordinary cases the colouring matter dissolved by the solvent is retained by the ammonia in the final treatment, but when the seeds have been dried at a high temperature some of the colouring matter is not thus retained, but is dissolved with the alkaloid by the chloroform. It is true that the amount of this impurity in the alkaloidal residue is not very appreciable, as is shown by the following experiments, and when approximate results only are required the preliminary treatment with sodium carbonate may be omitted. In other cases, where strict accuracy is required, it should be adopted when the percolate exceeds dark yellow in colour. Again, in the manufacture of the alkaloidal salts by this process treatment with sodium carbonate is advantageously employed, for the removal of this colouring matter together with the alcohol greatly facilitates subsequent crystallization.

The following results from highly dried seeds show the influence of sodium carbonate as a purifying agent: (α) the percentage of alkaloid obtained normally, (β) the percentage of alkaloid found after treatment with sodium carbonate.

	α.	β.
1.	2·75	2·62
2.	3·32	3·20
3.	2·45	2·36

The solution of sodium carbonate was also used in the analysis of normally dried seeds (100° C.). The experiments show that its use in such cases is unnecessary—

	α.	β.
1.	3·16	3·12
2.	3·48	3·45
3.	3·12	3·18
4.	3·61	3·55

We have previously noticed (paper above cited) that the method of ascertaining the purity of the final alkaloidal residue by precipitation with tannin is not altogether satisfactory, for we found that tannin was incapable of entirely precipitating the alkaloids from even slightly acid solutions. We have since made a great number of experiments on this point. In the first place we find that with the hydrates or carbonates of ammonium, sodium, and potassium, even when added until the solution is only faintly alkaline, it is impossible to precipitate the whole of the alkaloids from solution; this is especially the case with brucine. With reference to other precipitants, none of those employed by us are applicable in acid solution, and the experiments included platinum chloride, potassium mercuric iodide, potassium bismuth iodide, phospho-tungstic acid, phospho-molybdic acid, tannin, picric acid, and potassium chromate. Most of the experiments were quantitative, and showed errors far beyond the limits of the experimental equation. Fairly satisfactory results were obtained with platinum chloride in neutral solutions, and still better with tannin made faintly alkaline with ammonia. The alkaloidal residue to be tested was dissolved in dilute sulphuric acid, the solution made exactly neutral with ammonia, precipitated with excess of the ammonia-tannin solution, the precipitate washed with the same solution, then dissolved by a saturated solution of sodium carbonate, and the alkaloid extracted with chloroform from this solution. This process answers well, although, owing to the large field for experimental error, the process did not give exactly coincident results, even when the pure alkaloids were employed, yet when carefully performed the results are always sufficiently near to pronounce upon the purity of an alkaloidal residue. The following table exhibits some typical results obtained from the residues obtained in the course of analysis: (α) percentage of alkaloid normally found, (β) percentage found after the treatment of the residue with ammonia-tannin:—

	α.	β.
1.	1·68	1·66
2.	2·64	2·57
3.	3·04	2·94
4.	3·90	3·84

The amount of residue used in the above experiments varied from 0 10 to 0·15 gram, that is to say, it was obtained from 5 grams of nux vomica, and to this quantity we were restricted by the great ease with which the alkaloids were decomposed when exposed in a solid state for any considerable length of time at 100° C. We attempted to ascertain by the tannin process the purity of a comparatively large quantity of the alkaloidal residue weighing about 1·0 gram, this being extracted from 30 grams of nux vomica. This quantity gradually lost weight during six hours when exposed on the water-bath, and at the end of this time was dark brown in colour and did not wholly dissolve in dilute sulphuric acid. The same quantity of the pure alkaloids behaved in a precisely similar manner. A further result of this decomposition is the preclusion of the use in analysis of more than 5 grams of nux vomica; for this quantity yields a residue which requires one hour for complete drying, and after this time begins gradually to decompose, consequently the length of time necessary for complete desiccation, in cases where a larger amount of residue than this is obtained would involve the decomposition of the alkaloids in the manner we have just described.

In view of the results described above the following method was adopted for the analysis of the seeds: Five grams of the finely divided seeds, after drying at 100° C., were exhausted with 40 c.c. of chloroform containing 25 per cent. by volume of alcohol. For this exhaustion the extraction apparatus described by us in a former paper (*Pharm. Journ.*, [3], xiii., 663) was employed and the hot digestion and repercolation continued until a few drops of the solvent after passing through the marc left no residue on evaporation. The percolate was agitated with 25 c.c. of a 5 per cent. solution of sulphuric acid, the chloroform separated and agitated again with 10 c.c. of the dilute acid. The mixed acid solutions were filtered if necessary, rendered alkaline with ammonium hydrate, and shaken with two successive 15 c.c. of chloroform, or with a sufficient quantity to thoroughly extract the alkaloid. The chloroform was separated, if necessary filtered, evaporated, and dried at 100° C., until constant in weight, which usually occupied one hour. Some little trouble is always experienced in the separation of chloroform from aqueous liquids, especially when alkaline; the separation is much facilitated by heat, but even then, often much depends upon the ingenuity and dexterity of the experimenter. It may here be stated that in the filtration of aqueous liquids containing chloroform if the filter-paper is well wetted with chloroform the chloroform alone will pass through from the mixture, leaving the aqueous liquid; but if on the other hand the paper be wetted with water the aqueous liquid will flow through, leaving the chloroform upon the filter.

The appended tables show the results of our analysis of the two series of specimens of nux vomica. It will be observed that although the specimens in the two series differ in alkaloidal content, the order of content in each series is precisely the same, that is, Bombay first, Cochin second, and Madras third. These results are at once interesting and important. The specimen of "Bombay" in the second series contains the largest percentage of alkaloid yet recorded in the seeds of *Strychnos Nux-vomica* (3·90). Of the specimens (? source) examined by Dragendorff,* the highest percentage of total alkaloid found was 2·88. In the series of commercially powdered nux vomica previously analysed by us (*Pharm. Journ.*, [3], xiii., 665), the richest specimen yielded 3·57 per cent. The present results also show that these above-mentioned specimens of powdered nux vomica were of good quality and free from adulteration. The pharmaceutical aspect of the great difference in the alkaloidal content of the various specimens of *Strychnos Nux-vomica* disclosed by these results is of no small moment; upon this point we shall dwell at a future time. We also hope to perfect an accurate method for the separation of strychnine and brucine.

* Die Chemische Werthbestimmung einiger Starkwirkender Droguen, p. 65.

Series I. (collected 1877).

Specimen	Diameter.	Thickness.	Circumference.	Nature of Edge.	Texture	Form.	Interior.	Percentage of strychnine and brucine.
Bombay Fine.	20·25 to 25·5 mm. average 23·0.	4·0 mm.	60·0 to 82·5 mm. average 70·0.	Generally acute.	Very silky.	Nearly flat; fairly regular; few concavo-convex and bent.	Cotyledons 7-veined; two outer veins small.	3·46
Bombay Ordinary	19·0 to 28·0 mm. average 23·0.	5·0 mm.	60·0 to 82·5 mm. average 70·0.	Generally rounded; some acute.	Silky.	Nearly flat; some irregular; few concavo-convex.	Cotyledons 7-veined; two outer veins small.	3·14
Cochin	19·0 to 28·0 mm. average 23·0.	4·0 to 6·0 mm. average 5·0.	57·0 to 79·0 mm. average 68·0.	Round; few acute.	Silky.	Nearly flat; some concavo-convex; many irregular.	Cotyledons 7-veined; two outer veins small.	3·04
Madras .	12·5 to 23·0 mm. average 18·0.	4·0 to 5·0 mm. average 4·5.	38·0 to 71·0 mm. average 57·0.	Generally round; seldom acute.	Dull.	Nearly flat; some slightly concavo-convex; some irregular.	Cotyledons 7-veined; two outer veins small; albumen resinous.	2·74

Series II. (collected 1883).

Specimen	Diameter.	Thickness.	Circumference.	Nature of Edge.	Texture	Form.	Interior.	Percentage of strychnine and brucine.
Bombay .	20·0 to 28·0 mm. average 23·0.	2·25 to 4·0 mm. average 3·5.	59·0 to 84·0 mm. average 73·0.	Nearly all acute.	Very silky.	Nearly flat; fairly regular; some concavo-convex.	Cotyledons 7-veined; two lateral veins small and sometimes indistinct.	3·90
Cochin .	19·0 to 28·0 mm. average 25·0.	4·0 to 5·0 mm. average 4·5.	57·0 to 84·0 mm. average 74·0.	Round.	Slightly silky.	Nearly flat; few slightly concavo-convex.	Cotyledons 7-veined; two lateral veins indistinct.	3·60
Madras .	12·5 to 21·5 mm. average 19·0.	4·0 to 5·0 mm. average 4·75.	38·0 to 65·0 mm. average 57·0.	Round.	Dull.	Nearly flat; some slightly concavo-convex.	Cotyledons 7-veined; two lateral veins indistinct; albumen resinous.	3·15

THE NEW PHARMACOPŒIAS FOR THE UNITED STATES AND GERMANY.

(*Continued from page* 1035.)

Senega, U.S.P.; Radix Senegæ, P.G.—A description of the root is now given in the U.S.P., in which the length is given as 10 centimetres, but the average width is omitted. The P.G. gives the limit of width of the rootstock as 1½ centimetres, and the length of the root branches as 2 decimetres, while the bark should not exceed 1 millimetre in diameter. Both Pharmacopœias mention the keel which is characteristic of senega root of good quality. The rootstock of the Northern senega, now so frequent in commerce, derived from the *P. senega*, var. *latifolia*, much exceeds the dimensions here given, and is therefore excluded from the P.G. by the limits imposed.

Senna, U.S.P.; Folia Sennæ, P.G.—The U.S.P. omits *Cassia obovata*, D.C. Alexandria senna should be freed from stalks and from argel leaves, which are thicker, veined, glaucous, and even at the base. India senna should be free from stalks, discoloured leaves and other admixtures. Alexandria senna is described as nearly smooth and India senna as slightly pubescent, the reverse being the case in English commerce. The P.G. now admits the leaves of Tinnevelly senna, and mentions *Cassia angustifolia* as their botanical source. It states that the leaflets of *Cynanchum Arghel* are commonly mixed with those of *Cassia acutifolia*, but does not order their removal, remarking only that senna leaves should not be brownish or yellowish. It states that the argel leaves may be easily recognized by the ornament of short rigid hairs. This, however, is not the case, since both Alexandria and Tinnevelly sennas have similar hairs. The minutely wrinkled surface of the argel leaves is the best character by which to recognize them with the naked eye, especially when the base of the leaf is broken off.

Serpentaria, U.S.P.—The root is now omitted from the P.G. The U.S.P. restricts the official drug to the roots of *Aristolochia Serpentaria*, L., and *A. reticulata*, Nuttall, remarking that the roots of *A. reticulata* are coarser, longer, and less interlaced than those of *A. Serpentaria.* It is *A. reticulata* which is generally sold in English commerce as the root of *A. Serpentaria.*

Serpylli herba, P.G.—It must be borne in mind by those who have to dispense German prescriptions that *Herba Serpylli* and *Herba Thymi* are not synonyms for the same plant, but that the former indicates *Thymus Serpyllum* and the latter *Thymus vulgaris.*

Sinapis nigra, U.S.P.; Semen Sinapis, P.G.—The seeds of *Sinapis alba* are not official in the P.G., but both species are noticed separately in the U.S.P. The P.G. states that the cooled and filtered decoction of powdered seeds should not afford a blue colour with iodine water.

Spigelia, U.S.P.—The rhizome and rootlets only are official. The rhizome should be 2 inches or more long and about ⅛ inch thick, and the rootlets purplish dark brown. It should not be confounded with the underground portion of *Phlox Carolina*, L., the rootlets of which are brownish yellow, rather coarse, straight, and contain a straw-coloured wood underneath a readily removable bark.

Staphisagria, U.S.P.—The seeds of *Delphinium taphisagria*, L., are now official, but the seed of *D. Consolida*, formerly official in the secondary list under the name of Delphinium, is omitted.

Stillingia, U.S.P.—The root of *Stillingia sylvatica*, L., is described as being about 12 inches long and nearly 2 inches thick, sub-cylindrical, slightly branched, compact, wrinkled, tough, greyish-brown, breaking with a fibrous fracture, showing a thick bark and porous wood, the mixed bark and medullary rays with numerous yellowish-brown resin cells; odour, peculiar; taste unpleasant, bitter, acrid and pungent. The root, as usually seen in this country, is rarely an inch in diameter. Attention has recently been called to this drug by Dr. Marion Sims as a remedy in syphilis (*Brit. Med. J.*, March 10, p. 449).

Stramonii Folia, U.S.P.; Folia Stramonii, P.G.—The P.G. directs that the leaves should be collected during the period of flowering, and gives the maximum dose of the leaves as 0·2 gram. The seeds are official in the U.S.P., but omitted from the P.G.

Sumbul, U.S.P.—The root is referred to *Ferula Sumbul*, Hook. f. The Indian sumbul is not mentioned; an example which might well be followed in a future British Pharmacopœia, since there can be little doubt that the reddish kind mentioned in the last edition of that work is false sumbul, prepared by colouring and perfuming ammoniacum root. As a tincture is official in the U.S.P., and the tincture of the false sumbul is much darker in colour than that of the true drug when made of the same strength, a colour test would have been an advantage.

Tabacum, U.S.P.; Folia Nicotianæ, P.G.—The U.S.P. directs the commercial dried leaves of *N. Tabacum*, L., up to 20 inches in length, but the P.G. orders leaves "*modicæ magnitudinis specierum cultarum quas habet Nicotiana Tabacum, aere nulla arte adhibita siccata.*" By which it may be supposed that medium-sized leaves of any cultivated variety of *Nicotiana Tabacum* are intended, dried without previous fermentation; but these are not easily obtained in commerce, at least in this country.

Tamarindus, U.S.P.; Pulpa tamarindorum cruda, P.G.—No mention is now made in the P.G. of the Egyptian and West Indian tamarinds, which in the last edition were ordered to be rejected; but judging from the description, the East Indian tamarinds are still the official kind, while the U.S.P. apparently intends the West Indian to be used, since it describes tamarinds as a reddish-brown, sweet, subacid, pulpy mass. The test for copper is not given.

Taraxacum, U.S.P. Radix Taraxaci is now omitted from the P.G., but Radix Taraxaci cum Herba is retained. It is to be collected in spring before flowering, and dried, and the extract is to be prepared from the dried plant. This plan, as the extract is made with cold water, presents the advantage of excluding the large quantity of inulin often present in extracts made in the autumn.

Terebinthina, U.S.P. and P.G.—The American turpentine is now attributed to *Pinus australis*, Michaux; this name being a synonym of *P. palustris*, Mill. The drug corresponds with the *Thus Americanum* of the B.P. German turpentine is now chiefly that made from *Pinus pinaster* and *P. Laricio.* It should contain 70 or 80 per cent. of resin and 30 to 15 per cent. of essential oil. The crystalline sediment in it should dissolve when the turpentine is heated in a water-bath, and the liquid should form a clear solution with five times its weight of spirit, the solution strongly reddening moistened litmus paper. Venice turpentine is no longer official in the P.G.

Terebinthina Canadensis, U.S.P.—This should be completely soluble in ether, chloroform or benzol.

Thuja, U.S.P.—The twigs of *Thuja occidentalis* are the part official. This drug apparently owes its introduction to its extensive use amongst the homœopathic section of the community in the United States. Although recommended in Philip's 'Materia Medica' as valuable in certain diseases, it does not appear to have been received with much favour as yet by allopaths.

Tiliæ Flores, P.G.—The botanical names *Tilia ulmifolia* and *T. platyphyllos*, Scopoli, have been adopted instead of *T. parvifolia* and *T. grandiflora*, for the official plants. The warning against the use of the leaves of *T. tomentosa* is now omitted.

Tormentillæ rhizoma, P.G.—The root should give, with forty times its weight of water, an astringent liquor, which with the addition of a small quantity of sulphate of iron should give a bluish-black colour and on the addition of lime water an intense violet sediment.

Tragacantha, U.S.P. and P.G.—The U.S.P. now gives *Astragalus gummifer*, Labill., and other species, as the botanical source. The P.G. mentions *A. ascendens*, *A. leiocládos*, *A. brachycalyx*, *A. gummifer*, *A. microcephalus*, *A. pycnoclados*, and *A. verus*, as yielding the gum. The flakes should not be more than 1 to 3 millimetres thick, nor less than ½ centimetre broad, and should be white and diaphanous. The mucilage made by mixing the powder with 50 parts of water should give a yellow colour with solution of caustic soda; the mucilage, when filtered, should yield a filtrate which will not give a blue colour with iodine, although the insoluble matter in the filter should do so.

Trifolii Fibrini Folia, P.G.—Under this name the leaves of *Menyanthes trifoliata* are still official.

Triticum, U.S.P.—The rhizome of *Triticum repens*, L., deprived of the rootlets and collected in spring is official. The segments should be hollow in the centre, about $\frac{1}{12}$th of an inch in diameter, and have a straw-yellow colour and sweet taste.

Ulmus, U.S.P.—The inner bark of *Ulmus fulva*, Michaux, is alone included under this name. *Cortex ulmi*, prescribed in America, would not be at all represented by the *Cortex ulmi* of the B.P. The bark of *Ulmus fulva* has a remarkably mucilaginous taste, which, although described in the U.S.P. as peculiar, can scarcely be said to be so, since it is met with in fœnugreek, *Melilotus cœrulea*, and in several umbelliferous roots.

Ustilago, U.S.P.—Under this name *Ustilago maydis*, grown upon *Zea Mays*, L., is intended. This new introduction into the U.S.P. should consist of irregular masses, sometimes 6 inches thick, enclosed in a blackish membrane containing brownish-black globular, nodular spores. It should be preserved in a dry place and not kept longer than a year.

Uva Ursi, U.S.P.; Folia Uvæ Ursi, P.G. The description in the U.S.P. is so worded as to imply that the leaves are reticulated on the lower surface only, the upper surface being the more strongly reticulated of the two. The P.G. remarks that there should be no glandular dots on the lower surface of the leaves. An infusion of one part of the leaves in 50 parts of water, set aside for some hours and filtered, should give a red colour, becoming violet when a granule of sulphate of iron is added and shaken up with it, depositing after a little while a sediment of an intense violet colour.

Valeriana, U.S.P.; Radix Valerianæ, P.G.—It should be remembered that the upright rhizome of valerian is about 2 centimetres thick, while the horizontal rhizome of cypripedium, which is commonly sold in this country as American valerian, is only 3 millimetres thick and has numerous cup-shaped scars on the curly brittle rootlets. Occasionally this root has been sold in this country as valerian by dealers in herbs.

Vanilla, U.S.P.; Fructus Vanillæ, P.G.—The botanical source is now more correctly given in the U.S.P., as in the P.G., as *Vanilla planifolia*, Andrews. The U.S.P. uses the term "somewhat warty" in describing vanilla, but this character must surely be of exceptional occurrence.

Veratrum viride, U.S.P.—The rhizome is described as upright, obconical, simple, or divided. *Veratrum album* is the only species official in the P.G., but that Pharmacopœia orders the roots to have the yellowish rootlets present, in which condition it is almost impossible to distinguish with certainty between the roots of the two species, the usually more wrinkled and yellowish rootlets of *V. viride* being an unreliable characteristic.

Verbasci flores, P.G.—The species now adopted is *V. phlomoides*; the use of the flowers of *V. thapsiforme* being also permissible. The size and character of the corolla is now given. The flowers should not be of a brown colour.

Viburnum, U.S.P.—The bark of *Viburnum prunifolium* or black haw, is a new introduction, due probably to the reputation it has recently obtained in the United States as a uterine tonic. The bark is described as occurring in thin pieces or quills of a glossy purplish brown colour, with scattered warts and minute black dots; when collected from old wood greyish-brown; the thin corky layer easily removed from the green layer; the inner surface whitish, smooth; fracture short; inodorous, somewhat astringent and bitter. A fluid extract is the only official preparation.

Viola tricolor, U.S.P.; Herba Violæ tricoloris, P.G.—This new introduction into the U.S.P. is probably inserted with a view to the requirements of the German element in the United States, although no preparation is official in that Pharmacopœia. The plant is a common weed in this country.

Xanthoxylum, U.S.P.—The bark of *X. fraxineum* and *X. carolinianum* are still official. The latter is chiefly distinguished by large conical corky projections and stout brown spines arising from a corky base. Xanthoxylum should not be confounded with the bark of *Aralia spinosa*, which is nearly smooth externally, and beset with slender prickles in transverse rows. The bark of *X. fraxineum* occurs in thin, greyish, quilled fragments, about 1 millimetre in thickness; it has a very pungent taste. Under a lens it exhibits minute crystals, a feature not mentioned in the U.S.P.

Zingiber, U.S.P.; Rhizoma Zingiberis, P.G.—The whitened ginger is not official in either Pharmacopœia.

Zedoariæ Rhizoma, P.G.—The root of *Curcuma zedoaria*. Under this name is intended the greyish root with a camphoraceous taste produced by *Curcuma Zerumbel*, Roxb., and not the yellow root formerly known as "cassumunar root," which is obtained from *Curcuma zedoaria*, Roxb.

CONVALLARIA MAJALIS.*

BY H. G. GREENISH.

It has frequently been remarked that the *Convallaria majalis*, or lily of the valley, can scarcely be classed with the so-called "new remedies" as it is in reality a very old one. But nevertheless with regard to its application in medicine it is truly a "new remedy."

Although in many of the recent publications on Convallaria allusion has been made to its employment by the Russian peasants from time immemorial as a remedy for dropsy, its history in more modern times and in our own country has received but little attention. As the latter possesses for us a greater attraction, and is not without interest, I may be permitted to trace it, as well as I can, for the last three or four centuries.

Apart, therefore, from the mention made of it by Dioscorides and from its use in Russia, a description of the plant was published in 1517 in the 'Ortus Sanitatis' and illustrated by a woodcut, which, though rough, sufficiently resembles it to allow of recognition.

"Neither the leaves nor the roots," says the author, "are used in medicine; the virtues reside in the flowers;" to these aperient properties are attributed. They are prepared for medicinal use by infusing in white wine, distilling the infusion and mixing it with lavender water and pepper. This exclusive use of the flowers and the method of preparing them continued general for centuries.

In 1586 Rovillius honoured the lily of the valley with a lengthy notice in his 'Historia Plantarum.' The flowers and fruit are said to be warm and dry; the former are useful in apoplexy, epilepsy, vertigo, palsy and other diseases proceeding from a cold and damp brain; hence the juice or a decoction of the plant is administered in such cases. It is also said to be employed to cure leprosy, to remedy blindness or indistinct vision, and to counteract the bites of poisonous animals. Some persons, according to Rovillius, make a preparation by infusing the flowers in white wine and distilling as just described.

In 1633, we find it mentioned in Gerard's 'Herbal.' In 1639 it is admitted into the Pharmacopœia Londinensis, in which it constitutes an ingredient in the Aqua Antepileptica. The flowers were infused in white wine and distilled, but any specially anti-epileptic property this preparation may have possessed might have been attributable to some other of the nineteen substances that entered into its composition. Possibly it was found to be unsatisfactory, either in its effects or in the number of ingredients it contained, for in the next edition, the latter is increased to twenty-seven and the name changed to a much more familiar one, viz., "Spiritus Lavandulæ Compositus." This preparation still contained the flowers of the lily of the valley, *flores lilii convallii*, and appears to have been a more effectual preparation, as it remained in the Pharmacopæia till 1746.

The lily of the valley must certainly about this time have been held in high estimation. Schröder, in his 'Compleat Chemical Dispensatory,' mentions six preparations of the flowers, the roots being but seldom used. He ascribes hot and dry virtues to them, and powdered, he says they form an excellent sneezing powder. And its celebrity was not confined to our own country. In France, Germany and Belgium it was a well-known drug. The Royal Pharmacopœia of France, published in 1678, contains several preparations into the composition of which it enters, as for instance, an "apopletick water," a "paralitick water," a "corrected antiepileptic water of Langius," which latter is said to be much bettered by the addition to it of shavings of human skull.

In Germany it was the subject of dissertations by Doederlinus in Altorf, 1718; Senckberg in Göttingen, 1737; Mossdorp in Magdeburg, Schulze in Halle, 1742.

From this time until its re-introduction some years since by the Russians but little is heard of the plant. In 1810, Lewis, in his 'Complete Dictionary of Materia Medica,' observes that the watery or spirituous extracts of the flowers act as gently stimulating aperients and laxatives and seem to partake of the purgative virtues as well as the bitterness of aloes. The roots possess the same properties in a greater, the leaves in a lesser degree.

The properties that have been attributed to the lily of the valley are, as we have seen, manifold. It was well known as an aperient and is mentioned as such in the 'Ortus Sanitatis.' It has even been proposed as a substitute for scammony. But the prevailing idea was that a distillate of the flowers was a remedy for epilepsy and apoplexy.

Of the real properties of the drug and of its composition little or nothing was known until Walz, in 1857, isolated the active principles, and Marmé, ten years later, determined their physiological action. In 1865, Martin announced the presence of an alkaloid, majaline, but Tanret was unsuccessful in his endeavours to isolate it. The experiments of Marmé showed that the convallamarin, which possesses a bitter taste and is soluble in water, was a powerful cardiac poison, and acted also, in large doses, as an emetic, whilst the convallarin produced purgative effects without any secondary symptoms.

A few words on the botanical and chemical relationships of Convallaria and its active principles may not be out of place here.

The lily of the valley is generally placed in the natural order Liliaceæ, sub-order Asparagaceæ; its nearest botanical allies are, therefore, the various species of Polygonatum or Solomon's Seal, Majanthemum, Paris and others of the same sub-order, whilst the sub-order Smilaceæ is but little further removed. The first of these, Polygonatum, probably contains active principles similar to or identical with those of the Convallaria. The paridin and and paristyphnin found by Walz in the *Paris quadrifolia* await closer investigation; possibly they may be shown to exercise a similar physiological action. The various species of Smilax contain parillin, which agrees with convallarin in bearing a certain resemblance to saponin. Several species of Trillium and Medeola, both of which are closely allied to Convallaria, are reputed to possess emetic and diuretic properties, and may, therefore, prove to contain cardiac poisons. It is a remarkable fact, says Professor Husemann, that all well-established cardiac poisons are glucosides. Many of them are accompanied in the plants yielding them by other principles possessing a different physiological action; as, for instance, the digitonin of digitalis, which has no action on the heart, the helleborin of hellebore, the convallarin of convallaria. Most of them, in addition to their action on the heart also produce emetic and diuretic effects. Thus several species of squills have long been known as diuretics. One of them only, *Scilla maritima*, has been closely investigated; it has yielded in addition to other principles a powerful cardiac poison, scillitoxin, and an inert substance, scillin.

In 1880, Troitzky and Bojojawlkensky, two Russian physicians, conducted some experiments with Convallaria, but their investigations do not appear to have attracted much attention. Soon afterwards another of their countrymen, Professor Botkin, of St. Petersburg, published a case of neurosis of the cardiac apparatus taking the form of angina pectoris accompanied by palpitation and dyspnœa, in which the palpitation and dyspnœa were almost immediately relieved by the Convallaria. "Our usual cardiac remedies," say Professor Botkin, "digitalis and adonis, have no effect whatever in the vast majority of cases of cardiac neurosis, whilst Convallaria generally acts as a specific."

About the same time Dr. Alfayef, military surgeon in the Caucasus, where the flowers of the Convallaria have a great reputation amongst the people as a remedy for intermittent fever, reported the trial of them in thirty-eight such cases, but the success he met with was in-

* Report on Pharmacology, read before the School of Pharmacy Students' Association.

different. Small doses, he found, invigorated the pulse much more noticeably than large ones, and possessed at the same time a marked diuretic action. "I am, therefore, inclined to think that the convallaria acts as a diuretic only as it stimulates the heart's action, and consequently increases lateral blood pressure, being similar in this respect to digitalis. But its great advantage over digitalis is that it is quite harmless, even in overdoses." There is, however, probably a limit to the overdose that may thus be taken with impunity.

Dr. Ott experimented upon rabbits with an extract of the roots, and concluded that it acted probably directly on the muscular tissue of the heart, whilst the action of digitalis was due to cardio-inhibitory excitation.

Professor Sée found an extract of convallaria in doses of 5 to 8 grains relieved cardiac distress in severe cases of mitral regurgitation and considered it might be used in all forms of heart failure, as it had none of the nauseating effects of digitalis and did not exhaust the contractility of the heart and arteries. Dr. Sansom employed it as a substitute for digitalis, and though convinced of its action in promoting a stronger ventricular contraction was not convinced of its superiority to digitalis.

The preparation of convallaria most suited for administration in heart disease is a matter of interest to us all. As the active principle is not volatile, the distilled waters that we have seen were the favourite preparations up to the end of the previous century are out of the question. Professor Sée, in 1883, undertook to solve the question, and with this object instituted a series of experiments in his clinical practice at the Hotel Dieu, in Paris. Aqueous and alcoholic infusions and extracts were tested, and they were classed by Professor Sée in order of merit as follows:—

1. Aqueous extract of the leaves, which requires a dose three times as large as the extract from other parts of the plant.

2. Extract of the flowers which exercises a very intense action on animals, much less so on man.

3. Extract of the whole plant, including flowers, stalks and roots (and ? leaves).

The dose was ascertained to be about 1 to 2 grams of the extract of the flowers or double that of the extract of leaves.

The order of merit should evidently be reversed, as Nos. 2 and 3 are both more active than No. 1.

About the same time, M. Langlebert published a similar paper. He found that the extract of the flowers and stalks gave good results, unaccompanied by vomiting or purging.

The preparations of the roots and of the leaves fulfilled the therapeutic indications, but possessed emetic and purgative properties if the dose given were too high. He attributes this action, which was exhibited by a series of extracts, to the presence of too large a proportion of roots in the crude material. The best results were obtained with an extract prepared from the flowers and stalks to which one-third of their weight of roots and leaves had been added. Dose from $\frac{1}{2}$ to 2 grams.

The reason for the addition of the roots and leaves is not stated, and is by no means evident. If they produce unpleasant emetic and purgative properties why add them at all? It must be observed that the dose is much larger than that recommended by Alfayef, viz., 5 to 10 grains of flowers or 20 to 30 drops of the tincture (1 to 4). Such small doses are said to act much better than larger ones (1 to 4 drachms of tincture). Is it not possible that the emetic action observed by Professor Sée was due to the greater activity of the extract of the leaves, for Marmé expressly states that the convallamarin itself when administered in large doses produces vomiting? The purging would be attributable to the convallarin.

Tanret comments upon the unsatisfactory nature of Messrs. Sée and Langlebert's results, and advises the administration of the active principle, which can easily be obtained in a state of approximate purity. Unless, however, the amount of impurity be constant it is difficult to see the desirability of this step.

The pharmacist that is desirous of adding a preparation of convallaria to his stock of drugs may well be at a loss to know which part of the plant he should select. Shall he, with Dr. Alfayef, make a tincture of the flowers, 1 in 4? or follow Professor Sée's advice and, having mixed flowers, leaves and stalks in certain proportions for reasons he is unable to fathom, proceed to make from them an extract? Or again, shall he act upon Tanret's suggestion and prepare the active principle in a state of approximate purity? From the literature on the subject no satisfactory answer is to be obtained; but is it not probable that any part of the plant, flowers, leaves or roots, that contains the convallamarin may be used; that the average dose will vary directly with the amount of that principle present, and that in each individual case a series of experiments must be made to determine the individual dose?

Digitalis, it is said, fails in the majority of cases in which it is tried, and the want of a drug exerting a more constant and uniform action on the heart is generally acknowledged. Nothing but a lengthy and systematic trial can, I think, show whether or not digitalis is likely to be superseded by the *Convallaria majalis.*

COMMERCIAL POWDERED RHUBARB AS COMPARED WITH A PERFECT STANDARD.*

BY GEO. W. HAYES.

The "Standard" rhubarb with which the "samples" were compared was personally selected by Mr. Charles Bullock, of the well-known firm of Bullock and Crenshaw, Philadelphia. I have Mr. Bullock's word for it that it "is a fair representative of the market at the present time—*of a good article*—of Chinese rhubarb." "To make assurance doubly sure," I carefully inspected each *piece*, and compared it with the description found in the 'National Dispensatory' (Stille and Maisch), and found it to agree to every characteristic of a first-class article. It was obtained from one of the most reputable houses in the country; selected by one of America's most prominent pharmacists and judges of the quality of drugs; and was then rigidly compared with one of the best authorities on the subject. The "standard" was broken into pieces; carefully dried; powdered in a scrupulously clean iron mortar; sifted; and placed in a tin box with a tightly fitting lid.

The "Samples" were obtained strictly according to the spirit and letter required by the rules of the competition. A friend of the writer obtained all the Philadelphia "samples," in order that the firms from whom they were obtained might not suspect the purpose to which they were to be put. In order to make the tests entirely free from *bias*, caused by knowing the price, source, etc., of the different specimens, each was placed in a tin box with a tight-fitting lid, by a friend, a young pharmacist, each was then carefully marked by him with an appropriate letter or figure, and all information respecting them, together with their corresponding symbols, placed by him in a sealed envelope, not to be opened until the investigation was completed. The only thing the writer knew was the source, etc., of the "standard." Twelve average "samples" were thus obtained and subjected to all the tests. Thinking that the examination for the presence of turmeric was worthy the examination of a much larger number of samples, seventeen additional samples were obtained, and the entire number (thirty in all, including the "standard") tested for this adulterant.

* Extract from the first-prize essay written in competition for prizes offered by Allaire, Woodward and Co., Peoria, Ill. Reprinted from the *The Druggists' Circular and Chemical Gazette.*

The tests were made entirely independently of one another, and were not in any way compared, until the entire investigation was finished. This was done for the purpose of avoiding any undue favourable or unfavourable bias, which one test might exercise upon the results of another. The writer believes that he can most conscientiously say that he has made a most thorough examination of the literature on the subject of Tests for Rhubarb, and that but very little has been written upon this subject which he has not consulted. Some tests, not previously disputed, have proved themselves valueless in his hands. A list of these will be found accompanying this essay. (See appendix.)

The tests are divided into five sections, namely: 1. Physical; 2. Pharmaceutical; 3. Chemical; 4. Microscopical; 5. Physiological.

1. *Physical Tests.*

I. *Colour.*
II. *Smell.*
III. *Taste.*
IV. *Action in the mouth.*

2. *Pharmaceutical Tests.*

These tests were all tried under exactly the same circumstances; in similar vessels, same amount made in each case, as nearly as possible at the same time, etc.

V. *Infusion.*—Four grains in 2 fluid ounces of water at ordinary temperature. Allowed to infuse two days, then noted colour of infusion.

VI. *Decoction.*—Four grains in 2 fluid ounces of water. Boiled for a few minutes, and, when cold, added water to make 2 fluid ounces. Set aside for a day, then noted colour and apparent value of sample, as before. All but three were rather turbid.

VII. *Alcoholic Tincture.*—Ten grains to 2 fluid ounces of stronger alcohol (95 per cent.) allowed to macerate for thirty-eight days, then noted colour. The samples gave but very slight variation in the colour of their tinctures, consequently it is impossible to arrange them in a graded series, as in the case of the infusion and decoction.

VIII. *Chloroformic Tincture Stain on Filtering Paper.*—Three grains to 1 fluid drachm of chloroform. Allowed to stand for a day. The clear tincture was then carefully poured over a piece of filtering paper, and the paper dried. The different stained papers were then compared and their colours graded. This test is a modification of Howie's test. Of the stain produced Mr. Howie says: "With really fine, bright-coloured East Indian rhubarb, this stain is scarcely perceptible, but cheaper and darker samples may yield a brilliant yellow stain, while even the finest bright-coloured English rhubarb will give a yellow stain as deep, and in most cases deeper, than the darkest East Indian."

Ethereal Tinctures of the different samples did not give sufficient variability of colour to be used as a test.

IX. *Solid Aqueous Extract.*—Distilled water being used; and, in each case, the drug was *thoroughly* exhausted and the extract thoroughly dried. It is but fair to state that Dr. Squibb says in regard to this test: "The foolish test of an aqueous extract does more harm than good. . . . Our *garden* rhubarbs will yield over 40 per cent. of aqueous extract at any time." Yet it appears to be possessed of enough value to entitle it to be used in connection with other tests.

X. *Moisture.*

XI. *Portion Insoluble.*—After *thoroughly* percolating drug with cold distilled water.

XII. *Height of Sample* in beaker after allowing 100 grains of it to infuse in 7 fluid ounces of distilled water for fifteen hours. Height from bottom of beaker to surface of water equals 4·25 inches. This test was used by Mr. Greenish, one of Dragendorff's pupils.

XIII. *Test with Calcined Magnesia and Essence of Anise*, B.P.—Rillot's test. Three grains were triturated with 3 grains of calcined magnesia in a perfectly clean mortar. Two drops of essentia anisi, Br.P., was then added, and the mixture triturated thoroughly. The mixture was then placed on a clean piece of white paper, flattened out on the top with a spatula, and allowed to stand two days. The colour of the sample was then noted. According to Rillot, if any rhapontic rhubarb be present, the colour of the mixture will be more or less "decidedly rose." All of the mixtures changed colour somewhat, after the essence of anise was added and the mixture allowed to stand, but only those containing rhapontic rhubarb changed to a more or less "decidedly rose;" the colour of the other mixtures varied from a bright salmon to a light brownish-yellow.

3. *Chemical Tests.*

Tests for Turmeric.—As before remarked, thirty samples in all (including the "standard") were tested for turmeric by Howie's test. Three grains were placed, in the form of a cone, on a piece of fine white filtering paper, and 50 drops of purified chloroform were slowly and carefully dropped on the apex of the cone; a stain was left. When dry, the powder was brushed away, and a pinch of borax placed on the most stained portion of the paper, and a drop of hydrochloric acid allowed to fall upon the pinch of borax. According to Howie, "If turmeric is present, a red colour is produced, . . . while no change, or only a slight bleaching, occurs, if the rhubarb is pure." In order to be very accurate, each of the samples was tested twice. Two gave a most conclusive red colour in both testings. As neither of them belonged to the regular samples (the twelve powdered "samples" and the "standard"), it may be of interest to state that the *first* came from a small wholesale drug house of Philadelphia. The proprietor of the place stated, when the sample was obtained, that the drug was "powdered for us from SELECTED roots. We KNOW it is PURE". His price for this PURE article was sixty cents a pound. The *second* came from a well-known large wholesale house of Philadelphia, price, fifty cents a pound. It must have been either bought already powdered, or been coloured by some drug miller, who was more anxious to turn out a nice-looking article than to maintain his customer's professional reputation. I feel confident that the firm is too honest and too rich to be a conscious party to any sophistication.

In regard to the active principles of rhubarb, there appears to be some uncertainty. After a very careful consideration of the subject, from a practical as well as theoretical standpoint, it appears that cathartic acid is the purgative principle, and chrysophanic acid and tannic acid the tonic principles. The last two are conceded by all to be contained in rhubarb. The first is most positively asserted to be a constituent of rhubarb, by such chemists as Dragendorff and Greenish; and in their published analyses of rhubarb, is given as being the only purgative principle. Watts's 'Dictionary of Chemistry' says; "Cathartic acid appears to be the purgative and tannin and chrysophan the tonic principles of rhubarb." Again, in the 'Proceedings of the American Pharmaceutical Association,' 1879, p. 151, it is stated that "the active principles of rhubarb are cathartic acid, chrysophan, tannin." Mr. John E. Cook, Assistant Professor of Materia Medica, Philadelphia College of Pharmacy, stated the other day, in the writer's presence, that "rheocathartic acid is the cathartic principle of rhubarb." If the writer may be excused the liberty of referring to his own experiments, in such a connection, it appears to him beyond doubt that cathartic acid is the cathartic principle.

The course of analysis is essentially that of Mr. Henry G. Greenish (see *Pharm. Journ. and Trans.*, May 17, 1879, pp. 933–936).

XIV. *Mucilaginous Matter.*—One hundred grains was completely exhausted with cold distilled water, the percolate was carefully evaporated to 30 cubic centimetres, and when cool, to this was added 45 c.c. of stronger alcohol (95 per cent.); the mixture was well shaken and set aside for twenty-four hours. The precipitate was then carefully collected on a tared filter, well washed with stronger alcohol, dried and weighed.

XV. *Cathartic Acid.*—The filtrate was then carefully evaporated to dryness, and carefully dissolved in stronger alcohol, with the very smallest amount of distilled water, to make a clear solution of 15 c.c. To this was added 120 c.c. of absolute alcohol, Squibb's (warranted not below 99·75 per cent.), and the vessel well corked and set aside for twenty-four hours. The precipitate was then collected, washed with absolute alcohol, dried, etc.

XVI. *Chrysophanic and Tannic Acids.*—The filtrate was carefully evaporated to dryness, and dissolved into distilled water with just sufficient stronger alcohol to make a clear solution of 30 c.c. To this was added, as long as it produced a precipitate, a solution of acetate of copper, C. P. The precipitate was rapidly collected, washed with the smallest amount of distilled water, dried, weighed, etc. This precipitate consisting of a mixture of chrysophanate and tannate of copper, it was necessary to subtract from its weight the weight of the oxide of copper it contained, which, according to the mean of several of Mr. Greenish's analyses, equalled 26·82 per cent. This being subtracted, the remainder was placed as *chrysophanic and tannic acid.*

4. *A Microscopical Test.*

XVII. Each of the samples was examined by means of the microscope. A power of 100 diameters was found best. Each sample was tried by transmitted as well as reflected light. Was unable to find any adulterant by this means, though somewhat of a difference was noticed in the relative amounts of the three different colours (yellow, white, red).

5. *Physiological Test.*

Eight grains of each of the "samples" (including the "standard") was taken internally by the writer at about the same time in the morning, at periods sufficiently distant from one another, so as not to in any way interfere. Each sample was tested as nearly as possible under the same circumstances. As a result, it was found that in almost every case, the purgative activity of the drug was in almost direct proportion to the amount of cathartic acid found in it; making, of course, due allowance for the counteracting tendency exerted by the presence of a small or large proportion of chrysophanic and tannic acid.

Price, etc., of the Samples.

XVIII. Every precaution was taken to keep the seller from suspecting the purpose to which the sample was to be put. The only reason why his *claim*—in regard to the sample gotten from him—was obtained, was for the purpose of ascertaining where to locate the deception, in case of such, as well as to make the essay, in a measure, more complete.

It may be well to state here that it was the writer's original intention to make a complete test, by all the methods given above, of 30 *samples* (including the "standard"); but he soon found that it would require almost a year to properly do so, so he has had to content himself himself with the twelve "samples" and the "standard." The tests have occupied all of the writer's available time for the past three months.

General Conclusions.

1. Out of twelve "samples," four (4), or 33 *per cent.*, were adulterated with *rhapontic rhubarb.*

2. Out of twenty-nine "samples" two (2), or nearly 7 *per cent.* were *adulterated* with *turmeric.*

3. From test VIII., together with the "Chemical Tests," it is believed that at least one-quarter of the "samples," or 25 *per cent.* were *adulterated* with *inferior, poor, dark-coloured, perhaps worm-eaten rhubarb.*

4. Taking all of the "Pharmaceutical Tests" together *none* of the "samples" *equalled* the "standard."

5. Chemically the "standard" was the *fourth* (4th) in *purgative power* (cathartic acid) and the *second* (2nd) in *tonic constituents* (chrysophanic and tannic acids). It contained almost *twice* as much cathartic acid as one sample, and over *four* times as much *chrysophanic and tannic acid* as another.

6. The *price* is no *just criterion of* either the *cathartic* or *tonic* power of the drug.

APPENDIX.

Tests that have been found in the writer's hands to be unreliable:—

Physical.

Dr. Squibb's. — "When two powders (rhubarb) are exposed on a table to the action of light and air for two weeks, the powder of the bad or mixed rhubarb turns of a *very light colour*; it changes its colour entirely, while the good rhubarb does not change to anything like the same extent."

On the contrary after repeated trials, I have found that any sample of powdered rhubarb, instead of becoming lighter, will in every case become darker, after being exposed to light and air for two weeks.

Pharmaceutical.

Dragendorff's.—"According to Dragendorff, the presence of chrysophanic acid in a condition (free) extractable by cold petroleum spirit, is a test of the quality of the rhubarb. Good rhubarb yields a colourless extract with petroleum spirit, while a rhapontic rhubarb yields an intensely yellow extract."

All the "samples" (including the "standard") gave exactly the same coloured solution, namely, a bright yellow.

Chemical.

Normandy's.—Gamboge "may be readily detected by digesting a portion of the powder in ether, and pouring a few drops of the solution in water. If gamboge is present, a film of an opaque yellow colour will be observed floating on the surface, which, on adding potash, is dissolved with an intensely red colour."

All the samples acted the same way with this test, giving a red colour. A small portion of the "standard" was purposely adulterated with 5 per cent. of gamboge, and both it and some of the unadulterated "standard" tested by this test. No difference could be observed; both solutions becoming red.

NEW COLOUR REACTIONS OF THE ALKALOIDS.*

BY B. ARNOLD.

The author describes the behaviour of various alkaloids with certain reagents; the most distinctive are the following:—

Conine.—One drop, when mixed with a few drops of syrupy phosphoric acid, and the mixture evaporated in a white porcelain capsule over a small flame, becomes a fine green to blue-green.

Nicotine similarly treated gives a deep yellow to orange, the residue is soluble in water; the same colour. The reaction is more surely obtained when the mixture is heated for five to ten minutes on the water-bath. Conine when so heated shows a clearer green.

Aconitine.—The well-known violet colour given by this alkaloid when evaporated with phosphoric acid, is obtained easily and surely by agitating a few particles with syrupy phosphoric acid and warming ten to fifteen minutes on the water-bath.

The syrupy acid used as the reagent is obtained by dissolving the anhydride or the glacial acid in the officinal phosphoric acid of the German Pharmacopœia.

The author suggests that the ptomaconine of Selmi should be tested by this reagent.

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* *Arch. Pharm.*, [3], xx., 561–566. Reprinted from the *Journal of the Chemical Society*, March, 1883.

Portions of other alkaloids yielded characteristic reactions when rubbed with a few drops of concentrated sulphuric acid and gently warmed; alcoholic or aqueous potash solution (30 to 40 per cent.) is then dropped in by means of a capillary tube with constant stirring until in excess. Narcotine, morphine and codeine give the most striking reactions.

Narcotine, in course of heating with the acid, takes a yellow, or if warmed longer, a violet colour. On the addition of alcoholic potash, it becomes a fine orange-red, which on adding water passes to yellow; treated with *aqueous* potash solution, the final reaction shows a gamboge-yellow, soluble, unchanged in water.

Morphine on the addition of the alcoholic solution becomes yellowish to dirty red, then turns to steel-blue and sky-blue. The continued addition of the potash solution causes, after a short time, a transition to a fine cherry-red. Water partially dissolves the residue to a red-violet colour: the residue is a fine blue to blue-green, and dissolves with that colour on adding water. Treated with *aqueous* potash solution it passes from red to a fine moss-green, and on further addition of the potash solution to a dirty yellow-brown. The more strongly the morphine is heated with the acid, the more intense is the blue produced on the addition of alcoholic potash.

Codeine gives no reaction with alcoholic potash: with the aqueous solution it passes from reddish to pure green, and then to a dirty white; if it is heated with sulphuric acid until it begins to brown, it gives all the reactions of morphine, and seems to change into that body.

Solanine with the alcoholic solution passes from yellow to blue or red-violet, particularly after standing some time; with more potash it becomes whitish-grey. Sulphuric acid dropped into the mixture to excess causes a cherry-red, which disappears on adding water. Solanine treated with the aqueous potash solution passes from yellow to violet, then to green, and finally dirty yellow-brown. Sulphuric acid added as above causes the same reactions, but the process must be carefully conducted. The cherry-red and its disappearance are very strongly characteristic of this alkaloid. The reaction is most successful when the substance is dissolved in *cold* sulphuric acid and warmed, but not until the solanine becomes brown, as in that case the colour reactions do not take place.

Another method of examination adopted by the author is to rub small portions of certain alkaloids with concentrated sulphuric acid on a white porcelain slab; to the mixture he then adds a few crystals of sodium nitrite. Certain changes of colour occur, which again alter when alcoholic or aqueous potash solution employed in the previous experiments is added in drops, with constant stirring, until in excess; previous warming with the sulphuric acid is not desirable, unless when specially directed.

Atropine with sodium nitrite shows a deep yellow to orange. Alcoholic potash produces a splendid red-violet, quickly passing into pale rose: the more nitrite used, the deeper the colour. Aqueous potash does not produce a colour reaction.

Narceine with sodium nitrite first gives a dirty brown-green, then clear blue margin, the mixture gradually passes to a fine violet, red-violet, and a blood-red. Alcoholic potash changes this to a yellow, but aqueous potash causes the violet to pass through yellow to a dirty brown. When the blue margin appears as above, if the mixture is very gently warmed, it becomes a magnificent blue-violet.

Narcotine with sodium nitrite passes gradually through red, brown and green into a cherry-red. Alcoholic potash added changes this to a dirty orange; *aqueous* potash when dropped into the mixture after the sodium nitrite, shows a green spot after each drop. When it has been added in excess, all becomes a dirty green; when narcotine is warmed with sulphuric acid until yellow, or till the characteristic violet appears, and sodium nitrite is then added, a fine cherry-red immediately makes its appearance.

Strychnine with sodium nitrite gives a dirty yellow. Alcoholic potash changes it to a fine orange-red, the aqueous solution causes it to turn brownish-green, and finally dirty red-brown.

Digitaline with sodium nitrite gives a brown to dirty cherry-red colour, changed by alcoholic potash to a dirty yellow-grey, by aqueous potash to brown: the reaction with the sulphuric acid and sodium nitrite is peculiar to this alkaloid.

Two or three samples of each alkaloid were obtained from different sources. The processes followed in the experiments require a considerable amount of practice, and it is sometimes difficult to exactly specify the shade of colour, for example, whether one should be called brownish-green or greenish-brown; yet with practice the characteristic reactions can be very accurately produced.

CALX SULPHURATA AND SULPHIDE OF CALCIUM.*

A peculiar product obtained by calcining about seven parts of finely-powdered gypsum and one part of powdered charcoal in a covered crucible has long been used in medicine, and has been officinal in various pharmacopœias. The proportion of gypsum and charcoal vary in the latter between eight and three of the former to one of the latter. Soubeiran advises to mix eight of gypsum, four of lampblack and enough of a fatty oil to make a mass. Other formulæ prescribe caustic lime and sulphur. The homœopaths prepare it by heating equal parts of finely-powdered oyster-shells and flowers of sulphur for ten minutes to a white heat. One of the old names of this preparation is *Hepar Sulphuris Calcareum*, and this is the name it is known by in homœopathic practice. None of the above processes yields a pure sulphide of calcium (CaS), the product being always contaminated with other substances, either undecomposed gypsum or carbonate of calcium, or free lime or free carbon. A *pure* sulphide of calcium can be prepared only with some difficulty.

It is not at all necessary that the "sulphide of calcium" used in medicine shall be absolutely pure. All previous reports of the therapeutic effects of the compound are based on the commercial article—chiefly on that made from oyster-shells and sulphur—and the quality of this, though it only consists in part of CaS, has remained tolerably uniform.

The pharmacopœia only wished to recognize the article already in use, and knowing that the ordinary name by which it was known in practice and in trade, viz., sulphide of calcium, was wrong, inasmuch as the preparation contained only about thirty-three per cent. of the pure sulphide, the revisers selected the more correct old name, which expresses only the fact that the compound is prepared from *lime* and contains *sulphur*, "Calx Sulphurata" = sulphurated lime. A test was, however, appended to estimate the amount of pure calcium sulphide present, and the lowest limit of percentage was placed at thirty-six.

Perfectly pure sulphide of calcium, if ever introduced into medicine, will have to receive the title "Calcii Sulphidum" in the pharmacopœia.

Whether calx sulphurata or calcii sulphidum be prescribed in the United States, the patient will always receive the same substance. It is never "mixed" artificially, the admixtures being inevitable in process of preparation. A fair estimate of the good quality of a sample may be obtained from the odour of the substance, which should be that of a sulphydric acid and should be quite distinct. As a rule we have obtained a better article in the United States from homœopathic manufacturers than from any other source. This is probably owing, at least partly, to the fact that they prepare it more frequently than others, and are thereby enabled to dispense it in a much fresher state.

* From *New Remedies*, May, 1883.

The Pharmaceutical Journal.

SATURDAY, JUNE 23, 1883.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE CHEMISTRY OF STORAGE BATTERIES.

ALTHOUGH the sanguine expectations which were raised by some of the statements that accompanied the introduction of FAURE'S modification of the PLANTÉ battery have not all been fulfilled, enough has been realized to demonstrate that it would be an enormous gain to electrical science if a secondary or storage battery could be devised which should not be too cumbersome and should be capable of giving up, after a reasonable time and at the will of the operator, a large proportion of the energy that has been previously stored up in it. One reason, perhaps, why there has been an apparent delay in the practical application of M. FAURE'S invention is that the physical and chemical conditions which obtain when a current of electricity is passed through a series of lead plates arranged in a bath of dilute sulphuric acid are still imperfectly understood. True, it is known that the first plate in the series, or the one by which the current enters, becomes coated with peroxide of lead, whilst on the last plate of the series a loose covering of metallic lead is formed, and that those conditions become reversed as the plates become depolarized by the discharge of the cell; but the changes leading up to this result have been variously explained. Some writers contend that much of the storage effect depends upon the occlusion of oxygen and hydrogen by the positive and negative plates or their coatings, others that the lead sulphate which is formed plays an important part, whilst others maintain that this lead sulphate undergoes no chemical change. Some of the researches of Messrs. GLADSTONE and TRIBE which throw light upon this subject have already been referred to in this volume (see before, p. 221), and a further important elucidation of it is furnished in a paper recently read before the Royal Society by Dr. FRANKLAND and published in the latest number of the 'Proceedings.'

It may be stated at once that the first-mentioned theory has now been eliminated from the discussion, since the results obtained by Dr. FRANKLAND in some preliminary experiments justify the conclusion that occluded gases play practically no part in the phenomena of the storage cell. The function of the lead sulphate formed appears, however, to be much more important and so far as it has been traced is exceedingly interesting. During the "formation" of a cell a thin superficial deposit of insoluble lead sulphate is soon formed on both the positive and negative surfaces of the plates; but the amount of sulphuric acid which disappears from the liquid contents of the cell is much more than sufficient to account for the apparent result and is probably used up in the formation of other lead sulphate that is obscured by the chocolate-coloured peroxide formed simultaneously. Unless the coated plates have been immersed previously for several days in dilute sulphuric acid, this disappearance of acid during their "formation" continues for ten or twelve days. At length, however, as the charging goes on, the strength of the acid ceases to diminish, and soon afterwards it begins to augment, the increase continuing until the maximum charge has been reached and abundance of oxygen and hydrogen gases begin to be discharged from the plates. At this point the current becomes occupied exclusively, or nearly so, in the electrolysis of hexabasic sulphuric acid (SO_6H_6), which appears to be the central point with which all the chemical reactions that occur in the cell are connected. On the other hand, during the discharge of the cell the specific gravity of the acid continually decreases until the discharge is finished, when it is found to have sunk to about the same point from which it began to increase during the charging. Hence it is apparent that during the discharge lead sulphate, which has been continuously decomposed in charging, is continually reformed. Dr. FRANKLAND concludes that the chief if not the only chemical changes occurring during the charging of a storage battery are (1) the electrolysis of hexabasic sulphuric acid into sulphuric anhydride and oxygen, eliminated on the positive plate, and hydrogen eliminated on the negative plate; (2) the reconversion in the presence of water of sulphuric anhydride into sulphuric acid; (3) the chemical action of the eliminated oxygen on the coating of the positive plate, resulting in the presence of water in the formation of lead peroxide and hexabasic sulphuric acid; and (4) the chemical action of the eliminated hydrogen on the coating of the negative plate, resulting through an analogous reaction in the formation of spongy metallic lead and hexabasic sulphuric acid. In the discharge of a storage cell, Dr. FRANKLAND supposes the chemical changes to be (1) the electrolysis of hexabasic sulphuric acid as in charging; (2) the reconversion of sulphuric anhydride into hexabasic sulphuric acid, as already described; (3) the chemical action of eliminated hydrogen upon the coating of what was before the positive plate or electrode, but which now becomes the negative plate of the cell,—that is to say the plate from which the positive current issues to the external circuit,—resulting in the reduction of the lead peroxide formed during the charging into lead oxide, which is immediately converted into lead sulphate by the sulphuric acid present; and (4) the chemical action of eliminated oxygen upon the coating of what has now become the positive plate of the cell, resulting in the formation of lead oxide, which also is at once converted into lead sulphate.

To sum up, Dr. FRANKLAND concludes that the initial action in the charging of a storage cell is the electrolysis of hexabasic sulphuric acid, each molecule of which throws upon the positive plate three atoms of oxygen, and upon the negative plate six atoms or three molecules of hydrogen. Each atom of oxygen decomposes one molecule of lead sulphate on the positive plate, producing one molecule of lead peroxide and one of sulphuric anhydride, the latter instantly uniting with three molecules of water to form hexabasic sulphuric acid. In discharging, as in charging, the initial action is the electrolysis of hexabasic sulphuric acid. The oxygen eliminated on the positive plate reconverts the reduced metal of that plate into lead oxide, whilst the hydrogen transforms the lead peroxide on the negative plate into the same oxide, which in both cases is immediately converted into lead sulphate by the surrounding sulphuric acid, thus restoring both plates to their original condition before the charging began. The discharge of a cell does not proceed so far as to undo the work of "formation;" in fact it is highly probable that in the ordinary use of a storage cell the discharge is never completed.

One practical result of Dr. FRANKLAND'S investigation is that he has been able to suggest an extremely convenient chemical method for ascertaining the extent to which a storage cell is charged, based upon the observation mentioned before that in a "formed" cell the specific gravity of the dilute sulphuric acid increases regularly during the charge, and decreases during the discharge of the cell. The specific gravity and consequent strength of the dilute sulphuric acid of a "formed" cell being known in its uncharged and also in its fully charged condition, it is only necessary to take the specific gravity of the acid at any time in order to ascertain the proportion of its full charge which the cell contains at that moment, and if the duty of the cell is known, the amount of energy stored will also be thereby indicated. In a cell experimented with, containing about seven quarts of dilute sulphuric acid, each increase of ·005 in the specific gravity of the acid meant a storage of energy equal to 20 ampères of current for one hour obtainable on discharge.

In conclusion, it may be mentioned that Messrs. GLADSTONE and TRIBE have recently published a further communication as to the result of their researches upon this subject, in which they deal mainly with the influence of the strength of the acid used in the cell. They state that they have obtained the best results as to the oxygen fixed on the positive plate by using dilute sulphuric acid of a strength of 1 to 10. When a dilution of the strength of 1 to 1000 was used, the amount of oxygen fixed was double as compared with the strength of 1 to 10, but a considerable quantity was taken up in the formation of a basic lead sulphate, with a consequent diminution in the amount of peroxide formed.

As expected, the Medical Acts Amendment Bill did not come on for second reading on Thursday of last week. It was postponed until Monday, and then again until Tuesday, when although it was second on the list, it was not reached. It was then set down for Thursday, but as seventeenth on the list, so that at the time of going to press it had not been reached, nor is it likely to be. A petition to amend the Bill was presented on Friday, the 15th inst., from the Pharmaceutical Society of Ireland. Our readers will notice with satisfaction the continued unanimity amongst pharmacists as to the action taken by the Council of the Society in respect to the Pharmacopœia clause of this Bill, which is further indicated in the resolution passed by the Sheffield Pharmaceutical and Chemical Society, and printed in another part of this Journal.

* * *

Referring to the scheme for the revision of the British Pharmacopœia, as disclosed in the recent report of the Pharmacopœia Committee, *New Remedies* remarks that it is to be regretted that the General Medical Council has not been "more liberally inclined towards the pharmaceutical profession as a body," and given it an opportunity to participitate in the work, rather than pursue the course it has chosen to adopt. Our contemporary thinks that since the General Medical Council is notoriously obliged to go outside of its own organization to secure the necessary skill for revising a work which is as much the property of the pharmaceutical as of the medical profession, "the course pursued in the present instance is not calculated to add to the dignity of the Council, or serve as an example of the fair-play in which our British cousins have so much pride."

* * *

It is not expected that there will be time left for the French Pharmacy Bill to be considered by the present Chamber. The report of the Commission, to which reference was made last week, shows a strong disposition to free pharmacy from all regulations, only restrained by the difficulty of passing from one extreme to the other. It defines, in, so many words, the duty which society owes to its members, in assisting them to form a judgment in such matters, as being limited to saying, "Here is a competent medical man, or a skilful pharmacist; you know that if you resort to him you will be in the hands of a trustworthy man; but if you prefer to go to the bone-setter or to the druggist, which you are free to do, it is not for the law to protect you against your own stupidity." The present time is, therefore, looked upon as one of transition, when there should be nearly complete liberty under the guarantee of a diploma. The conclusions of the Commission appear, however, to be in advance of public opinion in some quarters, for the proposition to allow pharmacists to sell any substance expressly demanded by the purchaser has been denounced in the *Intransigeant* by M. Rochefort as the liberty to poison, and he maintains that laws and regulations in respect to pharmacists cannot be too rigorous. The Minister of Commerce has also succeeded in introducing into the Bill a prohibition of the sale of poisons without the order of a medical man.

* * *

Just now, when some attention has been directed to the position of pharmacists in this country in relation to the supply of alcohol, it may be interesting to mention some privileges that have been accorded to registered pharmacists in the Dominion of Canada, under a new "Licence Act." In this Act it is provided that a registered chemist and druggist shall not be prohibited from keeping, having or selling alcoholic liquors for purely medicinal purposes, but no sales are to be made in quantities of more than six ounces at a time, except under an order from a registered medical practitioner. Further, all supplies of alcoholic liquor are to be registered in a book, which is to be open to inspection, and in no case may the liquor supplied be consumed on the premises of the chemist and druggist supplying it.

* * *

In the discussion which followed the reading of a paper at the Plymouth meeting of the Pharmaceutical Conference, in which a denial was given to the then prevailing belief that the presence of a salt of copper in preserved peas was prejudicial to the health of persons eating them, statements were made as to the longevity of persons subjected to the influence of "copper smoke" or who drink water containing copper. These find strong confirmation in the results of an inquiry made in reference to the circumstances attending the epidemics of typhoid fever that prevailed in Paris in the years 1876–77 and 1882–83. In the former epidemics 2462 persons died from typhoid, of whom only two were workers in copper, whereas fifty would hardly have represented the relative proportion of copper workers to the population. In the more recent epidemic the deaths amongst workers in copper and bronze were equally below the average. A similar immunity has been observed in respect to cholera. A more striking illustration is quoted in the "Bon Accord" Society, consisting of between three and four hundred members, who are all turners, fitters and workers in bronze; this Society has not lost a single member by death from typhoid fever or cholera since its establishment in 1819, and very few from small-pox or diphtheria.

* * *

There appears to be a prospect of a decided improvement in the bark and quinine market in this country. We understand that within the last two weeks large quantities of bark have been sold.

* * *

According to a Report on the Drug Trade of New York, drawn upby Mr. D. C. Robbins, the importations of quinine into the United States during the year ending June 30, 1882, amounted to 794,495 ounces, against 408,851 ounces in the previous year. During the year ending December, 1882, the importation of cinchona bark reached 29,200 bales, against 31,700 bales in the year 1881. This large increase in the amount of manufactured quinine imported and the decrease in the quantity of raw material are attributed to the removal of the high duty on quinine that was formerly levied.

* * *

We understand that the patent rights in kairine, the latest proposed substitute for quinine, have been acquired by the Colour Manufacturing Company in Höchst, formerly Meister, Lucius and Co., by whom it is now being made under the superintendence of Professor Laubenheimer. It appears that two kinds of the drug are to be met with, one called "karin M," which is said to present some advantages, and the other simply "kairin," which represents the substance with which the original clinical experiments were made. Whether kairin will be more successful in ousting quinine as a febrifuge than chinoline, from which so much was expected, appears very doubtful, and we are more inclined to think that the cinchona alkaloids, produced at the moderate price which the spreading cultivation of the cinchona plant appears to bring within a measurable distance, will eventually beat every competitor from the field.

* * *

Some cultivators evidently have faith in the future of cinchona cultivation in India. A writer in the *Madras Times*, who advocates a more free utilization of the assistance that chemists are able to give in selecting the most valuable varieties suitable to particular soils, prophesies that in the event of this being done the average richness of quinine in the total bark gathered, which is taken by the writer to be in that Presidency at present 1½ per cent., will, possibly, by the year 2000, have reached 4½ per cent. If so, should any of the fellow-countrymen of Macaulay's oft-quoted New Zealander happen then to be engaged in the quinine manufacture, they will be within reach of a supply of good bark.

* * *

According to the official report on the Government Cinchona enterprise in Java for the first quarter of the present year, a translation of which appears in the *Ceylon Observer*, the fears that were entertained as to the deteriorating influence of a "succirubra" stem on a "Ledgeriana" graft have proved groundless. Analyses of bark taken from twenty three-year old grafts failed to reveal a trace of cinchonidine, whilst the yield of quinine reached 7·37 per cent. A recent visitor to Java has stated that one private proprietor in that island has five thousand acres of land occupied in *Cinchona Ledgeriana* cultivation, and that the plantation is in a flourishing condition.

* * *

In connection with an Exhibition to be held in Colombo in August, under the auspices of the Colombo Agri-Horticultural Society, a gold medal is offered for the best collection of cinchona barks, and silver medals for the best collections of barks of *C. robusta*, *C. Ledgeriana* and *C. succirubra*.

* * *

The *British Medical Journal* reports a fatal case of poisoning by carbolic acid administered in mistake for a black draught, which has taken place in the Bridgwater Workhouse. A coroner's jury returned a verdict of "Homicide by misadventure."

* * *

We understand that one of the two Research Scholarships recently instituted by the Grocers' Company has been awarded to Dr. Matthew Hay, of the University of Edinburgh, whose name will be familiar to the readers of this Journal. The scholarship is of the annual value of £250, and although the award is for one year only, the holder will be eligible for re-election at the end of that term.

* * *

A meeting of the School of Pharmacy Students' Association will be held on Thursday next, June 28, at 8 p.m., when a paper will be read by Mr. H. Hamilton, on "The Characteristics of the Principal Natural Orders," illustrated by specimens. A Report upon Analytical Chemistry will be made by Mr. C. Thompson on "The Estimation of Carbolic Acid."

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

June 20, 1883.

Present—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Benger, Brady, Corder, Ekin, Fletcher, Gale, Greenish, Linford, Plowman, Tanner, Taylor and Thresh.

Dr. Greenhow attended on behalf of the Privy Council.

MAJOR EXAMINATION.

Six candidates were examined. *Five* failed. The undermentioned passed, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Wedge, George Deller ....Alresford.

MINOR EXAMINATION.

Nineteen candidates were examined. *Twelve* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Ashton, Frederick William ...Market Harborough.
Atkins, Alfred Edward ....Newport.
Austin, George Leonard.........Ashford.
Bachelot, Emile ....Mauritius.
Blain, William Rushton ....Bolton.
Hircock, George Walter ....Kettering.
Joye, Joseph.........................Southport.

June 21, 1883.

Present—Mr. Carteighe, President; Mr. Atkins, Vice-President; Messrs. Barnes, Brady, Corder, Ekin, Fletcher, Gale, Greenish, Linford, Plowman, Tanner, Taylor and Thresh.

Dr. Greenhow attended on behalf of the Privy Council.

MINOR EXAMINATION.

Twenty-two candidates were examined. *Ten* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Hamilton, Henry..................Finchley.
Handford, Thomas Edward ...Torrington.
Kitchin, John ....Ulverston.
McLanachan, John ....Sheffield.
Marsden, Charles Edwin.........Huddersfield.
Martin, John ....Redruth.
Nicholls, Reginald Edward......Lee.
Silk, Edward ....Macclesfield.
Stocker, George ....Exeter.
Thacker, Henry Ransley.........Nottingham.
Whiston, Edmund ....Wolverhampton.
Wilson, Harry ....Buxton.

MODIFIED EXAMINATION.

Two candidates were examined. *Both* passed, and were declared qualified to be registered as Chemists and Druggists:—

Castell, George Gower......... ...London.
Heathcote, Henry ....Liverpool.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination:—

Certificates of the College of Preceptors.

Church, Albert Victor John ...Norwich.
Croasdale, James C................Ulverston.
Davison, Daniel ....Cromer.
Jolly, John ....Chorley.
Nicholson, Thomas Brough......Sunderland.
Reinhardt, Charles Emmanuel..Leeds.
Taylor, Walter........................London.

Certificates of the Faculty of Physicians and Surgeons of Glasgow.

Bolas, Samuel Brittain ....Rock Ferry.
McCurrie, John ....Port Bannantyre.

Certificate of the Royal College of Surgeons of England.

Capper, Percy ....Huyton.

Certificate of the Royal University of Ireland.

Harrold, John P....................London.

Certificate of the Society of Apothecaries.

Brown, Edgar Marshall ....Derby.

Certificates of the University of Cambridge.

Allison, Henry ....Birmingham.
Brookes, Joseph ....Northwich.
Hitchcock, Thomas Frederic ...York.
King, Lawrence Bowdler ......Turnham Green.
Miller, Edwin Frederick.........Ipswich.
Parry, John ....Llangefni.
Peck, Ernest Saville ....Cambridge.

Certificate of the University of Glasgow.

Neill, William ....Govan.

Certificate of the University of London.

Want, William Phillip............Lee.

Certificates of the University of Oxford.

Pinch, Albert Edwin ....Bath.
Smith, Arthur ....Watford.

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

Pharmacopœia Revision.

At a meeting of the Council of this Society the memorandum of the Medical Council was duly discussed. It was resolved that in acknowledging the courtesy displayed in the communication, the Council desired to state that it would do its utmost to render every assistance in its power towards suggesting improvements and giving information to the Committee for the revision of the British Pharmacopœia. But the Council wished to record its desire that any such information may be allowed to be transmitted through the Pharmaceutical Society, its representative head.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

CHLORAL.*

BY W. PIRIE.

Chloral, like chloroform, was for many years on the shelf of the chemist's laboratory before its medicinal properties were known. It was discovered by Liebig in 1829 or 1830 (though not published till 1832) and for thirty-six years was looked on as merely a chemical curiosity; but in the year 1868 Dr. Otto Liebreich, of Berlin, discovered that when administered internally chloral produced hypnotic effects on the animal organism. Making some experiments, the doctor communicated the result of these to the Medical Society of Berlin, in June, 1869. The new remedy at once received attention. It was introduced for the first time into English medical practice as a soother of pain and producer of sleep in August, 1869. Nine years later it was calculated that upwards of fifty tons of chloral had been manufactured, or sufficient for some 36,000,000 doses.

Regarding the process for the manufacture of chloral, I presume all are acquainted with the bare outline given in the B.P. "Chloral, produced by the action of dry chlorine gas on anhydrous alcohol, purified by treatment, first with sulphuric acid and afterwards with a small quantity of lime." Our Pharmacopœia, however,

* Read at a meeting of the Edinburgh Chemists' Assistants and Apprentices' Association, March 7, 1883.

leaves us with but a crude notion of the preparation of chloral.

The following is the process as described by the discoverer, Liebig:—

"Chlorine gas is passed through absolute alcohol, which is kept cool at first, but afterwards raised to a continually increasing temperature, as long as hydrochloric acid continues to form; the resulting hydrate of chloral is freed from water and a small quantity of alcohol by agitation with oil of vitriol, and the decanted liquid rectified over lime. The chlorine is evolved continuously from a large retort or flask; passed through a chloride of calcium tube to dry it, and then into a bent tube, the arms of which are short and parallel to each other, but somewhat oblique towards the middle, while that portion of the middle which is directed downwards and contains the alcohol is wide, long and somewhat slating, so that the chlorine after arriving at the lowest part, is obliged to pass through the oblique column of alcohol; from this the unabsorbed chlorine, together with hydrochloric acid gas and vapour of hydrochloric ether, passes into two Woulfe's bottles and thence into the open air, so that the operator is not annoyed by it. At the commencement of the operation the alcohol is cooled by effusion of cold water, to prevent it from taking fire and depositing soot; but afterwards when the absorption of the chlorine diminishes, and the liquid assumes a yellow colour, it must be gradually heated and ultimately to the boiling point. Eight ounces of alcohol require the passage of the chlorine to be continued for twenty days, involving a consumption of 20 pounds of chlorine mixture. The alcohol becomes continually thicker, acquires a higher boiling point and is finally converted into a heavy syrup, which, after standing for some days, solidifies completely to a white crystalline mass, consisting of hydrate of chloral, together with a small quantity of hydrochloric acid and undecomposed alcohol." But how can we tell if enough chlorine has been passed into the alcohol, without having to wait for some days for the solidifying of this mass? "If a small sample of the liquid, after being agitated with four times its volume of oil of vitriol and set aside, does not in a few hours form an insoluble stratum (which is an insoluble form of chloral) above the oil of vitriol, enough chlorine has not been passed through the alcohol and of course it is necessary to continue the passage of the chlorine for a longer time. The solidified crystalline mass is heated till it melts; briskly agitated with four or six times its volume of oil of vitriol, which does not heat or blacken it, left at rest till the dehydrated chloral has risen to the top of the oil of vitriol, a result which may be accelerated by heating, and the transparent film of chloral immediately decanted by means of a pipette. If the oil of vitriol contains rather more than one atom of water it is particularly necessary to decant as quickly as possible, else the chloral will be converted into the insoluble variety. Lastly, the chloral is distilled over lime (which has been slaked and subsequently ignited) to remove hydrochloric acid, care being taken to keep the whole of the lime below the surface of the liquid, otherwise the lime will decompose the vapour and become red hot. In this manner the chloral is obtained tolerably pure, but it still contains traces of water and alcohol which may be removed by repeated treatment with oil of vitriol, the chloral being each time rectified over lime. All these operations must be performed in well-closed vessels." Such are the elaborate, though at the same time essential, details given by Liebig.

Regarding the rectification of chloral from lime, Dumas recommends a slight modification. He uses a saturated solution of common salt as well as the lime. The saturated solution of salt covers the lime and thus the vapour of chloral cannot be "fired" by coming into contact with it. True, a little hydrate remains behind, but he assures us that the distillate consists of pure chloral.

Gmelin informs us that hydrate of chloral may be obtained by saturating absolute alcohol with hydrochloric acid gas and then distilling this with black oxide of manganese and strong hydrochloric acid; or by distilling 3 parts absolute alcohol with 46 parts oil of vitriol, 32 parts common salt, and 24 parts manganese oxide. This process, however, does not appear to be advantageous.

To prepare chloral, Städeler very ingeniously does away with the use of alcohol altogether. Instead he uses either starch or sugar. One part of starch (or sugar) is added to 7 parts of commercial hydrochloric acid, which must be as free as possible from sulphurous acid. An equal volume of water is added, and the mixture gently warmed until the paste (formed when starch is used) has become liquid. This liquid when cold is introduced into a capacious flask. Three parts of manganese and a small quantity of common salt are then added (the salt is used to fix the sulphuric acid produced from the sulphurous acid in the commercial hydrochloric acid). The mixture is heated as quickly as possible to the boiling point, and then the fire is completely removed.

The mass swells up giving off a large quantity of carbonic acid, and continues to boil for some time by itself. As soon as the ebullition slackens it is kept up by fresh application of heat, and the distillate collected so long as it becomes turbid when mixed with a tolerable solution of potash. The turbidity is due to the separation of chloroform from the chloral. More hydrochloric acid is then repeatedly introduced into the flask by small portions at a time, till the distillate no longer smells of chloral or becomes turbid with the solution of potash.

The watery distillate is carefully freed from the colourless oil drops, which have been produced at the beginning of the distillation and which are heavier than water and smell strongly of chloroform. It is then saturated with common salt, in order to raise its boiling point and retain the water, distilled again and the resulting distillate freed from a sulphur-yellow very pungent smelling oil. It is then distilled several times more with common salt, removing the oily drops, in order to obtain aqueous chloral as concentrated as possible, and as free as possible from the yellow oil, which greatly impedes the purification of the chloral and thereby occasions loss. To facilitate the removal of this oil the distillate, before each successive distillation, is supersaturated with powdered chalk, which, during the boiling, decomposes a portion of the oil, but not the chloral. The concentrated chloral solution, however, always remains yellowish through oil remaining in it, and becomes turbid when mixed with a small quantity of water, but regains its transparency on heating or by mixing with more water. The concentrated solution is supersaturated with dry chloride of calcium and distilled in the oil-bath at 120°, whereupon the hydrate of chloral passes over as a colourless liquid, which soon solidifies, and consequently may stop up the neck of the retort, unless it be kept warm. By-and-by the liquid distilling over, instead of being colourless, becomes a yellowish or brown colonr, arising from the presence of a peculiar oil which passes over in oily drops simultaneously with the water. The resulting hydrate of chloral is mixed with four times its bulk of oil of vitriol and gently warmed. The chloral rises to the surface in a colourless layer whilst the oil becomes heated and blackened with the evolution of hydrochloric acid gas. The stratum of chloral, after being removed by a pipette, retains only a small quantity of hydrochloric acid, to free it from which it is boiled for a while by itself, and then rectified over a small quantity of oil of vitriol and finally over lime. This is Städeler's process; a very troublesome one, indeed.

Such are the earlier processes for the preparation of chloral. As carried on on the large scale the manufacture may be briefly described thus:—Into thirty or forty glass carboys, each containing from 108 to 144lbs. of alcohol of 98 per cent., a copious stream of chlorine (washed and dried by sulphuric acid) is passed thorough for twelve or fourteen days. The carboys are, of course, kept cool at first, then gradually heated. As soon as the specific gravity of the contents reaches 1·400 chlorination is stopped. The chlorinated alcohol is transferred to copper stills, lined with lead, and carefully boiled with an equal weight of sulphuric acid. Large quantities of ethyl chloride and hydrochloric acid gas are at first evolved. These with a whole series of valuable bye-products are condensed. After a while chloral distils over at a temperature of 94° C. When the temperature rises to 100° C. distillation is stopped. The distillate is neutralized with chalk and redistilled, the product being pure chloral.

The chemical reactions attending the production of chloral are very complex. During the chlorination step of the process we have formed aldehyde, acetal, trichloracetal, chloral alcoholate and ethyl chloride. Most of the ethyl chloride is converted into ether, then, step by step, into mono-, bi-, tri- and finally tetra-chlorinated ether. At this stage the liquid containing chloral alcoholate and tetra-chlorinated ether assumes the specific gravity 1·400 and the chlorination is stopped. If the chlorination were continued a penta-chlorinated ether would be formed which by distillation with sulphuric acid does not yield chloral.

During the distillation with sulphuric acid the chloral alcoholate splits up into chloral, water and ethyl sulphuric acid, while the tetra-chlorinated ether decomposes into chloral, hydrochloric acid gas and ethyl sulphuric acid. This ethyl sulphuric acid reacts with the hydrochloric acid gas, forming sulphuric acid and the ethyl chloride, which distils over in large quantity before the chloral.

Chloral is a thin colourless oily liquid, specific gravity 1·5439 at 0° C., while at 18° C., or about ordinary atmospheric temperature, the specific gravity is 1·502. It boils at 94·4 C. and may be distilled without change. Vapour density = 5·13. Chloral has a peculiar pungent odour and excites a copious flow of tears; has a greasy and slightly astringent taste; is also greasy to the touch and dropped on paper makes grease spots which, however, are not permanent. It acts very strongly on the skin, especially when its boiling vapour comes in contact therewith. It has no acid reaction even when dissolved in water; neither does it precipitate a solution of silver. Chloral, perfectly pure, when kept for some time in a closed vessel, gradually becomes turbid and deposits white flakes of insoluble chloral. This change will occur in a few days should the chloral be not quite pure. This insoluble chloral is also formed if chloral is allowed to stand for some time over sulphuric acid containing more than 1 atom of water. This insoluble modification will not dissolve in cold water and is only sparingly soluble in boiling water. It is insoluble in alcohol and ether, even at the boiling point. Chloral, on the other hand, is freely soluble in water, alcohol and ether. Chloral readily dissolves phosphorus, sulphur, iodine and bromine, and also absorbs a small quantity of chlorine gas, acquiring a yellow tint.

Anhydrous metallic oxides, such as baryta, strontia, lime, cupric oxide, mercuric oxide and peroxide of manganese, when heated in chloral vapour to only 100° C. become red hot and are converted with evolution of carbonic oxide gas into a metallic chloride, mixed with finely divided charcoal. Caustic alkalies also decompose chloral even at ordinary temperatures. The chloral is converted into chloroform, a formiate being formed.

The Compounds of Chloral.—Of the compounds of chloral the principal are the hydrate and alcoholate. There are, however, also a sulphide, a mercaptide, and a cyanate. Then there are combinations with aniline, toluidine, xylidin, and so on. In fact, new combinations are being formed every year.

Chloral Hydrate.—Chloral, shaken up with a small quantity of water, combines with it immediately, causing evolution of heat. In a few seconds it solidifies into a white opaque crystalline mass; this is the hydrate. Dissolved in water, and evaporated slowly to crystallizing, rhombic crystals are formed. Chloral hydrate melts at 46° and distils at 96° to 98°. It does not deliquesce on exposure to air. It has a pungent, but not acrid odour, and a pungent, but not acrid taste. On the application of a gentle heat it fuses to a colourless transparent liquid which, as it cools, begins to solidify at a temperature of 120° F.

It boils in a test tube with pieces of broken glass immersed in it at about 96° C. (evidence of due hydration), and at a slightly higher temperature it volatilizes on platinum foil without residue. It is soluble in less than its own weight of distilled water, rectified spirit or ether, and in four times its weight of chloroform. The aqueous solution is neutral or but slightly acid to test papers. A solution in chloroform when mixed by agitation with sulphuric acid does not impart colour to the acid. One hundred grains dissolved in 1 ounce distilled water and mixed with 30 grains of slaked lime submitted to careful distillation with a suitable apparatus should yield not less than 70 grains of chloroform.

From the new edition of the United States Pharmacopœia we learn that chloral hydrate is soluble in glycerine, benzol, benzine, bisulphide of carbon, and fixed and volatile oils. It also liquefies when mixed with carbolic acid or camphor. An aqueous solution soon becomes acid, but an alcoholic solution remains normal. Absence of alcoholate is confirmed by dissolving 1 grain in 2 c.c. of distilled water, warming and adding about 8 c.c. or a slight excess of a 5 per cent. test solution of caustic potash. This mixture is filtered and treated with a test solution of iodine until yellowish, when no yellow crystalline precipitate (iodoform) should appear, even after standing for half a hour. Before laying aside the United States Pharmacopœia I cannot help remarking that, from a student's point of view, it possesses a decided advantage over our own, for it explains why such and such a test is applied.

From these tests we would infer that the alcoholate is sometimes substituted for the hydrate, and such may be actually the case. Nor would the reason be far to seek, for the formula of the alcoholate being $C_2HCl_3\left\{\begin{matrix}OC_2H_5\\OH\end{matrix}\right.$ and that of the hydrate $C_2HCl_3\left\{\begin{matrix}OH\\OH\end{matrix}\right.$ the molecular weight of the alcoholate exceeds that of the hydrate by 28. By calculation we find that the excess is to the amount of 17·25 per cent., meaning, of course, a gain to the manufacturer if he can sell it for hydrate.

Now chloral hydrate has sometimes been put down as impure, through the presence of hydrochloric acid, because if a stirring rod wet with liq. ammoniæ be held over the bottle containing the hydrate, white fumes are observed. Now this results from a different cause altogether. Chloral hydrate is volatile at any but very low temperatures and, of course, when we open a bottle volatilization goes on, though we do not see it, but on bringing ammonia to the mouth of the bottle, a formiate of ammonia in the form of a white cloud is produced. This may be proved by absorbing vapour of chloral hydrate with blotting paper, saturated with a solution of ammonia and testing for the formiate in the usual way. Wash the paper with distilled water, heat to evaporate the excess of ammonia, add solution of $AgNO_3$ and heat. The mixture becomes cloudy, blackens, and a silver mirror is deposited on the sides and bottom of the vessel.

Commercial chloral hydrate varies in consistency. Some of it is soft and easy to crumble. Other samples are hard and solid. The cause of this is the degree of hydration. The softer variety is saturated with a slight excess of water, while the harder contains a little free chloral. The latter has an advantage over the former in dispensing, and contact with moisture immediately converts the minute quantity of free chloral into hydrate. Lately, however, brilliant pellucid rhombohedra have been produced by crystallizing from boiling chloroform, and they are much more capable of resisting change by contact with air than the common variety.

Chloral hydrate is sometimes used to detect the English, French and German peppermint oils. Its power of doing so became known in this curious fashion. Dr. C. Jehn had stated that peppermint oils were coloured by chloral hydrate. This statement was afterwards contradicted by Professor Flückiger and Dr. Hager. Dr. Jehn re-experimented and found that chloral hydrate gives with French peppermint oil, a red colour; with German oil, a pale brown colour; and with English oil, hardly any colour.

Chloral Alcoholate.—This is prepared by mixing chloral with absolute alcohol. The formula is $C_2HCl_3 \left\{ \begin{matrix} OC_2H_5. \\ OH. \end{matrix} \right.$ This is a crystalline body melting at 56° C. and boiling at 114°–115° C. It is decomposed by strong sulphuric acid with reproduction of chloral. It is easily soluble in alcohol, ether, acetic ether and petroleum, and on cooling, a hot concentrated solution crystallizes out in long beautiful needles. They have much the smell and taste of the hydrate, but dissolve less easily in water. Heated with 2 volumes of water, the alcoholate melts at the bottom of the tube and solidifies again on cooling. (The hydrate would dissolve.) Treated with sulphuric acid the liquid becomes brown; hydrate would not. Lastly, if the alcoholate be warmed in nitric acid of specific gravity 1·2, violent reaction ensues with evolution of nitrous acid; hydrate treated in this way gives, at the most, a very small quantity of yellowish vapour.

There is a pretty experiment which is almost distinctive between the alcoholate and the hydrate. A glass is filled with water. A few crystals are dropped into it. If the salt is the hydrate, it will sink at once and dissolve, with, perhaps, the exception of one or two minute flakes. If the salt be the alcoholate, only the large crystals will sink to the bottom and lie there some time before they gradually disappear; but small crystals or fragments of crystals will float on the surface of the water, and in a second or two they will become, apparently, imparted with life. They begin to spin round and round and dart from one side of the vessel to the other. The sight is very amusing. Slightly tepid water makes their motions more rapid and jerking. The cause of the movements is the slight current of saline solution from each crystal sinking down.

Chloral Sulphydrate.—This body is prepared by passing dried sulphuretted hydrogen through anhydrous chloral. It is purified by crystallization either from anhydrous alcohol or ether. It crystallizes in white rhomboidal plates or four-sided right prisms. It has a disagreeable odour and a peculiar taste recalling that of the hydrate. It melts at 77° C. and boils at 123° C. Its vapour darkens paper, saturated with a solution of a soluble salt of lead. It is soluble in all proportions in anhydrous alcohol, ether and chloroform. In the presence of water the sulphydrate is slowly decomposed, with deposition of sulphur, formation of hydrogen sulphide which escapes, and hydrochloric acid and chloral which are found in the water. There is also deposited a small quantity of liquid which has the appearance of tetrachloride of carbon. It is certain that this decomposition in water is very complex, because part of the hydrogen sulphide reduces the chloral, as shown by the deposit of sulphur and formation of hydrochloric acid and carbon tetrachloride.

The formula of the sulphydrate is $C_2HCl_3 \left\{ \begin{matrix} OH. \\ SH. \end{matrix} \right.$

When aniline is mixed with chloral great heat is evolved and a thick liquid is formed. This becomes crystalline when it cools, and may be recrystallized from alcohol in fine tables with well developed faces. This body has basic properties and forms with perchloride of platinum golden coloured scales. It has the formula—

$$C_{14}H_{13}N_2Cl_3 \text{ or } CCl_3 - CH \begin{matrix} \diagup NH - C_6H_5. \\ \diagdown NH - C_6H_5. \end{matrix}$$

The body is trichlorethylidine-diphenyldiamine.

When toluidine is mixed with chloral great heat is evolved and the compound becomes solid on cooling. This body, trichlorethylidine-ditolyldiamine, forms with acids salts of toluidine. It melts and is decomposed by water. Formula—

$$CCl_3 \begin{matrix} \diagup OC_2H_5. \\ \diagdown NHC_6H_4CH_3. \end{matrix}$$

A compound of xylidine and chloral is also formed similar to the above—

$$CCl_3 . CH \begin{matrix} \diagup NH . C_6H_3(CH_3)_2. \\ \diagdown NH . C_6H_3(CH_3)_2. \end{matrix}$$

Now, having looked at our subject only as a chemical, let us deal with it in its application as a medicinal agent. Chloral hydrate is the compound invariably prescribed. As before stated, Liebreich was the first to point out the therapeutical importance of chloral. He had observed that chloral hydrate is decomposed by an alkali into chloroform and a formiate, and reasoned that if administered internally the alkali of the blood would have the same effect. To test the correctness of the theory he administered chloral hydrate to some rabbits and found that it produced sound sleep. He administered a dose of 17 grains to a lunatic. The result was a sleep of five hours. Another dose of 44 grains was given. This dose produced a sleep lasting for the rather alarming period of sixteen hours. From these experiments Liebreich inferred that his theory of the decomposition of chloral hydrate into chloroform was correct. However, the theory has been experimentally proved to be untenable. Chloral does not produce the distinct anæsthetic effects of chloroform. Animals under the influence of chloroform exhale chloroform from the lungs, while in the excreta and blood chloroform is readily detected. Animals under the influence of chloral hydrate exhale chloral from the lungs and chloroform is not found in their excreta or blood. Messrs. Mering and Muscullen made some experiments to disprove Liebreich's theory, and in examining the urine of persons who had taken for some time doses of 5 or 6 grains of chloral hydrate every night, discovered neither chloroform nor formic acid, but a trace of chloral. They also found a substance which reduced Fehling's solution and turned the plane of polarization to the left. They isolated this substance and obtained it in stellar groups of colourless silky crystals, having the properties of an acid. It was readily soluble in water, alcohol, and a mixture of alcohol and ether, but insoluble in pure ether. Ultimate analysis of the acid and examination of its barium and potassium salts led to the formula $C_7H_{12}Cl_2O_6$. This substance they named uro-chloralic acid. From the discovery of this body it would appear that chloral hydrate belongs to those bodies which, like benzoic acid, combine with some product of the organism and are eliminated in this condition.

When administered internally chloral acts as a hypnotic, sedative and antispasmodic. The B.P. dose is 5 to 30 grains. Fifty grains have proved fatal, while on the other hand 460 grains have been given without any alarming results. The person who received this large dose was addicted to excessive drinking and in such subjects large doses of chloral seem to be tolerated. Dr. Richardson, from experiments, concludes that an average adult man can only use up 7 grains of chloral hydrate per hour, so that we should bear in mind not to dispense a prescription ordering more than 140 or 160 grains per twenty-four hours without making inquiries, else accumulative poisoning may result.

As a remedy, chloral has become so popular that its range of application is as diversified as any drug or chemical of a century's standing. In proof of this we find our pharmaceutical liturature teeming with formulæ for the preparation of elixirs, cough mixtures, liniments, ointments, plasters, suppositories, caustic pencils, capsules, etc., all containing chloral.

Allow me to call special attention to one of these preparations,—the liniment of camphor and chloral. On mixing equal parts of chloral hydrate and camphor there is formed an oily liquid which smells of chloral and tastes of camphor. When ignited it burns with a white flame having an emerald green edge; is readily soluble in alcohol, ether and olive oil; treated with water it is converted into a soft translucent mass, from which, after some time, the chloral hydrate appears to be dissolved out, leaving the camphor in crystalline grains Mixed with $1\frac{1}{2}$ parts of chloroform the mixture remains clear, but a further addition of 3 parts renders it turbid. By careful distillation I was able to separate the chloral from the camphor.

Why does a mixture of chloral and camphor liquefy? Does the chloral dissolve the camphor or the camphor dissolve the chloral? Is the resulting liquid a mere solution or a chemical compound? I mixed 2 parts of chloral with 1 part of camphor and obtained a liquid. Then I made another mixture in inverse proportions, 2 parts of camphor and 1 part of chloral. I placed this mixture in a phial and put it in my trousers pocket. I carried it there for some hours, during which time of course it was submitted to a gentle heat. When I looked at this mixture it was liquid also. I placed it aside. Next time I examined it, I found it had become a soft crystalline mass. I had got thus far when my attention was directed to the following simple experiment by Saunders, which appears in the 'Year-Book of Pharmacy' for 1877:—"A lump of camphor and a lump of chloral hydrate were placed on a flat plate about an inch apart from each other. They were covered by a bell jar. In fifteen minutes the surface of the camphor was damp, while the chloral hydrate remained dry. In three hours the camphor was wet and standing in liquid, while the chloral hydrate remained still dry. In twelve hours the liquid had reached the chloral, the upper surface of which was still dry. In twenty hours both the chloral and camphor were half liquefied and the inner surface of the bell jar covered with moisture."

This experiment seems almost to point out that the vapour of chloral was the solvent; but 1 part of camphor forms a permanent liquid with $3\frac{1}{2}$ parts of chloral, while 1 part of chloral dissolves, with heat, 2 parts of camphor and solidifies on cooling, owing to camphor crystallizing out. It is probable that camphor is the solvent. Before quitting the subject I may state that a slight rise of temperature, 3° F., has been observed on mixing chloral and camphor together, and Messrs Cazeneuve and Imbert conclude that the liquid formed is an unstable molecular compound, similar to the combinations of camphor with alcohol, acetic acid and nitric acid.

With regard to making an ointment of chloral hydrate, chloral hydrate liquefies solid fats, so that if we were to mix it with lard or simple ointment our product would be far too soft. A little spermaceti must be added to give the ointment consistency. Then, again, in making suppositories we generally use oil of theobroma as an excipient. Try it as an excipient for chloral hydrate and we get a fine unctuous mass. In fact we must use something like equal parts of oil of theobroma and spermaceti to make a good suppository.

About 1874 Dr. Kean discovered that chloral hydrate possessed remarkable antiseptic powers, and in these rooms, March, 1876, Dr. Craig, of the Edinburgh School of Medicine, communicated a paper to the North British Branch giving the results of some experiments he made in this direction. As an antiseptic in treatment of wounds, ulcers, etc., he employed chloral hydrate with great success. He also used it in the dissecting room, for the preservation of anatomical specimens, with good results. Employing a solution of from 1 to $1\frac{1}{2}$ grains per ounce, he found it an excellent preservative for vegetable specimens, and showed leaves, fruits and flowers, which had been preserved for sixteen months. Thus chloral hydrate would be very useful in that we could have a fresh plant sent from a distant country in such a condition that it could be minutely examined by a botanist.

Chloral hydrate is the best antidote for strychnine, when promptly given, arresting both the force and frequency of the tetanic convulsions. Conversely, strychnine is an antidote to chloral hydrate.

Chloral is also antagonistic to calabar bean; but to act as an effectual antidote the slower acting chloral must be given within two minutes after the quicker acting calabar bean.

With regard to the medicinal properties of any of the other compounds of chloral, I have been unable to obtain any information. The only hint that any one of them had ever been tried was that the alcoholate seems to differ essentially from the hydrate in its physiological effects.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, June 7, Dr. W. H. Perkin, F.R.S., President, in the chair.

The following certificates were read for the first time:—J. T. Barr, L. L. Garbutt, C. W. Stephens, P. H. Wright.

The President expressed his regret that a sufficient number of Fellows were not present to enable a ballot to take place; he hoped that a ballot would be held at the next meeting, on June 21, which would be the last meeting of the session.

Dr. Gladstone then communicated—

Laboratory Notes. By J. H. Gladstone and A. Tribe.—1. *On the Action of Light and Heat on Cane and Invert Sugars.*—The authors have investigated the action of their well-known copper-zinc couple on a 5 per cent. solution of sugar. No carbonic acid was evolved at ordinary temperatures, but at 100° C. carbonic acid was formed, and a small quantity of a substance which gave the iodoform reaction on treatment with iodine and potassium hydrate; this substance also gave acetic acid on treatment with potassium chromate and sulphuric acid. It was, therefore, thought at first that alcohol had been produced from sugar. Further investigations showed that the carbonic acid came from some oxycarbonate of zinc formed during the working of the couple, while the reducing body was a product of the action of heat upon the sugar solution. Many experiments were made in which a 5 per cent. solution of cane sugar was heated for many days, in all cases the iodoform-yielding substance was formed even in the absence of air. Some experiments were also made as to the influence of light, air, atmospheric germs on the conversion of cane sugar into glucose. The authors conclude that this conversion takes place with extreme slowness, when the cane sugar solution is exposed to the action of light and air, singly or jointly. Light appears to be detrimental to the development of fungoid growths in a solution of cane sugar exposed to atmospheric air. 2. *On Hydroxylamine.*—The copper-zinc couple reduces the hydrochloride of this base, ammonia being formed. 3. *On the Recovery of Iodine from Organic Iodide Residues.*—The residues are poured on an excess of copper-zinc couple wet with water or alcohol; zinc iodide is formed, which is extracted with hot water. The iodine is obtained in the free state by the action of hydrochloric acid and bleaching powder. 4. *A Residual Phenomenon of the Electrolysis of Oil of Vitriol.*—It was noticed that gas continued to be evolved from both the electrodes after the battery had been disconnected, this gas was oxygen. This phenomenon is probably due to the presence of Berthelot's persulphuric acid. 5. *On an Alleged Test for Alcohol.*—Davy suggests that traces of alcohol can be detected by the blue colour which is produced with a warm solution of molybdic anhydride in oil of vitriol. The authors find that many other reducing substances and sugar give the same reaction. 6. *Reaction of the Copper-zinc Couple on Nitric Oxide.*—When this gas is passed over the moist copper-zinc couple ammonia, but no protoxide of nitrogen, is formed. Free nitrogen was substituted for nitric oxide, but no evidence as to the formation of ammonia could be obtained. 7. *On the Reducing Action of Spongy Lead.*—Spongy lead, free from occluded hydrogen, reduces nitrates to nitrites, ammonia being simultaneously formed. This spongy lead has no action upon an aqueous solution of potassium chlorate, but the addition of 1 per cent. sulphuric acid causes a slow reduction to chloride. Lead filings cause similar reactions, but their activity is much less.

Mr. Warington said the fact recorded by the authors, that sugar solution when heated forms a reducing substance giving the iodoform reaction, was of great importance, and moreover threw some doubt on the conclusions drawn by Muntz, as to the occurrence of alcohol in almost all natural waters, these conclusions depending on the iodoform reaction.

The Secretary then read the following—

Note on a Basic Ammonia Copper Sulphate. By S. U. Pickering.—The author stated in a previous paper (*Chem. News*, xlvii., 182) that on dilution, ammonio-copper sulphate solution throws down a basic precipitate containing only traces of ammonia. With strong solutions, however, different results are obtained; with nearly saturated solutions a violet-blue substance is slowly deposited, which has the composition $4CuO,5SO_4\ 16NH_3$. When such a solution is diluted with a small quantity of water a violet-blue precipitate $CuSO_4\ 3CuO\ 2NH_3\ 5H_2O$ is deposited.

Notes on Loew and Bokorny's Researches on the Probable Aldehydic Nature of Albumin. By A. B. Griffiths.—The author states that he has gone over a good portion of the experiments which led the above chemists to their conclusions, and in the present paper details one or two observations he has noticed in the case of the protoplasm of spirogyra. The protoplasm, whether dead or alive, reduces a dilute alkaline solution of a cupric salt. The living cells when treated with a weak solution of sodium chloride under the microscope form crystals. The author is, therefore, inclined to think that the reducing body is a glucose and, moreover, it must be dextrose, because levulose does not form a crystalline compound with sodium chloride. The author does not give any analysis or say how the crystals were identified, but states that most likely they have the formula—

$$C_6H_{12}O_6NaCl,H_2O.$$

Note on the Action of Sulphuric Acid, Specific Gravity 1·84, *upon Potassium Iodide.* By H. Jackson.—It has long been known that when strong sulphuric acid acts upon potassium iodide, there are produced hydric sulphide, sulphur dioxide, iodine, hydriodic acid, hydropotassic sulphate and water; but no details as to the amounts produced have been published. The author finds that two principal reactions occur. The first when the sulphuric acid is in large excess, when the reaction is—

$$2KI + 3H_2SO_4 = I_2 + SO_2 + 2HKSO_4 + 2H_2O$$

the second when there is just sufficient sulphuric acid to satisfy the potassium iodide used.

$$8KI + 9H_2SO_4 = I_8 + H_2S + 8KHSO_4 + 4H_2O.$$

To obtain these reactions perfectly it is necessary to have the sulphuric acid boiling. The analytical numbers are given upon which the above reactions are founded.

Dr. Debus said the reaction was interesting, as in the second equation the hydriodic acid first evolved reduced the sulphuric acid, hydric sulphide being formed. Under certain conditions hydric sulphide was obtained from the action of zinc upon sulphuric acid, the nascent hydrogen reducing the sulphuric acid. In both cases the sulphur changed its valency.

The Action of Nitrous Anhydride on Glycerine. By O. Masson.—The author employed the pure glycerine of commerce and generated the nitrous anhydride by the action of nitric acid sp. gr. 1·35 on "porcelain arsenic." The gas was dried over fused calcium chloride and then passed direct into the glycerine. The reaction takes place quietly, the glycerine greatly increases in bulk and mobility; its colour changes through yellow to brown, finally becoming dark green. Two layers of liquid form, an aqueous solution of nitrous acid and of oxidation products of glycerine, and a layer which consists of the nitrous ether of glyceryl. These layers react upon each other and should therefore be separated as soon as possible. By passing a rapid current of dry hydrogen the author succeeded in distilling the ether at 100°, or 50° below its boiling point. Analysis indicated the formula $C_3H_5(NO_2)_3$. The liquid was distilled several times; it is amber coloured; boils with decomposition at 150°: burns with a whitish flame, but does not explode under the hammer. It does not mix with water, but the ether is decomposed at the surface of contact. It cannot be preserved pure; when enclosed in sealed tubes it produces pressure enough to shatter the glass.

Parliamentary and Law Proceedings.

The Pharmaceutical Society of Great Britain v. Copley.

At the Nottingham County Court, on Friday, the 15th inst., before S. B. Bristowe, Esq., Q.C., judge, the Council of the Pharmaceutical Society of Great Britain sued Mr. J. C. Copley, who carries on business at 51, Robin Hood Street, Nottingham, for the recovery of a penalty of £5 under the 15th section of the Pharmacy Act, 1868.

Mr. E. R. Turton, barrister, instructed by Messrs. Flux, Son and Co., appeared for the Society.

Mr. Barrows appeared for the defendant.

Mr. Turton said the action was brought under the 15th section of the Pharmacy Act, 1868. Contrary to the provisions of that section the defendant had kept an open shop for the retailing, dispensing or compounding of poisons, he not being a duly registered person. Mr. Turton then referred to the various sections of the Act bearing upon the case, and stated that it appeared that on May 12 last, Mr. Stroud went into the defendant's shop and purchased some laudanum, and the bottle was wrapped up in a handbill setting forth the defendant's name and qualifications. As he understood that Mr. Barrows admitted those facts, and that the defendant was the proprietor of the shop where the poison was bought, he submitted that the defendant had kept open shop for the sale of poison, and was, therefore, liable for the penalty sued for, and with those facts he left Mr. Barrows to show that the Act did not apply in the present case.

Mr. Barrows intimated that he admitted that the laudanum was sold in defendant's shop; he preferred to call witnesses before addressing the Court.

The defendant was called and said that he had in his employ Henry Edward Wakefield, a registered chemist; he had not sold poison in his shop, nor had he allowed any to be sold. He was an analytical chemist. He had authorized his assistant to sell poisons on his own account, but he had said that if he (Wakefield) liked to sell poisons at his own risk and with his own capital he could do so.

In reply to the Judge, defendant said that he was well acquainted with medical and pharmaceutical chemistry, and was a member of several learned societies.

Mr. Barrows: You prepare gentlemen to pass the examinations of the Pharmaceutical Society?—Yes, I do.

Mr. Turton: And you have failed to pass yourself?—Yes.

H. E. Wakefield was called and stated that he sold the laudanum at his own risk, the defendant did not share the profit. He was a duly registered chemist.

Mr. Barrows contended that the action was under a penal statute, and, therefore, it ought to be construed most strictly and not by inference.

His Honour pointed out that the section said "any person who shall sell or keep an open shop for the retailing, etc."

Mr. Barrows submitted that defendant kept an open shop for the sale of pharmaceutical preparations, but not an open shop for the sale of poisons. He referred his Honour to reported cases, and said that the Act was passed for the protection of the public, and submitted that the public had in no way been injured.

His Honour said the plaintiffs had made out their case and gave judgment, the penalty of £5 and costs.

Mr. Barrows asked for leave to appeal.

His Honour said it was a matter of some interest, and if he thought it desirable he would not refuse the request, but Mr. Barrows had better consider the matter.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN *v.* BROWN.

At the same Court the Council of the Pharmaceutical Society sued Mr. A. E. Brown, of 11, Sussex Street, Nottingham, to recover two penalties of £5 each under section 15 of the Pharmacy Act, 1868, one for keeping open shop for the sale of poison, not being a duly qualified person, and the second, for taking, using or exhibiting the title of "chemist."

Mr. Turton, barrister, instructed by Messrs. Flux, Son and Co., appeared for the Society.

Mr. Payne represented the defendant.

Henry Goodlud, of Nottingham, proved that on May 12 last he purchased two pennyworth of laudanum at defendant's shop. He produced the bottle in which it was contained, upon which defendant had placed a label bearing his name and address and the title "chemist."

Mr. J. B. Coleman, Analyst and Demonstrator of Chemistry at the University College, Nottingham, proved that he had analysed the contents of the bottle produced by last witness. He found the contents to be a tincture of opium.

Mr. Payne admitted that the Act had not been conformed with, but said that defendant would at once enrol himself as a member of the Pharmaceutical Society if the case was adjourned.

His Honour gave judgment for the plaintiffs for the two penalties, £10 with costs.

POISONING BY POTASSIUM CYANIDE.

An adjourned inquest on the body of the late Mr. John Odlum, who died suddenly at his residence, Hove, on May 30, was held on the 6th instant, by Mr. Wynne E. Baxter, Coroner for East Sussex.

Medical evidence having been given to the effect that death had resulted from poisoning by potassium cyanide,—

Horace Arthur Costerton, of 90, Western Road, Brighton, chemist, knew the deceased as a customer for some time past. He had bought recently some cyanide of potassium. On May 7, he came to witness's shop in his absence and asked his assistant to serve him with some cyanide in order to clean some silver. The assistant refused in the absence of witness to serve him with the cyanide of potassium, but on the following day deceased came and asked witness personally for the cyanide. Witness, knowing him well, served him with an ounce, obtaining his signature, as usual, in the poison book. On May 10, the deceased returned, saying that he had used the ounce, but it was not quite sufficient for his purposes. He asked for a further small quantity, and he was served with another half ounce, his signature being again given. These were the only two cases of deceased's being supplied with poison by witness. He should say the cyanide of potassium in the bottle produced was, as dissolved in the water, less than an ounce.

The Jury, after a short discussion, returned a verdict to the effect "That the deceased committed suicide whilst in a state of temporary insanity."—*Sussex Daily News.*

POISONING BY OPIUM.—A HERBALIST CENSURED.

On Friday, the 15th inst., the Leicester Borough Coroner, Mr. G. F. Harrison, held an inquest relative to the death of Charles Hanger, aged 51 years. It appeared that deceased had been ailing, and his daughter sent for a herbalist, named Whitley, who brought some medicine which was given according to direction. The symptoms, however, increased, and a medical man subsequently came, death ensued shortly afterwards.

James Whitley, the herbalist, said that on Sunday morning he was requested to see the deceased, who was suffering from chronic bronchitis. Deceased had some powders in his house, which witness had made up previously, and he told him to take one. He then went home and made up a bottle of medicine, which he took to the house of the deceased. On Monday night deceased was so much recovered that he came down stairs. On Tuesday, upon visiting, he found him much worse. On Wednesday he seemed a little better, and told witness he should like something to make him sleep. Witness went to Mr. Cleaver, a chemist, and bought three grains of opium. He made two and a half grains of it into a pill, and sent it for the deceased. About 9.30 on Thursday morning he went to see the deceased, and found his breathing very much worse, and he recommended that a doctor should be called in. He did not see the deceased again. He had been in business as a herbalist for twenty-five years.

In reply to the Foreman, witness said he had administered as much as two and a half grains of opium before, where there had been symptoms of typhoid fever, and there was a good deal of fever to contend against in this case.

Mr. G. C. Franklin, surgeon, had examined the body, and was of opinion that death was caused by bronchitis and an overdose of opium.

The Jury returned a verdict to the effect that death had been caused by bronchitis and an overdose of opium, indiscreetly administered by the man Whitley. Whitley was then called in, and censured by the Coroner.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

DEPOSITS FROM TINCTURES.

Sir,—As I am about to undertake the examination of deposits occurring in the B.P. tinctures, I should be glad if any readers would kindly forward me any which they may be able to obtain, with a label stating by what method the tinctures have been prepared.

17, *Bloomsbury Square, W.C.* R. A. CRIPPS.

J. Fingland.—(1) *C. pallescens*; (2 and 3) *C. panicea*; (4) *C. curta*; (5) *A. aquatilis*; (6 and 7) *C. vulgaris*; (8) *C. ampullacea*; (9) *C. teretiuscula*; (10) *C. fulva*; (11) *C. muricata*; (12) *C. hirta*. Please not to send more than six specimens at one time in future.

"*Crinis.*"—A solution of borax is sometimes used, but the condition is probably one requiring internal treatment rather than a local application.

"*Alpha.*"—The question is rather one for the opinion of medical men, who are by no means agreed as to the action of chrysophanic acid.

"*Salix.*"—*Salix fragilis*, probably; a twig bearing stipules should always be sent in the case of species of *Salix*.

R. A. Hoyle.—(1) *Eriophoron polystachion*; (2) *Luzula sylvatica*; (3) *Pogonatum juniperinum*; (4) *Luzula pilosa*; (5) *Melica uniflora*. The specimens sent previously were too fragmentary to name with certainty.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. G. Johnson, Dr. Senier, Messrs. P. Wells, Proctor, Jones, Junior Assistant.

"THE MONTH."

The refreshing showers of the last few weeks have given quite a new start to vegetation, and a large number of medicinal plants are consequently coming into blossom. The tall spikes of digitalis are ornamenting the hedgerows, and the pretty lilac-blue flowers of dulcamara are peeping out from the wealth of foliage through which its long straggling stems climb. In chalky woods the belladonna is beginning to put forth its lurid purplish-brown bells, and in the cottage garden the aconite (*A. Napellus*) is opening its helmet-shaped blossoms. At the Royal Botanic Gardens, Regent's Park, this species may be seen in blossom, while *A. paniculatum*, *A. ferox*, and *A. autumnale* are not showing any signs of flowering. An interesting hybrid at these gardens has been formed by cross-fertilization between the *Rheum officinale*, Baillon, and *R. australe*, Don. The plant has the reddish inflorescence and entire leaves of the latter, and the habit and size of the former. The *Rheum officinale* is now a splendid sight, its tall branching inflorescence being nearly 8 feet high, while not far off an equally tall but less branching inflorescence of *Rheum palmatum* forms almost as conspicuous an object. Other medicinal plants at present in blossom in the Gardens are, the black and white mustard, rue, hemlock, buckthorn, mulberry and pellitory of the wall. Several rare or uncommon British plants may also be seen in blossom at the present time, among which may be mentioned *Silene quinquevulnera*, *S. italica*, *Geranium pratense*, and *Reseda alba*. In one of the flower-beds may also be noticed *Orobanche minor*, apparently growing on *Nepeta Glechoma*. In the Economic House the singular *Xylophylla longifolia* is in blossom, the flattened peduncles looking like leaves with flowers at their margins. In the pots in the orchid house the male and female fructification of *Marchantia polymorpha* is now in a fit state for dissection.

One of the handsomest of our native spurges, *E. Lathyris*, is now in excellent condition for examination of the flowers and fruit, and is perhaps the best plant that could be chosen at this time of year for the purpose of studying the character of the genus and order. The leaves, unlike those of all the other British species (except *E. Peplis*), are opposite and decussate. The young fruits bear some resemblance to capers, for which they are sometimes pickled as a substitute, or even mistaken for the true caper. Hence the name of "caper spurge" applied to this plant. The seeds when recent are, according to Pereira, acrid and narcotic, and contain an oil similar in properties to croton oil, of which the dose is three to ten drops. The use of the pickled fruits would therefore be dangerous in quantity, especially if gathered when nearly ripe. A section of the spongy pericarp of the unripe fruit forms an interesting object for the microscope, the mesocarp being composed of a loose network of cells. The seeds were formerly used in medicine under the name of *Semina cataputiæ minora*.

One of the most common plants in the hedge-rows at this time of year is the *Galium Aparine*, which, were it not for the minute hooked prickles which everywhere cover its stem, causing it to adhere to the clothes of the passer-by, might easily be overlooked, its greenish-white flowers being very small and inconspicuous. It has long been known as a popular domestic remedy for "impurity of the blood," and indeed was brought under medical notice some years ago by Dr. Winn, in the treatment of lepra. Dr. Quinlan, who not long since directed attention to another of our indigenous medicinal plants, *Verbascum Thapsus*, in the treatment of phthisis, now gives the results of his experiments with *Galium Aparine*. He finds that in ulcerated sores a poultice made by beating the fresh herb into a pulp in a mortar acts as a slight steady stimulant and powerful promoter of healthy granulation. In one case mentioned by him in the *British Medical Journal* (June 16, p. 1174), in which skin-grafting and sponge-grafting proved useless, a sore 8½ inches long and extending nearly round a leg was reduced to half the size in a month by the use of a poultice of this plant. As there is a difficulty in obtaining the plant in a fresh state in the winter and spring, Dr. Quinlan recommends that it should be preserved during the winter months by the process of ensilage, the plant being chopped into small pieces and rammed down by screw pressure into glazed earthenware jars with air-tight covers, which should be buried in the ground. Thus preserved, it has been found quite fresh and sweet at the end of a month.

The ancients seem to have understood the secret of preserving the colours of flowers. In some funeral wreaths found in the coffins of the Egyptian kings, Amenhotep I. and Aahmes I., the colours of the flowers were admirably preserved, so that they were easily recognized although placed on the breasts of the mummies at least 1700 years B.C. Among others were florets of the safflower (*Carthamus tinctorius*), *Acacia nilotica* and *Sesbania ægyptiaca*, plants which are still used in medicine or the arts in Egypt. There was also found in an Egyptian tomb a basket of the lichen, *Evernia furfuracea*, which at the present day is sold in the drug bazaar in every town in Egypt. Mixed with this lichen were fragments of *Usnea plicata*, and the straw of a grass, *Gymnathelia lanigera* (*Andropogon laniger*, Desf.), from Nubia, which at the present day is used by the natives as a remedy against affections of the chest and stomach, the odour of the grass (the *Juncus odoratus* of old writers: 'Pharmacographia,' 1874, p. 662) being still preserved to some extent. Mixed also with this lichen was another (*Ramalina græca*) found only in the Greek Archipelago, thus proving that commercial intercourse existed between the Greeks and Egyptians, 1000 years before Christ. A set of the wreaths, the best that could be obtained after the selection made for the Museum of Boulak, has been presented to the Kew Museum by Mr. Maspero, through Dr. Schweinfurth, and were recently exhibited at the Royal Society. They may now be seen in a case on the first floor, in No. 1 Museum, Kew Gardens.

In an editorial article in the *Gardeners' Chronicle* (June 23, p. 792), there is an interesting summary of little known facts relating to the structure of the leaf buds, the gyrating movements of the young shoots and the arrangement of the leaves in different coniferous plants, which is well worthy of reading by those who may find a walk through a pine wood somewhat monotonous, as it shows that there are modes of growth and development which enable the species of this somewhat difficult group of plants to be easily recognized. It also opens a wide field for further observation.

It is generally supposed that plants will only graft well on others of the same natural order. A cultivator of the Ardèche, named Marcel, whose vines had been invaded by the phylloxera, has, however, succeeded in grafting a vine on the common bramble (*Brit. Med. Journ.*, p. 1097). Two brambles thus grafted with French vines have been sent by M. Henzé, Inspector-General of Agriculture, to the Versailles gardens, where the experiment will be continued.

Viola pedata, a plant official in the secondary list of the last United States Pharmacopœia, is now recommended in the *Gardeners' Chronicle* (p. 762) as an ornamental plant, especially the white-flowered variety. Although introduced into this country in 1759, it does not appear to have met with the favour its beauty deserves.

Arnica montana is now in bloom in botanical gardens, and when well grown, with flower-heads 2–3 inches across, is a really handsome plant.

At the evening meeting of the Royal Horticultural Society, held in the rooms of the Linnean Society on the 12th inst., a specimen of *Curcuma Zedoaria* in flower was exhibited. This plant is the source of the zerumbet root, formerly used in medicine in this country. Another medicinal plant, *Asimina triloba*, was exhibited by the Curator of the Cambridge Botanical Gardens. A very interesting series of Irises, arranged in a circle and showing every gradation of hybridism between two species, was exhibited by Professor Michael Foster, who takes great interest in this group of plants.

At the meeting of the Edinburgh Botanical Society, on June 14, a specimen of the costus plant, *Aplotaxis auriculata*, was exhibited in flower for the first time since it was sown, in November, 1873, from seeds sent by Dr. Bellew, from Yarkand. It had been grown in the open ground. The fragrant root of this plant, which has an odour resembling that of violets, is occasionally sent to this country, being an article of considerable traffic in the East for use in perfumery, in the manufacture of incense, and for protecting clothes from the attack of moths.

A case of poisoning by laburnum flowers is described (*Brit. Med. Journ.*, June 9, p. 1117), in which a child four years of age had eaten some of the blossoms. The symptoms were similar to those produced by eating the pods, the surface of the body being cold, the pupils dilated, and vomiting frequent. Although cases of poisoning by the pods occur somewhat frequently they are rarely fatal, owing to the emetic action of the plant, and the treatment with an ordinary emetic followed by a stimulant usually ends in recovery, as it did in this case.

Some interesting information on amber is contributed in a review in *Nature* (June 14, p. 152) of Goppert and Menge's 'Die Flora des Bernsteins.' It is there stated that amber is the produce of at least six species of the fir tribe, the chief being close allies of the common spruce and the American *Pinus Strobus*. The group of coniferæ of the amber flora comprise representatives from nearly every geographical province. It is estimated that although the annual yield of amber is 200,000 to 300,000 lbs., there is still sufficient in the bed of the Baltic Sea to supply the same quantity yearly for thirty thousand years to come.

Bonaccorsi, who commenced studying the antagonism of various drugs in 1877, has lately come to the conclusion, as the results of his experiments, that morphia is antagonistic to nicotine, and that in cases of nicotine poisoning opium or morphia is to be preferred to any other remedy (*Practitioner*, p. 459). He does not find any antagonism between morphia and hyoscyamine, or between morphia and daturine.

A newly observed action of euonymin is mentioned in the *British Medical Journal* (June 2, p. 1060) by Dr. E. A. Cook. He finds it at first causes an increase in the amount of uric acid excreted, followed by a decrease in the amount, even if the use of the drug be continued.

On page 1064 of the same journal, Dr. J. Beddoe states that if the extract of *Cannabis indica* be prescribed in the form of a pill, the addition of an equal weight, or a somewhat greater quantity, of sulphate of potash will cause its action to be tolerably speedy and certain by causing the minute division of the extract.

Dr. G. C. Wallich, in the *British Medical Journal* (June 23, p. 1224), throws some light on the conflicting statements which have been made as to the value of *Cannabis indica*. He states that he found, when residing in India, that the uncertain action of the drug was due to inherent differences in the composition of the extract incident to its being grown either on the plains or in the hilly districts of India, the extract obtained from plants grown on the hills being much superior to that grown on the plains.

The oxytocic action of quinine having been called in question recently, Dr. U. Hartigan, of Hong Kong, writes to the *British Medical Journal* (p. 1064) to say that he has found it increase the menstrual flow, and that in doses of 3 to 5 grains it causes "labour pains," whilst a dose of 10 grains produces abortion. He has also learned that the Chinese take it for the purpose of producing abortion, following its use by copious draughts of tea. Quinine is so commonly resorted to as a domestic remedy for neuralgia that it is well this action should be as widely known as possible.

In an article in the *Medical Press* (June 6, p. 487), Dr. D. H. Cullimore recommends the use of the moxa in certain chronic inflammatory diseases of the spinal cord, and some intractable and often incurable diseases depending thereon. Instead of using the artemisia of China, or other substances commonly used for this purpose, he recommends that the moxa should be made of a piece of brown paper 15 inches long by 4 broad, saturated with a solution of nitrate of potassium of the strength of 1 drachm to 1 ounce of water. The paper is then dried and rolled into a cylinder so that it resembles a short cigar without tapering ends. It is applied by lighting one end and placing the other on the skin in the vicinity of the subjacent disease, the neighbouring parts being protected with alum paper having a central hole. The burning part is never allowed to come in contact with the skin.

A new preparation of ergotin is described in *New Remedies* (p. 171). It is in the form of small cylinders of gelatin, each containing 3 grains of ergotin, which is mixed with the gelatin when in a melted state. These cylinders are kept in a small test-tube in the pocket case, and when wanted for use one of them is dissolved in the test tube in a quantity of water corresponding to the desired volume by means of a gentle heat, for which the flame of a match is sufficient.

The use of small doses of medicines frequently repeated instead of larger doses given three times a day seems to find advocates in the United States as well as in this country. Dr. A. A. Smith, in a lecture delivered some weeks ago and mentioned in the *Medical Times and Gazette* (June 2, p. 621), recommends chlorate of potash in grain doses every half hour in scarlet fever as not being liable to produce dangerous inflammation of the kidney, which sometimes results from a large dose; also, salicylate of sodium in doses of 2 grains every half hour for nettle rash, 5–10 minims of fluid extract of jaborandi every half hour in Bright's disease, and bromide of sodium in $\frac{1}{2}$ or 1 grain doses in the nervous complaints of children. Many other drugs are mentioned as being given with advantage in small often-repeated doses, such as aconite, digitalis, tartar emetic, Calabar bean, cantharides, ergot, hamamelis and gelsemium.

Drs. Weir Mitchell and Reichert have recently published some interesting facts relating to the venom of serpents. They find that all the venoms they have examined present certain characteristics in common. They are invariably of acid reaction, and, when dried, soluble in water save for a slight cloudiness. The authors do not find an alkaloid in any of them, but in every case the poison appears to be made up of three distinct proteid bodies. These they have named respectively, peptic, globulin and albumin venoms. The first, which they say is a peptone, is less active than the combined poisons, but reduces the blood pressure, induces œdema, and finally produces putrefactive effects. The second is an extremely virulent substance, $\frac{1}{20}$ of a grain being sufficient to kill a strong pigeon in two hours; it gives rise in a few minutes after injection to enormous infiltration of blood into the neighbouring tissue. The third is doubtfully poisonous.

At a meeting of the Physiological Society of Berlin (May 11), Professor Brieger reported further results of his studies of the poisons formed by the decomposition of animal bodies. He obtained the hydrochlorate of a diamine base in crystals, having the formula of $C_5H_{14}N_2H_2Cl_2$, which no longer possessed the toxic properties of the extracts of the products of decomposition. A second crystalline substance, but which was extremely poisonous, has the formula $C_5H_{11}NCl$. One milligram of this substance in solution, subcutaneously injected into a rabbit, produced symptoms characteristic of fish poison, and death in convulsions in a short time. The first-mentioned body could only be prepared from decomposing meat, but not from the later stages of putrescence, nor from decomposing fibrin or other albuminous substances. It would throw some light on fish poisoning if the alkaloid which produced similar symptoms could be obtained from decomposing fish. It would also be interesting if the effect of milk on the alkaloid could be ascertained, since milk is commonly used as an antidote in cases of fish poisoning, and Professor Brieger has shown that these bases are decomposed with extraordinary facility.

Dr. George Thin, who has been investigating the identity of the bacillus of leprosy obtained from different parts of the world (*Brit. Med. Journ.*, June 16, p. 1178), finds that the *Bacillus lepræ* is the same in all cases and that it closely resembles that of tuberculosis in size, in beaded appearance and in its action with regard to the dyes methylanilin, fuchsin and gentian violet.

In a recent meeting of the Crefeld circle of the German Pharmaceutical Association, Dr. Brunnengräber stated (*Pharm. Zeit.*, No. 48, p. 387) that whilst examining a number of samples of quinine sulphate from various manufacturers he had observed the presence in the solutions of what appeared to be fine threads, which at first he thought were accidental impurities, but afterwards discovered, upon microscopic examination, to be fungoid growths (*Aspergillus glaucus*), attached to minute fragments of linen and cotton fibre. The presence of this fungus he attributes to the fact that makers of quinine sulphate, in order to retain as much water of crystallization as possible, dry the salt at as low a temperature as they can, and possibly do this by spreading the salt out upon linen or calico, which would account for it becoming contaminated with both the fungus spores and the fibres. Dr. Brunnengräber explains in this way the known instability of quinine, morphine and atropine solutions, and he recommends a preliminary boiling and filtration when it is desired to have a solution that will remain clear and unaltered.

When the weak base caffeine ($C_8H_{10}N_4O_2$) is submitted to the action of boiling baryta water it is converted, with separation of baric carbonate, into a stronger base ($C_7H_{12}N_4O$), which has been named "caffeidine." According to Dr. Maly, however, caffeidine is the product of a secondary reaction, there being an intermediate formation of a monobasic acid, represented by the formula $C_8H_{12}N_4O_3$ (*Pharm. Post*, xvi., 268). This acid may be conveniently prepared by allowing caffeine to digest at the ordinary temperature with a solution of an equivalent of potash until it has all disappeared, which requires about a fortnight, when upon neutralizing the solution with acetate of copper the acid is combined as a sky-blue, crystalline, scarcely soluble copper salt ($C_8H_{11}Cu_2N_4O_3$), from which the acid is obtainable by decomposing with sulphuretted hydrogen, concentrating in a vacuum, dissolving in chloroform and precipitating by benzol. Upon boiling with water the acid splits up into carbonic anhydride and caffeidine; it is, therefore, caffeidincarbonic acid. Theobromine is not similarly attacked by alkalies and yields neither a corresponding acid nor "theobromidine;" in fact it forms compounds with some bases, that with barium being especially characteristic.

Strychnine is not very freely soluble in strong acids, but is more readily dissolved by dilute acids. An explanation of this is put forward by Messrs. Hanriot and Blarez (*Comptes Rendus*, xcvi., 1504), which is that in presence of an excess of acid a salt is formed that is less soluble in an acid liquid than in water. Thus when a concentrated solution of a neutral salt of strychnine is treated with a little of the corresponding acid a precipitate is formed, and the same occurs even in a dilute solution, but more slowly. In the case of the sulphate crystals have been obtained, which gave upon analysis results corresponding fairly to the composition of an acid sulphate of strychnia ($C_{22}H_{22}N_2O_2,SO_4H_2$). This salt is very soluble in pure water, but much less soluble in an acid liquid; hence its crystallization. But if the liquid be neutralized with a few drops of ammonia the salt redissolves. The same chemists have also described (*Comptes Rendus*, xcvi., 1671) an acid containing nitrogen, which has been obtained by oxidizing strychnine with potassium permanganate. The silver salt, which is said to be very stable when exposed to light, is represented by the formula $C_{11}H_{10}AgNO_3,H_2O$. Neither the free acid, nor any of its salts, has been obtained in a crystalline form.

Several interesting compounds of chinoline with other bodies have recently been described. According to Herr Rhoussopoulos (*Berichte*, xvi., 202), when chinoline is allowed to react on iodoform at the ordinary temperature a beautifully crystalline compound is formed, having the composition of methan-chinoline hydriodate and represented by the formula $CH(C_9H_7NI)_3$. The compound is conveniently obtained in handsome, large, colourless, transparent needles by mixing ethereal solutions of one equivalent of iodoform and three equivalents of chinoline and allowing the mixture to stand for about an hour. The crystals are soluble in acetic ether, benzol and ligroin, but insoluble in cold water, acids or alkalies. When treated with alcohol, or heated with acids or alkalies, the compound splits up again into chinoline and iodoform. Chloroform does not appear to undergo any similar reaction with chinoline in the cold, but when the mixture is heated to a temperature above 300° C. decomposition takes place, the products of which have not been fully examined. When chloral and chinoline are allowed to react directly upon each other a white mass is formed, having the consistence of butter, which refuses to crystallize and is insoluble in nearly all solvents. But when solutions of chinoline and chloral in ether, or other solvents, are mixed together, only a small quantity of the butter-like compound is formed, and upon removing this by filtration and evaporating the solvent, radiating groups of crystals are formed. The crystals are insoluble in water and are decomposed by alcohol and alkalies; after washing and recrystallizing from benzol they gave upon analysis results showing that they consist of a compound of equal molecules of chinoline, chloral and water, which may be represented by the formula $C_9H_7N.CCl_3COH.H_2O$.

Herr Hock also has been experimenting with a view to preparing compounds that shall combine the therapeutic properties of chinoline and the antiseptic properties of phenol. He reports, however, (*Berichte*, xvi., 885) that when carbolic acid and chinoline are brought together in equivalent proportions they yield, under a considerable rise of temperature, a clear liquid from which he has not succeeded in separating a definite compound. But when resorcin and chinoline are melted together on a water-bath, in the proportion of one molecule of the former to one of the latter, the mixture forms upon cooling a crystalline mass, which can be easily purified by repeated washing and recrystallization from absolute alcohol. A pure preparation may also be obtained by mixing solutions of chinoline and resorcin in dilute hydrochloric acid, precipitating by means of sodium carbonate, and recrystallizing the precipitate from absolute alcohol. The results of an analysis showed that the new compound is a combination of two molecules of chinoline with one of resorcin. Herr Hock states that this resorcin-chinoline possesses marked antiseptic and antipyretic properties, which are being investigated in the hospital at Bern. The compound has a bitter, somewhat acrid taste, and melts at 102° C. It is slightly soluble in cold water (1 in 400), but freely soluble in alcohol, ether and chloroform. In the low-boiling portions of petroleum it is insoluble. Resorcin-chinoline has scarcely any alkaline reaction, though it dissolves completely in dilute hydrochloric acid; but if such a solution be shaken with ether the resorcin is taken up and hydrochlorate of chinoline is left in the solution. It is also decomposed by other acids and alkalies as well as by continued boiling in water. An analogous compound with hydroquinone has also been obtained, and Herr Hock is continuing his experiments upon the formation of others with pyrocatechin, pyrogallol, etc.

Messrs. Lieber and Haitinger (*Ber.*, xvi., 1263) have obtained pyridine from chelidonic acid from *Chelidonia majus*, and from meconic acid, by distilling the acids produced by the action of ammonia on these bodies with zinc dust.

At a recent meeting of the Royal Society of Edinburgh (*Nature*, p. 167), Mr. D. B. Dott read a paper on "The Acids of Opium," in which he stated that contrary to the usual opinion the principal acid in opium (judged by its acidifying powers) is sulphuric and not meconic acid, a considerable portion of the morphia being always combined with sulphuric acid.

In a paper on the occurrence of salicylic acid in the Violacæ (*Pharm. Journ.*, [3], xii., 627) Herr Mandelin confirmed the presence in *Viola tricolor*, var. *arvensis*, of a yellow substance that had been mentioned by previous observers. He has now made a closer investigation of this compound and reports (*Pharm. Zeit. f. Russl.*, xxii., 339) that it is a glucoside, splitting up in the presence of water into three molecules of sugar and one of a body identical with quercetin ($C_{24}H_{16}O_{11}$) obtained in the decomposition of quercitrin derived from the bark of *Quercus tinctoria*. This new glucoside has been named "violoquercitrin;" it is represented by the formula $C_{42}H_{42}O_{24}$, and its decomposition by the equation $C_{42}H_{42}O_{24} + 5H_2O = C_{24}H_{16}O_{11} + 3C_6H_{12}O_6$. The decomposition is not, however, so simple as this, a small quantity of a third body being produced, which is characterized by its beautiful fluorescence in alkaline liquids.

In the *Répertoire de Pharmacie* (xi., 246), Messrs. Adrian and Moreaux describe a process by which they have succeeded in preparing quassiin from Surinam quassia wood (*Quassia amara*) in a crystalline form and in considerable quantity. It was obtained by crystallization from alcohol in white light crystals, very soluble in chloroform, soluble in about 90 parts of cold absolute alcohol and in 35 to 40 parts of 80° alcohol, scarcely soluble in ether and soluble in about 300 parts of hot water, from which it is deposited again in the crystalline form upon cooling. The yield of crystals was from 1·25 to 1·50 gram per kilogram of wood; whilst Christensen obtained less than half that quantity, still in an impure condition (see before p. 146). A still further quantity of quassiin can be separated from the mother-liquor, but this appears to be an uncrystallizable modification; it is very soluble in absolute alcohol, more soluble in ether than crystallizable quassiin, and slightly soluble in water.

About a dozen years since M. Duclaux affirmed that copper is normally present in cacao beans, and that its occurrence in manufactured "cocoa" and "chocolate" is not therefore necessarily referable to the use of insufficiently tinned copper vessels, as had previously been supposed. This statement is now confirmed by Dr. Galippe, who reports (*Répertoire*, xi., 277) that he has found copper to be a constant constituent in cacao beans from different sources, both unroasted and roasted, in varying proportions ranging from 0·0112 gram to 0·0292 gram per kilogram. As might be expected, he has also found copper in chocolate, in proportions varying from 0·005 gram to 0·125 gram per kilogram; some samples of chocolate would therefore appear to contain as much, or even more, copper than is added to preserved peas to give them an acceptable colour. The principal seat of the copper in the bean is the episperm, which is not used in the manufacture of fine chocolates. The *débris* is, however, sometimes bought up by makers of low-priced chocolate, and this would account for a considerable proportion of copper occurring in some samples of chocolate of inferior quality; but the fact that others contain hardly any would seem to suggest that they are equally poor in cacao bean.

Nickel is coming into such general use for plating purposes that it is satisfactory to learn that poisoning by the use of nickel-plated instruments appears to be almost impossible, even when food which comes into contact with the metal is acid. Schulz gave to a dog weighing 4 kilograms separate doses of 0·5 gram of acetate of nickel until 10·5 grams had been taken without producing any ill effect; on the contrary, the animal increased 1 kilogram in weight during the treatment. Schulz also found that traces only of nickel were dissolved by sour milk after eight days' contact with a nickel plated vessel (*Lancet*, June 2, p. 970).

Herr Grünning states that a pure solution of hydrobromic acid may be conveniently obtained by the decomposition of potassium bromide with phosphoric acid and collection of the liberated gas in water. He recommends (*Pharm. Zeit. f. Russl.*, xxii., 315) 100 grams of coarsely powdered potassium bromide to be placed, together with 280 grams of phosphoric acid, sp. gr. 1·304, in a glass retort of half a litre capacity, provided with a delivery tube, and heated over a flame with wire gauze interposed. The bumping of the liquid in the first part of the reaction is liable to break the retort, but it may be diminished by directing the flame on to the side of the vessel; after a a short time the liquid boils quietly until the whole of the salt is converted into potassium metaphosphate. At first water passes over, then some aqueous acid, and afterwards pure hydrobromic acid gas, which should be conducted into distilled water, care being taken to prevent any liquid being drawn back into the retort upon the absorption of the gas. Any chlorine impurity in the potassium bromide would pass over in the first portion of the acid distillate, which should, therefore, be separated and tested for hydrochloric acid.

The incrustation which occurs in the vacuum pans used in the manufacture of sugar from beetroot has already been found to contain the calcium salts of citric, aconitic, tricarballylic and malonic acids. Herr von Lippmann (*Ber.*, xvi., 1078) has isolated another acid from the same deposit. The crude calcium salts were decomposed by dilute sulphuric acid and the resulting solution treated with ether; this when evaporated left a syrupy residue, which on standing for two years yielded needle-shaped crystals of an acid substance that was very soluble in water, alcohol and ether, and upon analysis gave the formula $C_6H_8O_8$. The analysis of the barium and calcium salts showed it to be a tribasic acid, the calcium salt having the formula $Ca_3(C_6H_5O_8)_2$; the corresponding sodium and potassium salts were also obtained and found to be very soluble in water. The substance was evidently identical with the oxycitric acid, obtained by heating chloro-citric acid ($C_6H_7ClO_7$)—which is produced by the action of hypochlorous acid upon aconitic acid—with caustic alkalies. Aconitic acid ($C_6H_6O_6$), tricarballylic acid ($C_6H_8O_6$), citric acid ($C_6H_8O_7$), and oxycitric acid ($C_6H_8O_8$), are all closely related, and their simultaneous occurrence in the beet-root residues is extremely interesting. Citric acid when heated loses water and is converted into aconitic acid ($C_6H_8O_7 - H_2O = C_6H_6O_6$) and aconitic acid by the addition of hydrogen becomes tricarballylic acid ($C_6H_6O_6 + H_2 = C_6H_8O_6$).

It is a curious fact in the history of many great inventions that several experimenters have been on the brink of the discovery, but it has been reserved for one master-mind to bring out the practical result of the teaching of a multitude of experiments made by different investigators. Professor Silvanus P. Thompson illustrates this in some historical notes on physical subjects (*Nature*, June 7, p. 130), in which he shows that the occurrence of a brilliant spark between charcoal points in connection with a voltaic pile had been mentioned by at least three observers in the course of the years 1800 and 1802; but none of these writers spoke of the properties of the arc as a continuous luminous spark. This was probably not produced until 1808 or 1809, when Sir Humphrey Davy, working at the Royal Institution with the large battery of two thousand Wollaston cells, succeeded in obtaining a voltaic arc that could be extended to 4 inches without rupture. It only remained then to devise machinery for maintaining the carbons at a proper distance apart. In like manner Philipp Reis described in the *Journal of the Physical Society of Frankfort-on-Main* as early as 1860–61 an apparatus in which the galvanic current was utilized to reproduce the tones of divers instruments and even to a certain degree the human voice. Concerning its designation the inventor says, "Since the length of the conducting wire may be extended for this purpose just as far as in direct telegraphy, I give to my instrument the name 'telephone.'" Again, in the year 1802, one "Citoyen Martin" advertised in Paris, as a "spectacle extraordinaire et amusant," that he would show "l'expérience du *télégraphie* plus rapide que la lumière."

Herr Pawlewski (*Ber.*, xvi., 1298) has devised a modification of Dumas' apparatus for the determination of vapour densities, which enables one apparatus to be employed for any number of experiments, the capacity of the apparatus being determined once for all. Two forms of apparatus are described, the simpler being merely a conical bulb capable of holding from 20 to 30 c.c., having a tube from 10 to 12 c.m. long, of capillary bore, fitted on and bent a little sideways; this tube is blown out before tapering to a point in a slightly conical form, and upon this end a tightly fitting indiarubber cap is placed. The use of this cap does away with the necessity of sealing the end of the tube when full of vapour, as is necessary in Dumas' method, at the same time enabling the apparatus to be used for any number of experiments. In place of the bulb used in Dumas' method a small beaker is employed which contains the water, oil, paraffin or other substance used, depending upon the temperature required, and in this the apparatus is immersed. Owing to the difficulty of getting such an apparatus as this, having but one opening, dry and pure after use a second form of the apparatus is described. This has two pieces of capillary tube sealed, the one bent a little sideways and constructed as in the first apparatus, the other fitted with a stopper, and used for the introduction of the substance. This form of apparatus can easily be purified after use by aspiration in the ordinary way.

Professor F W. Clarke (*Science*, i., 485) places on record the fact that a battery cell can be constructed of three non-miscible liquids. A cell is described which consists of layers of mercury, dilute sulphuric acid, and a solution of iodine in ether. Upon connecting the uppermost and lowest layers with insulated wires evidence of a fairly strong current of electricity was obtained with a galvanometer. Theoretically, the resistance of a three-liquid cell ought to diminish with rise of temperature, and Professor Clarke suggests that perhaps a combination of solid plates with the upper and lower liquids would yield a voltaic cell in which the internal resistance would be constant for varying temperatures.

The Bakerian Lecture of the Royal Society was this year delivered by Mr. Crookes, who communicated some new and important results of his investigation upon electric discharges in high vacua. It will be remembered that Mr. Crookes had previously shown that many substances when exposed to the molecular discharge from the negative electrode in a highly vacuous tube emit phosphorescent light, the colour of which varies with different compounds. While engaged in the investigation of the phosphorescence of various substances by means of the spectroscope, Mr. Crookes noted the repeated occurrence of a band having a citron colour. It was most favourably observed by treating the substance with strong sulphuric acid, expelling the excess of acid by heat and then igniting the sulphate to redness. The residue from this treatment gave the band distinctly. A compound which behaved thus was treated by the ordinary chemical methods of separation, and the group precipitates separately examined. In this way the characteristic band was tracked to the precipitate which contained the calcium as oxalate. This calcium oxalate was chemically tested and nothing but calcium was found, the ordinary flame spectrum yielded only the calcium lines, and finally the atomic weight was determined and found to be 39·9 (Ca=40). An examination of the principal native compounds of calcium showed that they all gave the citron band when treated as above described, but certain specimens of lime were found to fail in this respect and hence the conclusion was inevitable that the result was not due to calcium itself, but to some substance constantly associated with it in quantity too small to be revealed by ordinary chemical means. Upon examining a number of other minerals it was found that they nearly all yielded the characteristic citron band, and after a considerable amount of work, special attention was devoted to the minerals cerite and zircon, from which nearly all the rare metals of the earths which they contain were isolated and examined, with the final result that the citron band was without doubt characteristic of yttrium, especially when in the form of sulphate. The spectrum of the phosphorescence yielded by the ignited sulphate in a vacuous tube consists of a broad red band, an intensely brilliant citron band and two equally strong green bands. When only traces are present the citron band alone is seen. Mr. Crookes had not suspected yttrium as the cause of this phenomenon, as pure yttria precipitates by ammonia had been previously examined and gave no phosphorescence, and consequently no citron band. This same specimen when converted into sulphate and ignited at once yielded the distinctive spectrum. Starting from the fact that the number of bands in the spectrum of yttrium is dependent upon the amount of this substance present, a spectroscopic method for the approximate estimation of yttria was devised. By this means it was found that pink coral contained 1 part of yttrium in 200, strontianite 1 part in 500, calcite 1 part 10,000, ox-bone 1 part in 10,000, and tobacco ash 1 part in 1,000,000. Mr. Crookes's results point to a new method of spectrum analysis evidently much more delicate than the ordinary method, in which the spectrum of the body is observed while under the influence of the molecular discharge in a vacuous tube as above described.

SYRUP OF IODIDE OF IRON.*

BY ALVIN G. HAMMER.

The chemical combination of iodine and iron was first brought to the notice of the profession by MM. Baup and Caillot (*Journal de Pharmacie*, August, 1828), and by them recommended in the manufacture of iodide of potassium.

An aqueous solution for medicinal use was subsequently prepared by M. Durand, the formula of which was published in the Journal of the Philadelphia College of Pharmacy for January, 1883. This aqueous solution was, however, not very permanent, due to the fact that the iron salt is oxidized and precipitated out of solution as a sesquioxide of iron, and the iodine is liberated as free iodine. This objectionable feature of its decomposition was to be remedied by the addition of sugar to the solution, and the preservative agent was first recommended by M. Frederking, in 1839. About the same time the subject of protecting the solution of this iron salt was being investigated by Professor Proctor, who published his researches "on the power of saccharine substances in general and uncrystallizable sugar in particular, of protecting the solution of protoiodide of iron from decomposition," in the *American Journal of Pharmacy* for 1840, and subsequently, in the same volume, he again referred to the same subject, stating that he had tried the following saccharine substances as protecting agencies: sugar of milk, manna, sugar cane, honey and uncrystallizable sugar. In summing up Professor Proctor says that either uncrystallizable honey or uncrystallizable sugar (molasses) are the best protective agents of a saccharine character. What seems very remarkable is the fact that such a definite recommendation, based upon the observation of Professor Proctor, should have altogether gone unheeded by the framers of the Pharmacopœia and that subsequent investigators, who are numbered by hosts, should not have taken into consideration the results of his investigation. Another surprising fact is that much diversity of opinion still exists among investigators of this syrup as to what causes the chemical changes are due, and in what they consist. Professor Wayne, in a communication to the *American Journal of Pharmacy*, pointed out the conversion of the cane sugar into that of grape sugar, which change he ascribed to the action of hydriodic acid generated during the process of decomposition of the iodide of iron; but he seems to have overlooked the very important fact that grape sugar might be the very agent to prevent a chemical change in the freshly-prepared syrup.

* A paper read at a meeting of the Iowa Pharmaceutical Association. Reprinted from the *Weekly Drug News and American Pharmacist.*

Professor Maisch, in papers published in the *American Journal of Pharmacy*, 1854-5, states that the chemical change which takes place in the preparation is due to the liberation of free iodine and the precipitation of sesquioxide of iron, and if this decomposed syrup be now exposed to the action of direct sunlight, the free iodine is converted into iodic acid, which forms with the precipitated oxide of iron an iodate of the sesquioxide of iron which salt dissolves in the syrupy liquid, and thus forms a colourless solution. This explanation seems somewhat improbable to me, from the fact that in no specimen of the decomposed syrup that I have met with had the precipitation of the oxide of iron and the liberation of free iodine proceeded beyond a certain degree, and then and there ceased. Now, whenever this decomposed syrup was exposed to the action of sunlight, it would become colourless, and thereafter not again undergo the change which takes place in freshly-prepared syrup of iodide of iron. To determine the correctness of Professor Maisch's theory, I subjected a sample of the syrup of iodide of iron which had undergone decomposition, and had been exposed to the action of sunlight, until it had become perfectly colourless, to the following tests for iodic acid.

With chloride of barium, no precipitate; no reaction with starch and dilute hydrochloric acid when the test was performed by the exclusion of air. When this exclusion was not guarded against the iodine test was obtained, this would indicate the absence of iodic acid. Professor Maisch, no doubt, came to his conclusion by the reaction he obtained with sulphuric acid, which liberated free iodine. It seems to me, however, that this reaction does not prove the presence of iodic acid, for it is a well-known fact that sulphuric acid, if not largely diluted, will liberate free iodine in metallic iodides. In testing for sesquioxide of iron the following were the reactions obtained, which would indicate the entire absence of this oxide of iron: Ferrocyanide of potassium, a white precipitate, which after a few moments acquired a bluish tint; neither tannin nor sulphocyanide of potassium produced any change; carbonate of potassium, a whitish deposit, which soon turned to a green colour; phosphate of sodium, a whitish precipitate, which finally acquired a greenish colour. These results leave no doubt in my mind that the sesquioxide of iron, as first formed in the decomposed iodide of iron syrup, is reduced by the combined action of the sugar and sunlight to the state of a protoiodide of iron.

I will now enumerate a number of experiments made with different processes in preparing this syrup:

No. 1. Made according to the formula of the U.S. Pharmacopœia; it began to change in about three weeks, becoming gradually dark brown; exposed to sunlight, it becomes colourless, having a slight sediment of a light colour.

No. 2. Made like number one, with the addition of twenty drops of a solution of hyposulphite of soda (of the strength of twenty grains of the salt to a fluid ounce of water); this specimen of syrup began to change in three weeks.

No. 3. Made like number one, with the addition of ten grains citric acid to twenty fluid ounces of the syrnp; this specimen remained unchanged for about a month, then rapidly acquired a dark brown colour.

No. 4. Made like number one, substituting iron by hydrogen for iron wire, and an addition of ten grains citric acid to twenty fluid ounces of the finished syrup, retaining its colour for nearly two months.

No. 5. This specimen was made like number one, using a pure crystallized sugar (rock candy) for the ordinary crushed sugar; this syrup changed its colour and underwent decomposition in about ten days; a sample of this syrup kept in a dark place, changed in about the same time.

No. 6. This specimen was made by the formula of the German Pharmacopœia, the syrup retained its colour some two months, when it gradually became quite dark brown.

Samples of all the above described experiments were subjected to the same favourable conditions of temperature, light, etc.: also the same sample of sugar was employed in all specimens, excepting number five, which was made with white rock candy, and I am fully satisfied by this result that the purer the sample of cane sugar the less is its preservative qualities. This fact led me to investigate the changes that had taken place in the sugar. The article employed was what is known as crushed sugar, and yielded a syrup up to all the requirements of the Pharmacopœia; when this syrup was tested for grape sugar, previous to the addition of the solution of the iodide of iron, it was found to be entirely free from it; also, it was not present for several days in the fresh prepared syrup of iodide of iron; but the moment that the preparation indicated the least change of colour, just so soon a grape sugar reaction was obtainable. When a certain per cent. of grape sugar had been formed, the change seemed to come to a stop, and proceed no further. If, now the syrup was submitted to sunlight or heat, the decoloration was effected, and the preparation became a permanent one. This fact led me to substitute grape sugar for cane sugar in the formula of the syrup, and although the sample of grape sugar employed was not absolutely a pure saccharine (it containing a certain per cent. of soluble starch or dextrine), yet when exposed for two months to all the varying influences of light and air, the preparation so produced has remained unchanged in colour and chemical composition. The only change that is perceptible is where the syrup has dried in the neck of the vial, which had been left uncorked; here the colour is very decidedly of a dark red, while the body of the syrup in the bottle is a light green. The query arises, What are the causes of the changes which take place, and how can the same be obviated to make a permanent and stable combination of this valuable medicinal preparation?

The following theory is based upon the results of my experimentations: An aqueous solution of iodide of iron is partially acted upon by the oxygen of the air, and changed into free iodine and sesquioxide of iron; the free iodine is converted by heat or direct sunlight into hydriodic acid, and if cane sugar is presented to this acid, decomposition takes place, grape sugar is formed, and free iodine is again liberated; the remaining portion of the unconverted cane sugar at the same time is exerting its action upon the precipitated oxide of iron, deoxidizing it and thereby increasing the per cent. of grape sugar, the liberated iodine again combining with the deoxidized iron to form proto-oxide of iron, and when this is reached it prevents further decompostion of the preparation, and it may now be exposed to oxidizing influences; provided, however, a certain per cent. of grape sugar is present in the preparation. Now the remedy to prevent this decomposition in the preparation seems an easy one, namely, to incorporate a certain per cent. of grape sugar in the preparation, or to produce the same during the process of forming the chemical combination of the iron and iodine. With this latter fact in view, I offer the following formula which, will yield a syrup which, under ordinary circumstances, will remain permanent for such a period as saccharine solutions usually can be relied upon:

Syrup of Iodide of Iron.

Take of Iodine	2 troy ounces.
Iron in the form of wire and cut in pieces	300 grains.
Distilled water	3 fluid ounces.
Syrup, sufficient quantity.	

Introduce the iodine, iron and distilled water into a flask of thin glass: shake the flask occasionally, until the reaction is about to cease, and is acquiring a greenish colour; now add to the mixture four fluid ounces of simple syrup, and then heat the mixture slowly, until it is brought to the boiling point; then, having introduced twelve fluid ounces of syrup into a graduated bottle, heat it, by means of a water-bath, to 212°, and through a small funnel inserted into the mouth of the bottle, filter into it the solution already prepared; when this has passed, close the bottle, shake it thoroughly, and when the liquid has cooled add sufficient syrup to make the whole measure twenty fluid ounces.

In conclusion, I will say that I believe that in the above modified formula of United States Pharmacopœia I have accomplished the object of presenting to the profession a formula for this syrup which is quite permanent, due to the fact that during the chemical action between the iron and iodine the cane sugar, which had been added in the form of simple syrup, is converted partially into grape sugar, which does away with the addition of foreign substances, like citric acid, etc., to the preparation. The formation and preservative action of grape sugar will also explain the fact occasionally cited by colleagues, regarding the success they have had at one time or another in preparing a syrup of iodide of iron which was permanent. "Due to an accident while filtering the just finished solution of iodide of iron—the paper filter gave way, the turbid liquid was thereby mixed with the simple syrup and to rescue the preparation it became necessary to heat the mixture and pass the same again through a filter, when, lo and behold! a beautiful green-coloured syrup was the product, which also left nothing wanting in way of permancy." This all is due to the fact that the iodide of of iron acted chemically upon the cane sugar, and converted it partially into grape sugar.

Whenever grape sugar of commerce can be obtained in sufficient purity which will fit it for medicinal preparations, then we can easily modify the formula by simply employing this saccharine body without any further manipulation, by adding it to the solution of iodide of iron.

NOTES ON SOME ABNORMAL FLOWERS.*

BY E. ERNEST SEWELL.

A century has almost elapsed since Goethe first published his essay on the 'Metamorphosis of Plants,' in which he pointed out the relationship existing between the various organs of Phanerogams. Earlier investigators, it is true, had recognized that "the leaf was the type of the whole plant," but Goethe revived the theory in a more complete form, and his work is now usually regarded as the foundation of our knowledge of the subject. The common flowers of our gardens afford us many illustrations of its truth; for instance, in the roses and camellias every stage of transition is observable between a perfect stamen and a beautifully rounded petal, and often we see no sharp line of distinction between petal and sepal. Among wild flowers, again, cases constantly occur in which one organ partakes more or less of the structure peculiar to another, as in species of *Geum* and *Primula*, where the sepals are frequently replaced by ordinary green leaves.

In a primrose recently sent to me, while the calyx was little altered, the segments of the corolla had assumed the colour and other peculiarities of the radical leaves,† differing from them in size, and in having the petioles united to form the corolla tube. The short stamens were inserted halfway down this corolla tube, as in normal specimens. The pistil was greatly elongated, and had partially unfolded, thus also revealing its structural relation to the leaf. This "phyllody of the carpel," as it is called, is quite commonly found in primroses, though perhaps the best example of it and the one most frequently quoted is to be found in the flowers of the double cherry.

When we speak of a carpel, stamen or petal as a modified or metamorphosed leaf, it is, of course, necessary to remember that the term leaf is used in rather a wider sense than when we speak of the leaves of a tree—meaning its foliage. For even these foliage leaves, although so much simpler than the floral leaves, have apparently undergone progressive changes in order to fit them for their special functions of assimilation and transpiration, just as the parts of the flower have been gradually differentiated so that they may best fulfil their function of reproducing the species.

Sometimes a single flower will furnish us with more than one example of this reversion to a primitive leaf-type, as in the case of a double hyacinth which I met with a few months ago. It had blossomed indoors in an ordinary hyacinth glass; and this method of water culture had apparently affected its vitality in some way, for the scape bore much fewer dark blue flowers than usual, although many of them were very large, as if to make up for their numerical scarcity in some measure. The lower part of the perianth (D, Fig. 1) in these larger flowers was greatly thickened, while a little higher up it divided laterally into three whorls (1, 2, 3, A), each whorl, of course, having six lobes like an ordinary flower.

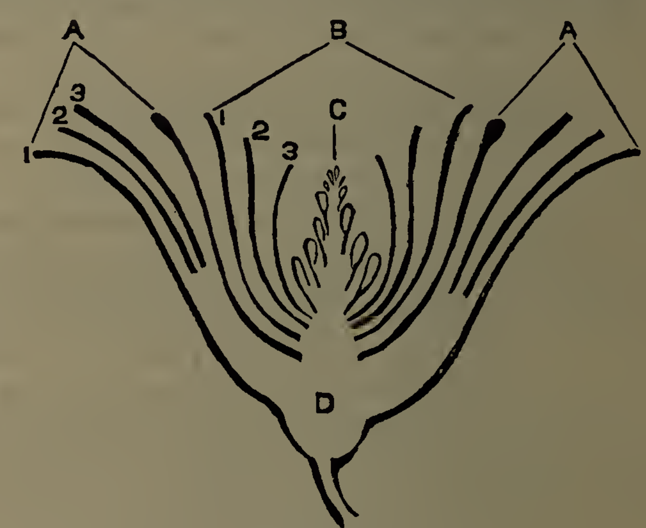

Fig. 1.

Some of the lobes of the outside whorl (A, 1) were quite green, while to be tipped with green was the rule rather than the exception. All the segments of the third whorl were more or less thickened and wrinkled at the apex, and so were some of those of the second. Between these three whorls and the central tuft of green leaves (B) two incomplete cycles of petalloid stamens were placed, also purple in colour, and presenting the usual variations of form commonly found in such transitional structures.

One or two anthers were quite normal and contained ripe pollen. In others, one anther lobe would be fairly well formed, whilst the other would be represented by a thin smooth expansion of the petalloid filament or connective. In these cases the true anther lobe was always more deeply coloured than the other as though the same amount of colouring matter had been supplied to each, but in the one it was spread over a large surface instead of being concentrated into a small compass, as in the other.

Two wrinkles or furrows on each side of the flattened connective replaced the anther in some cases. Each of these furrows appeared to correspond to a loculus or pollen-sac, for they were filled with small masses of yellow pollen, which looked as if they were growing there, and under a magnifying lens reminded one of a little yellow fungus growing in the cracks of a tree's trunk, though I suppose it would be more scientifically correct to compare each furrow or open loculus to the sporangium of a Lycopod.*

Turning now to the *Gynœcium*, or rather to the place where the *Gynœcium* ought to be, we find a complete change of colour; a tuft of green leaves (Fig. 1, B) having replaced the carpels. These were still arranged in whorls of six, and the particular flower I am describing had not more than three of these whorls, surrounding a central cone of much smaller scales (C).

The outside lobes of this green tuft were larger than those within, and some had reflexed points or projections

* A paper read before the School of Pharmacy Students' Association, May 24.

† A very similar occurrence was reported in the *Gardeners' Chronicle*, May 19, 1883.

* Sachs' 'Text-book of Botany' (Vines), p. 542.

from the apex, which were also coloured reddish-purple, and apparently corresponded to the sessile stigmas.

Others were characterized by having the upper part of the leaf converted into a kind of pointed hood, which I could not understand at first, but in another flower I found two of these hoods (Fig. 2, B) folded over one

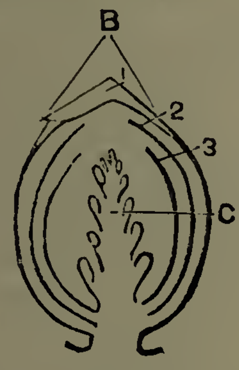

Fig. 2.

another, and in such a manner that it looked like a perfect ovary, until examining it more closely I saw a foliar arrangement (C) within, similar to that of the other flowers near it.

Supposing this outer enclosing whorl to represent the carpellary leaves, it is rather difficult to see what other organs the next two whorls (2 and 3, B, Fig. 1) are morphologically equivalent to. Probably they do not correspond to any distinct part of a normal ovary but are merely repetitions of the outer green whorl formed in a similar way to the inner whorls of the perianth (2 and 3, A, Fig. 1).

The centre of the flower has now to be described. It consisted essentially of a prolongation of the flower axis, covered with small scales, which were white or pale yellow in colour; and they were further distinguished from the surrounding green leaves by the thin fragile nature of their tissue.

The sheathing way in which each scale sprang from the central axis was very noticeable and interesting, although it was only what would be expected when we consider the nature of the other leaves; at the same time they were not so pointed or tapering as the large leaves springing from the base of the scape, but were almost as broad as they were long, having both apex and margins incurved in such a manner as irresistibly to suggest the idea that they represented the ovules of the normal plant. In fact, so much did they resemble ovules with their delicate white tissue, that in the flower first examined I did not immediately recognize their foliar structure, though the resemblance was not quite so marked in most of the other flowers. Their number, too, though of less importance, would tend to support this theory, for although rather difficult to ascertain accurately, I found it varied from eighteen to twenty-four in different flowers. The number found in each of the three cells of the normal ovary is not quite constant, but I have generally found it to be from six to nine.

Dr. Masters, in his 'Vegetable Teratology' (a most interesting work), says, "The ovules of a prolified flower are either unaffected, or they occur in a rudimentary form, or lastly they may be present in the guise of small leaves." But I cannot find after considerable search that there has been any case recorded in which the ovules of a monocotyledonous flower had assumed the form of "small leaves"; in fact, some authorities expressly state that such an occurrence has not hitherto been observed.

This fact in itself might make some hesitate to regard the structures which I have just described as really modified ovules, and perhaps their view would be strengthened if they saw only the upper flowers of the raceme; for it was more particularly some of the lower and larger flowers in which the central scales were so distinctly different from the surrounding carpellary segments; while in the flowers which expanded afterwards, or had not fully expanded, we find a series of whorls gradually diminishing in size from the perianth to the centre. It is very common in "double" flowers to find that the number of whorls is increased at the expense of the ovary and ovules, and in this case we further see that while the plant was comparatively strong some attempt was apparently made to form ovules in the lower flowers, but as the vitality of the plant decreased as it grew older it was unable to differentiate them at all from the surrounding whorls of leaves.

It might still be objected that these axial scales are not in the right position for ovules, in fact that they ought to be found on the margins of the carpellary leaves. I was inclined to think so myself at first, but found on consulting the work already alluded to, that Dr. Masters states* that "teratology shows that ovules may be formed indifferently on leaf-organs or on stem-organs," so now I incline to the opinion that teratology in the case of the hyacinth under consideration shows that the ovules are formed on a "stem-organ." Again, when we consider that in these monocotyledons each leaf grows in a sheathing manner, it is not so readily conceivable that an ovule,—the foliar structure of which has been frequently demonstrated in other plants,—should spring in a sheathing manner from the margin of a leaf, as that it should so spring from a central axis; while there is no reason to suppose that its insertion would be different from that of the other leaves of the same plant. The discussion of the exact nature of the ovule in any particular case can, perhaps, only be decided by expert botanical physiologists, but it is usually admitted that teratology throws much side-light on such a discussion. Sachs takes the view that in plants in which the placentation is axile, as in *Primulaceæ*, or where there is a single erect ovule in each ovary, as in *Piperaceæ*, the ovules spring from the axis of the flower, and are independent of the carpellary leaves. Teratology confirms this view, as the ovules of species of *Primula* have not unfrequently been found in a phyllodic state rising from the central axis. It will be remembered that in *Liliaceæ*,—the natural order to which *Hyacinthus orientalis* belongs,—the placentation is axile though not "free-central."

In order to obtain further evidence on this point, I have examined several other double hyacinths, and have invariably found the gynœcium more or less abnormal, some having free carpellary leaves; but in no other case have I seen the ovules also transformed into leaves or scales. Thus, while the ovules were quite perfect the carpels were phyllodic, so that in one flower in particular the ovules were laid bare, and visible when the flower was looked at from above, clearly indicating that they were not inserted on the margins of the carpellary leaves. In these cases the central axis was greatly swollen and of a fleshy mucilaginous nature, absorbing many of the lower ovules, and in some cases filling the cells of the ovary, when such were formed. On the outside and upper surface of this mass the remaining ovules made their appearance, though sometimes they were not quite round, owing, probably, to the pressure of surrounding tissue.

In two other flowers peculiar structures were observable rising from the axils of carpellary leaves (Fig. 3, *c*.),

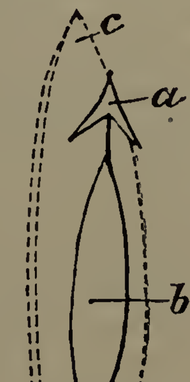

Fig. 3.

* 'Vegetable Teratology,' p. 483.

thus being within the gynœcium. An idea of their shape will be better conveyed in a rough sketch (Fig. 3) than in words. The upper part (*a*), resembling an arrowhead, was coloured either yellowish brown or purple, while the lower part (*b*) was translucent and very thin. It will be seen that though they resemble stamens in form they were placed quite out of the right position for such organs, and, as I only found them in two flowers, I was unable to make out their exact morphological relations.

Comparatively little, I believe, is at present known of the exact causes which give rise to a departure from the normal type; but if we knew all about the laws which regulate the growth of cells under peculiar external conditions, and could observe how, in their living state, as they increase and multiply themselves, they sometimes build up the simple flattened form of a petal instead of a more complex stamen, or of a green leaf instead of a carpel, then I think that we should find that even these so-called "monstrosities" are just as truly the results of unchanging laws, as the most perfect Alpine gentian or Californian Sequoia.

THE USE OF METHYLATED ALCOHOL IN LINIMENT AND TINCTURE OF IODINE.*

BY E. GREGORY.

My attention has been called, by a short paragraph in the February number of the *Canadian Pharmaceutical Journal*, to the fact that Mr. Peter MacEwan, of Edinburgh, had made a very interesting report concerning a sample of liniment of iodine, which had exhibited extraordinary pungency. As I have had a slightly unpleasant experience with a somewhat similar compound, a few notes on the subject may not be out of place.

We have a market here for the tincture of iodine made according to the U.S.P., which is a simple solution of iodine in alcohol. It is used only for external application. Some time last summer, my clerk suggested that it might be made from methylated alcohol, and, contrary to usual custom, I consented to make trial of half a gallon. After preparation it was carefully examined, and it seemed as if the odour of methyl alcohol was entirely covered by that of iodine, and, in no other respect did it seem to differ from the same tincture made with ordinary alcohol. For a time all went well, but, at the end of about a month, a patient complained that he could not use it on his knee, because "it burnt him and made his eyes smart when he was applying it." This complaint was disregarded, but soon there were more of the same kind, and we then concluded to withdraw it from general sale, and confine it to veterinary practice. Before this happened, however, a physician had got hold of some of the tincture, which he used in his gynecological practice, causing to his patient a few minutes of intense suffering, and three or four days confinement to a recumbent position, from the very great soreness produced by the application. I have just examined the last few ounces of this tincture, and on pouring out the liquid, the extremely pungent fumes filled the whole store, causing the eyes of both clerks and customers to water very freely. So pungent was it that although the day was cold and blustering, we were compelled to open all the doors and thoroughly ventilate the place.

At first I was inclined to think that the formation of a small quantity of iodide of methyl might account for the great pungency developed, but soon abandoned that theory and had laid the matter over for further consideration and experiment. I am now convinced that Mr. MacEwan has struck the key-note when he suggests that allyl alcohol may be present, which unites with the iodine to form some iodo-allyl compound. In confirmation of this it may be stated that the odour of the tincture was decidedly "garlicky," and the effect upon the nose and eyes very similar to that of oil of mustard, but more powerful. Mr. MacEwan states that he prepared some iodine liniment, omitting the camphor, and found that the pungency was not produced, arguing from this experiment that the camphor had in some way influenced the development of pungency. It will be seen, however, that my experience establishes the fact that camphor has nothing to do with the reaction.

In view of the above facts it would be interesting to inquire if a certain brand of "crystal methyl" has entered, to any extent, into the composition of tinctures and other pharmaceutical preparations, and what the chemical and therapeutical results of such a course are likely to be. It is well known that it has been much pushed and recommended as having scarcely any more odour than ordinary alcohol.

Should time and opportunity be afforded me I will endeavour to follow up this subject by such experiments as the busy avocations and slender resources of a country pharmacy will permit.

* From the *Canadian Pharmaceutical Journal*, June, 1883.

KEFIR, A NEW MILK-FERMENT.*

Whilst, during the last few years koumiss has been introduced into Western Europe, and even into America, a new drink prepared from cow's milk by a process of fermentation imperfectly understood is coming into use in Russia. This drink is kefir, and it has for long formed the chief article of diet among the mountaineers in the neighbourhood of Mount Elbruz and Kasbek, in the Caucasus. It forms a thick white fluid, with a faintly acid flavour, said to resemble certain light wines. The mountaineers themselves call it "ghippo." The inhabitants of the plains near the Caucasus, and the Russian settlers, who term it kefir, kifir, or khiafar, make use of it, not for the table, but as a popular remedy for anæmia, struma, gastric catarrh, and chronic bronchitis. According to the Moscow *Medical Gazette*, where a contribution on the subject has recently appeared, Dr. Kern being the author, the preparation of kefir is very simple. The mountaineers make it by filling a bag made of goat-skin with milk, then a tenacious mass, of the size of a walnut, of a material which they term "kefir-seed," and the precise origin of which is unknown, is added to the milk. In a few hours the process of fermentation sets in actively. When prepared in wooden or glass vessels, the kefir tastes better. After a lapse of twenty-four hours a weak kefir is produced; when the process is allowed to continue for three days, the kefir becomes very strong. The source of the ferment is scrupulously concealed by the Caucasian mountaineers, who, with the humour of the English cook who once sold a secret for making "fundied cheese," the "secret" being that, the cheese must be fundied after toasting and before the addition of pepper, cannot be persuaded to enlighten strangers to any greater extent than in supplying a small sample of the ferment, in the form of dry dark-brown earth-like masses, but steadfastly refusing to say whence they are obtained. One of these fragments dropped into milk begins rapidly to effervesce, turns milk-white, and assumes the form of a mulberry, then fermentation proceeds at once. If a piece, thus transformed, be dropped into another bowl of milk, it rapidly increases in size, and also causes fermentation. Dr. Kern has carefully examined specimens of this "kefir-seed," which consists chiefly of masses of zooglœa, holding together collections of a bacterium which he calls *Dispora Caucasica.* The yeast-fungus, *Saccharomyces cerevisiœ,* is always found associated with this new germ. "Kefir-seed" retains its vitality after remaining for months in its dry condition. Dr. Kern has a great belief in the future of kefir, which has all the virtues of koumiss, and possesses one great advantage over the latter fluid, in that it is just as good when prepared from cow's as from mare's milk.

* From the *British Medical Journal*, May 12.

The Pharmaceutical Journal.

SATURDAY, JUNE 30, 1883.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE FORTY-FOURTH ANNUAL REPORT OF THE REGISTRAR-GENERAL.

ALTHOUGH just a year and a half has elapsed since the close of the period to which the Report of the Registrar-General just issued refers, the delay finds a full explanation in the elaborate tables by which, like its predecessors, it is accompanied. To one section of these, the tables relating to the deaths during the year 1881, it will not be out of place to make reference in these columns, not only because they convey some important information as to the result of the increased interest in sanitary measures which has become developed in this country during recent years, but also they incidentally disclose the extent to which the wilful or intentional use of poisons is known to have led to fatal results. This latter subject at least may be assumed to present some points of special interest to the readers of this Journal, but before referring to it further we purpose mentioning some facts of more general interest as relating to the effect of recent sanitary legislation on the public health.

The year 1881 may be said to have completed a decade since the Public Health Act came into operation in 1872, and nothing stands out more distinctly and unmistakably in the series of reports issued during these ten years from the Registrar-General's office than the wonderful effect which recent sanitary operations have had in saving life. This is shown by the fact that the deaths registered in England and Wales in 1881—which numbered 491,935—were, notwithstanding the increased population, absolutely fewer than in any of the preceding twelve years. In 1877, the year when the lowest previous death-rate occurred, the deaths were in the proportion of one to every forty-nine persons living; but in 1881 only one person died out of each fifty-three living. Or, to spread the comparison over a longer period, in the ten years of 1862 to 1871 inclusive the death-rate had been 22·6 per 1000, and there were no indications of a tendency to fall lower, the average being exactly reached in the last mentioned year. But upon the Public Health Act coming into force, the death-rate at once commenced to fall and continued to abate every year, with one exception, until 1881, when it was only 18·9 per 1000. The exception was in 1875, when the rate was 22·7 per 1000. In that year, however, a second and more stringent Act came into force, and from that time until 1881 the death-rate in no year reached 22 per 1000, the average being only 20·5.

This decline in the death-rate has been shared by the population in all parts of the country, by both sexes, and by persons of every age, and the Registrar-General argues, very reasonably, we think, that as the improvement has now been maintained through a series of years, it can hardly be attributed, even by the most sceptical, to a succession of seasons favourable to health. Indeed, he claims that the saving in life is the direct return for the money and labour expended in sanitary improvements, and he enters into some calculations as to the *quid pro quo* which the country has already received for its enormous expenditure in this direction. Briefly stated, his conclusions, after eliminating as far as possible disturbing influences, are that in the year 1881 alone about 92,000 lives were saved, and—assuming that for every fatal case of illness there are four or five that end in recovery—probably nearly half a million cases of illness were avoided; whilst extending the estimate over the ten years from 1872 to 1881 inclusive, he states that nearly four hundred thousand persons were living in England and Wales at the end of the year 1881 who would probably have died before that time had the old *régime* continued. It is important to note that this improvement has not been equal during the ten years, but has on the whole shown a progressive rate of increase throughout that period.

Pharmacists, who have had special opportunities of watching the tendencies of modern medical practice, will not be surprised to learn that by far the largest decrease in the death-rate has been manifested in connection with the classes of zymotic and parasitic diseases, and this is of course quite consistent with the claim put forward as to the beneficial results from improved sanitation. In the important zymotic class, with few exceptions,—the most important being diphtheria, which reached the mean rate of the previous decade,—the reduction extended to every class. Enteric fever fell from a mean of 326 per million to 218; typhus from 58 per million to 21; and other or ill-defined forms of continued fever from 105 per million to 44. Measles, scarlet fever and whooping cough showed a great diminution in fatal cases, whilst although the mortality from small-pox, owing to the outbreak in London, was greater than it had been for some years, it did not reach the decennial average. Deaths from diarrhœa, dysentery and cholera were also far less numerous, but this was probably owing to the absence of long continuance of hot weather in the summer of 1881.

In the class of "Violent Deaths" no less than 569 fatal cases of poisoning are recorded as having occurred in England and Wales during the year

1881, 368 of the victims having been males and 201 females. This class is subdivided into "Deaths from Accident and Negligence," of which there were 220 amongst males and 120 amongst females, and "Deaths by Suicide," of which there were 147 among males and 81 among females; only one case of murder by poisoning is recorded as having taken place in 1881. It should be mentioned, however, that a considerable number of the deaths attributed to poisoning through "accident or negligence" were probably the result of employment in some noxious calling, the deaths of as many as 52 males and 14 females being referred to lead poisoning. Of course also the number of cases referred to poisoning by alcohol is capable of being largely modified according to the views held by juries upon the drink question. As might be expected opium and its preparations were the most frequent agents in the accidental deaths of both sexes; they were also used most frequently in cases of suicide by males, but carbolic acid was the poison used for the purpose of self-destruction most frequently by females. In fact carbolic acid was the cause of death in 50 cases, or nearly 1 in 7 of all the fatal cases of poisoning during the year. The deaths by poisoning were in the proportion of 1157 to each million of total deaths from all causes, and compared with the number living of each sex, they were 29 to each million of males and 15 to each million of females. One other point worth mentioning, respecting the cases of suicide by poison, is that the largest proportion occurred among males between the ages of 35 and 45, and among females between the ages of 15 and 20.

The following statement, condensed from the several tables, will show at a glance the various poisons to which death has been attributed and the number of fatal cases in the two sexes referred to each, the accidental deaths being also distinguished from the suicides. The deaths from the vapours of chloroform and ether, which numbered 22 and 7 respectively, only one being a suicide, are classed under another head in the Report.

Name of Poison.	Total No. of Deaths.	Accident.		Suicides.	
		Male.	Female.	Male.	Female.
Arsenic	10	2	—	6	2
Mercury	6	3	3	—	—
Lead	66	52	14	—	—
Barium Chloride	1	—	1	—	—
Potash	1	—	—	1	—
Ammonia	7	4	2	—	1
Solution of Caustic	1	1	—	—	—
Caustic Soda	2	—	2	—	—
Sulphuric Acid	4	1	1	1	1
Sulphurous Acid	1	1	—	—	—
Hydrochloric Acid	12	5	—	6	1
Nitric Acid	3	2	1	—	—
Carbolic Acid	50	10	7	15	18
Oxalic Acid	16	—	1	7	8
Prussic Acid and Oil of Almonds	24	3	1	19	1
Potassium Cyanide	22	6	—	15	1
Acetic Acid	1	1	—	—	—
Benzoline	1	1	—	—	—
Alcohol	20	18	1	—	1
Chloroform	2	—	1	1	—
Chloral Hydrate	20	9	6	4	1
Croton Chloral	1	1	—	—	—
Chlorodyne	8	3	4	—	1
Opium, Laudanum, Morphia	129	53	37	33	6
Paregoric	2	1	1	—	—
Syrup of Poppies	1	1	—	—	—
Godfrey's Cordial	2	1	1	—	—
Anodyne Cordial	1	1	—	—	—
Stothert's Soothing Syrup	1	—	1	—	—
Dalby's Carminative	1	—	1	—	—
Balsam of Horehound	1	—	1	—	—
Aniseed	1	1	—	—	—
Steadman's Powders	1	1	—	—	—
Belladonna	7	4	1	1	1
Aconite	4	1	3	—	—
Hemlock Dropwort	1	1	—	—	—
Arum Maculatum	1	—	1	—	—
Yew Berry	1	—	1	—	—
Digitalis	1	1	—	—	—
Unripe Fruit, Berries, etc.	4	3	1	—	—
Tobacco	3	1	2	—	—
Strychnia, Nux-Vomica	21	1	4	7	9
Phosphorus	15	1	6	3	5
Vermin Killer	9	—	—	9	—
Camphor	1	—	1	—	—
Cantharides	1	—	—	—	1
Poisonous Meat and Fish	2	2	—	—	—
Turpentine	2	1	1	—	—
Paint	1	1	—	—	—
Condy's Fluid	1	—	1	—	—
Washing Liquor and Carson's Detergent	2	2	—	—	—
Overdose of Medicine	2	2	—	—	—
Kind of Poison not stated	70	17	11	19	23

It is evident from the foregoing table that, probably owing to want of precision in the returns made by coroners, at present very little uniformity obtains in the method of classification of deaths by poisoning. Thus as many as 129 cases are huddled together under the head of "opium, laudanum, morphia," whilst a few others in which a preparation of opium was no doubt the noxious ingredient are set out in detail. Again it seems very likely that most of the cases of poisoning by phosphorus and by strychnine have more in common than is indicated by the classification under three different heads. But the least satisfactory feature is the return of no less than 70 cases, or about one-eighth of the whole, without the kind of poison being stated, which suggests that either many juries are satisfied with a modicum of evidence or the responsible officials are very chary as to the amount of information they transmit to the Registrar-General.

The second reading of the Medical Acts Amendment Bill was adjourned from Thursday the 21st until Thursday the 28th inst., when it was the thirteenth order of the day.

* * *

We learn from a statement in an evening newspaper that on Wednesday afternoon an assistant in a chemist's shop in Partick was apprehended in connection with the death of a young man from poison, apparently the case referred to in this Journal last week, but up to the time of going to press no report of the proceedings has reached us.

* * *

Some little time ago several "druggists" were charged before the Grenoble "tribunal correctionel" with a breach of the law which in France restricts the sale of simple drugs in medicinal quantities, pharmaceutical products and specialties to pharmacists. The case having been dismissed in respect to the sale of specialties, the decision has been the subject of an appeal in the interest of the pharmaceutical fraternity. It was pleaded by the defendants that specialties constitute secret remedies, the sale of which by pharmaciens is illegal; but the Court held that they are as a rule only modifications of official preparations, coming within the definition of pharmaceutical preparations, and therefore imposed upon each offender a fine of five hundred francs. The decision has naturally given great satisfaction to the pharmaciens.

* * *

Fortunately it does not often fall to our lot to have to chronicle the death in one week of two men of such high scientific attainments as General Edward Sabine and Dr. William Spottiswoode, the former an Ex-President and the latter actual President of the Royal Society, and both of them past Presidents of the British Association. Sir Edward Sabine died on Tuesday, at Richmond, in his ninety fifth year, and Dr. Spottiswoode on Wednesday, in London, aged fifty-eight.

* * *

The last number of the *British Medical Journal* contains a series of three reports on the subject of arsenical poisoning. The first is by Dr. T. Lauder Brunton on the evidence regarding the injurious effects on health arising from arsenical wall-papers and other articles containing arsenic, which although at present somewhat limited he considers sufficient to justify vigorous action. The second report is from a committee of the National Health Society appointed to consider the subject of the occurrence of arsenic in domestic fabrics. It deals especially with the limits to the amount of arsenic which should be fixed by legislation, and the standard test for its detection which should be adopted, the one recommended and described being a modification of Marsh's test. The last report, by Dr. Stevenson, is on the behaviour of arsenic in contact with putrefying organic substances, in which the writer explains that the reason why in some cases highly arsenical papers have been used without injury to health, whilst in others papers containing much less arsenic have produced distressing consequences, may be that sometimes volatile arsenical bases are formed similar to those which Professor Selmi has found in the corpses of persons who had died from arsenical poisoning.

The chemists and druggists of Toronto have just escaped in a fairly creditable manner from the operations of the city analyst. Twenty-three samples were obtained, including potassium iodide and bromide, cream of tartar, sodium bicarbonate, powdered acacia and powdered rhubarb. The analyst reported to the Dominion Inland Revenue Department that all the samples, when analysed, proved to be pure, except the powdered rhubarb, which contained flour; but even about this sample there was evidently some doubt, as the analysis is to be repeated.

* * *

If official recognition could secure success the Executive of the International Pharmaceutical Exhibition at Vienna are entitled to congratulation. We learn that the Archduke Karl Ludwig, who had consented to allow his name to be used as patron of the exhibition, has now, upon his return from Moscow, accepted an invitation to conduct the opening ceremony. The Executive Committee has also received an intimation from the Minister of Public Worship and Instruction that Professor Dr. Aug. Vogl will be deputed to represent the department on the larger Exhibition Committee.

* * *

According to the *Brooklyn Eagle*, whilst a "clerk" in a drug store at Sag Harbour was putting up a prescription including chlorate of potash and tannic acid the mixture exploded and burnt his eyes and face very badly.

* * *

In the "annual museum" held in connection with the forthcoming meeting of the British Medical Association in Liverpool, there will be, as usual, a section devoted to the exhibition of "new chemicals and apparatus, new drugs and their preparations, and new articles of diet for invalids." Applications for space by intending exhibitors of drugs, etc., should be made as soon as possible to Dr. T. Bushby, Clarence Street, Liverpool.

* * *

In a letter to the *British Medical Journal* last week, Mr. J. Dale, of Stockton-on-Tees, suggests that no person, however superior his attainments, who keeps an open shop in which he sells hair oil, tooth-brushes, etc., should have his name included in the Medical Register.

* * *

According to a return just presented to the House of Commons the quantity of coal exported from British and Irish ports to foreign countries and British Settlements abroad during the year 1882 was 19,926,011 tons, of the declared value of £8,954,448. Besides the coal there were 466,249 tons of cinders and 542,188 tons of patent fuel exported. The largest exports were from Cardiff, closely followed by Newcastle, the two ports sending away between them one half of the whole, whilst among the customers France, Germany, Italy and Russia rank in the order in which they are named.

* * *

The Albert Medal of the Society of Arts for "distinguished merit in promoting arts, manufactures or commerce," has this year been awarded to Sir Joseph D. Hooker, the eminent Director of the Royal Gardens at Kew.

Provincial Transactions.

HAWICK PHARMACEUTICAL ASSOCIATION.

The above Association held its first general meeting since its formation, in the Chemical Laboratory, Oliver Place, on Tuesday, 19th inst., Mr. Maben, Hon. President, in the chair.

The minutes of the former meeting having been read and approved, the Secretary intimated the following donations for the museum and library:—From Mr. J. C. Waldie, New York (formerly of Hawick): a series of specimens of capsules, capsulets, capsuloids and empty capsules; thermaline, a substitute for quinine, and seidlitine. From the Hon. President: Attfield's 'Chemistry;' Bell and Redwood's 'History of Pharmacy;' Gladstone's 'Life of Faraday;' and Kingzett's 'Animal Chemistry.'

A vote of thanks having been passed to the respective donors, the President, Mr. John Grieve, read a paper on "Evolution and Natural Selection."

At the outset of the paper, in which the subject was treated in an erudite and comprehensive manner, the essayist said that, though the idea of evolution had occurred to many minds, to some even so far back as twenty-five centuries ago, it was not until Darwin furnished the simple solution of natural selection to account for the origin of species that the evidence of descent obtained a *locus standi.* The remains of human bones, and implements fashioned by human hands found in caverns, etc., along with the bones of extinct animals, pointed to a remote antiquity, and anthropology proved that the earlier man had existed, the more savage and degraded was his condition. Man's development, in which a repetition of his descent might be traced, and his possession of rudimentary organs, which are the homologues of those structures that perform some observable functions in those animals which have them more perfectly developed, were adduced as evidences of his origin from the lower animals. The connections between certain distinct groups of animals were described, and the likeness existing between them explained on the ground of heredity, and the unlikeness as due to variation. In the development of animals there was clearly presented a picture of their descent, as all animals, in their successive embryonic stages, progressively imitated very closely those animals lower in the scale of creation. Natural selection was afterwards dealt with, and was stated to be the law of nature which determined those changes of structure which would be of advantage to the organism in adapting it to its environment, and which transmitted those advantageous characters. The ways in which natural selection acted, in connection with the survival of the fittest, were explained, and the essayist finally dealt in a critical manner with the objections most commonly advanced against Darwin's theory, including that of primogeniture.

A vote of thanks having been awarded to Mr. Grieve, a discussion took place in which several of the members took part.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A meeting of this Society was held on Thursday, June 21, Dr. W. H. Perkin, F.R.S., President, in the chair.

A ballot was held, and the Scrutators, Dr. Thorne and Mr. Meldola, declared the following gentlemen duly elected Fellows of the Society:—G. S. Bowler, C. Beringer, T. H. Coleman, A. Esilman, H. E. Harrison, C. Hulke, H. Heap, B. Hobbs, C. T. Heycock, W. J. Livingstone, B. P. Lascelles, H. R. Mill, M. F. Purcell, J. E. Richardson, F. G. Roberts, W. R. Riffell, A. Smith, E. H. B. Stephenson, A. W. Soward, A. H. Samuel, D. Wilson, R. Williams.

The President then called on Professor McLeod to read a paper—

On Evaporation in Vacuo.—The ordinary method of evaporation *in vacuo* over sulphuric acid is very slow, for three reasons: the aqueous vapour reaches the surface of the acid by diffusion only, the surface of the sulphuric acid is limited, and as the dilute sulphuric acid floats on the concentrated acid, the absorption of aqueous vapour is much retarded; lastly, heat is supplied but slowly to the evaporating liquid, being almost entirely that reaching it by radiation. In one experiment 50 c.c. of water placed *in vacuo* over 250 c.c. of sulphuric acid required two and a quarter days for complete evaporation. The author was led to try some experiments on the evaporation of water at low temperatures by some remarks of Professor Mallet (*Chem. News*, xlvi., 62, 73, etc.), and the method was suggested by Wright's apparatus for distillation of mercury (*ibid.*, xliv., 311); a somewhat similar apparatus is described by Mallet (*ibid.*, xlvii., 218, 252). The author used a Körting's jet pump to produce the vacuum. In one form of apparatus the water was evaporated in a glass dish with ground top which pressed a red indiarubber ring against a brass ring soldered to a copper dome. The aqueous vapour was condensed in a copper vessel consisting of a truncated cone within a cylinder. The tube by which the water to be evaporated is supplied ends in a small glass funnel, the mouth of which touches the inside of the dish. The dish is surrounded by a water-bath at 50°; the temperature of the water in the dish was found to be 26°. 50 c.c. of water can be evaporated in two hours. Instead of the dish, the author has used a wide test tube or a combustion tube, so that the water residue can be evaporated in the tube afterwards used for effecting its combustion. In another modification, described by the author, the condenser is replaced by a wide vertical tube, down the inner surface of which a thin layer of sulphuric acid is allowed to flow; the aqueous vapour is thus rapidly absorbed, and passes down the fall tube as dilute sulphuric acid. It is necessary to cool the sulphuric acid by a flow of cold water. The author exhibited this apparatus at work, and incidentally described a useful valve for preventing the loss of a vacuum, which occurs when using Körting's pump if the water pressure be suddenly diminished. The stream of water passes down a narrow glass tube into an elongated bulb, from the bottom of which it issues by a T piece. In this bulb floats a piece of glass tube filled with air and closed at both ends so that it just floats in water. The upper end of this float is ground, so that if the water stream stops, the float rises and stoppers up the narrow glass tube; the vacuum is thus preserved.

Mr. Thorp said the paper was of great interest to water analysts; he was afraid that it might be difficult to mix the water residue in the combustion tube perfectly with oxide of copper, and there seemed to him a possibility of the introduction of small pieces of indiarubber.

Dr. Roscoe then communicated a paper—

On the Preparation of the Pentathionates. By S. Shaw.—Professor Spring (*Annalen*, 213 [3], 329) expresses doubts as to the existence of pentathionic acid and the pentathionates, and especially combats the statements of Lewes (*Chem. Soc. Journ.*, March, 1881), who prepared and analysed the potassium and barium salts. The author therefore repeated Lewes's work and has been able to confirm completely his results. He has succeeded in preparing perfectly clear transparent crystals of potassium pentathionate which can be recrystallized; these differ in form from the tetrathionate, give a white precipitate of sulphur when treated with caustic potash, and on analysis proved to contain two atoms of potassium to five of sulphur.

Appended to this paper is a—

Note on Pentathionic Acid. By Watson Smith.—In it it is proved that Wackenroder's solution prepared with excess of sulphur dioxide does not bleach dilute indigo solutions. When to half neutralized Wackenroder solution caustic potash is added no precipitate is produced, because in the presence of free sulphurous acid thiosulphate is formed. If, however the solution be evaporated the sulphur dioxide is expelled and the sulphites and thiosulphates are decomposed; a liquid is then obtained which gives with caustic potash a precipitate of sulphur from the decomposition of the pentathionates.

Dr. Debus said that Mr. Lewes was still working at the subject and had obtained crystals of potassium pentathionate more than an inch in length. The pentathionates could only be prepared and recrystallized from acid solutions. If one-half of a solution was neutralized and the other half added, the pentathionates were decomposed. The quantity of base required must be calculated and then added to the acid solution.

Dr. Armstrong then read a—

Note on Hydrocarbons from Camphor. By Dr. Armstrong.—The author in a previous communication of December 1877, announced that he was engaged in an examination of the mixture of hydrocarbons produced by the action of several of the so-called dehydyating agents on camphor. Owing to the complex character of the product, the time occupied in fractional distillation, etc., but little progress had been made in the research; during the last few months, however, the author has in conjunction with Dr. Miller repeated the whole of the previous work on a very large scale, and satisfactory methods of separation have been devised so that it will soon be possible to publish a complete account of the investigation. An exhaustive study has been made of the actions of phosphoric anhydride, phosphorus pentasulphide, zinc chloride and of iodine. The author gave some account of the action with zinc chloride; after describing the methods of operating and separating the products, he stated that in the main C_{10} compounds are produced under the conditions which have been maintained in carrying out the reaction. The phenol produced is carvacrol, and the chief constituents of the hydrocarbon mixture are $C_{10}H_{20}$ and two $C_{10}H_{14}$ hydrocarbons; relatively small quantities of both higher and lower homologues of $C_{10}H_{14}$ are also present, together with one or more hydrocarbons which are carbonized by sulphuric acid, and are not yet satisfactorily identified. The two $C_{10}H_{14}$ hydrocarbons are isomers of cymene; the barium salt of one of these is almost insoluble in water, the sodium salt crystallizing with one molecule of water in large nacreous plates; the barium sulpho salt of the other hydrocarbon is easily soluble and closely resembles ordinary barium cymene sulphonate, with which previous observers have identified it. For a long time the author of the present note was similarly mistaken; the salt, however, contains 3½ molecules of water of crystallization, and is convertible into a magnesium salt which is highly characteristic, and is altogether different from ordinary magnesium cymene sulphonate. Although two other easily soluble barium sulpho salts derived from $C_{10}H_{14}$ hydrocarbons have been isolated, one crystallizing with 9 molecules of water in long flat prisms, the other with 7½ molecules in small glistening plates, no indication of the presence of ordinary cymene in the product from the action of zinc chloride has been obtained. A not inconsiderable quantity of camphorone, $C_9H_{12}O$, is also produced. The product of the action of iodine on camphor does not contain cymene, but yields the sulpho salt resembling that of ordinary cymene referred to above.

In answer to Dr. Tilden, Dr. Armstrong said that he was quite satisfied that the hydrocarbons were $C_{10}H_{14}$, and not $C_{10}H_{16}$ hydrocarbons.

Mr. V. H. Veley then read a paper—

On the Rate of the Decomposition of Ammonium Nitrate.—The author has carefully measured the rate at which gas is evolved by heating pure ammonium nitrate at a constant temperature. He has arrived at the following conclusions:—That the rate of decomposition into nitrous oxide and water is dependent, not only on the mass of the salt, but on the proportion of free nitric acid present. If the reaction of the salt be rendered alkaline, the rate gradually increases as the proportion of free acid increases; a period of maximum velocity is then reached corresponding to the greatest proportion of free acid; the rate then slowly decreases with the decrease of free acid. An excess of ammonia completely stops the reaction, even when the temperature is raised 50° or 60° above the normal temperature of decomposition. If the reaction of the salt be rendered acid at starting, the rate of decomposition gradually decreases as the acid decreases. After heating the salt for thirteen to sixteen hours the rate of change becomes practically constant. The apparatus used in the research was exhibited, and the method illustrated before the meeting by the author.

Professor Ramsay then shortly described and exhibited a new gas burner for heating combustion tubes. The burner consists of a Bunsen burner, on the top of which fits a brass T piece, the top of the T is about 6 inches long and 1 inch in diameter. It has a longitudinal slit cut in it on the top; the ends are closed by pieces of sheet brass which are arranged so that they support the tube to be heated. By a simple arrangement any third of the slit can be closed or opened. A series of these tubes can be connected together by a bayonet catch, so that any length of tube can be supported and heated. The tube is covered by a length of asbestos cardboard. The principal advantages are that the arrangement is cheap and cools quickly, so that seven combustions can be performed in a day.

The two following papers were taken as read:—

Note on the Action of Allylic Iodide upon Phenol in the Presence of Zinc or Aluminium Foil. By P. F. Frankland and T. Turner.—A colourless liquid was obtained boiling at 223° to 225°; it proved to be orthopropylphenol.

On a Bye-product of the Manufacture of Aurin. By A. Claparède and Watson Smith.—When aurin is prepared from phenol, oxalic acid and sulphuric acid, a quantity of white crystals are formed on the lids of the aurin pots. The authors have purified and analysed these crystals, which consist of a phenylortho oxalic ether,

$C{=}(HO)_2$
$|\ \diagdown OC_6H_5$
$|\ \diagup OC_6H_5$. This substance melts at 123° to 124°; it is
$C{=}(HO)_2$

formed when phenol and anhydrous oxalic acid are distilled together.

The Society then adjourned over the summer recess.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a Council meeting, held May 30, the following officers were elected for the coming session:—Mr. C. Parkinson, President; Messrs. J. C. Braithwaite and H. H. Millhouse, Vice-Presidents; Mr. J. Hills Hartridge, Honorary Treasurer; Mr. W. Temple Cooper, Junr., Honorary Secretary; Mr. H. Cracknell, Honorary Assistant Secretary and Librarian.

The Council decided to open the rooms of the Association on the following Wednesday evenings during the summer months at nine o'clock:—June 20, July 4 and 18, August 1, 15 and 29, September 12 and 26. The Council having subscribed to Mudie's Library, members will be able to obtain books, other than works of fiction, mentioned in Mudie's Catalogue, a copy of which is kept at the rooms, on those evenings on which the rooms are open, subject to the rules drawn up by the Council, a copy of which will be fowarded to each member.

ROYAL INSTITUTION OF GREAT BRITAIN.

The Ultra-Violet Spectra of the Elements.*

BY PROFESSOR GEORGE D. LIVEING, M.A., F.R.S.

It seems probable that the range of our vision as regards colour is closely connected with the intensity of that part of the solar radiation which reaches us on the earth, for Langley's observations on the intensity of the sun's rays in different parts of the spectrum bring out the fact that the region of greatest intensity falls nearly

* Read Friday, March 9, 1883.

in the middle of the visible spectrum, and includes those colours to which our eyes are most sensitive. The ultra-violet rays, those which lie beyond the violet on the more refrangible side, are not, however, absolutely invisible, for, by carefully excluding light of lower refrangibility, Herschel found that he could see some distance beyond the Fraunhofer line H, into what he called the lavender-grey; and Helmholtz has succeeded in seeing nearly all the strong lines in the solar spectrum almost or quite up to its limit. Still these rays may fairly be said to be beyond ordinary vision; and from their power of chemical action they used to be distinguished as "actinic" rays. We know now that they have no monopoly of chemical activity, and we recognize no difference between luminous and actinic rays, the visible and the ultra-violet, except in their oscillation frequencies; that is, in the rate at which the successive pulsations of the ray succeed one another, and in the colour and refrangibility which are directly dependent on that rate. That the ultra-violet part of the solar spectrum extended at least as far above the line H as F is below it, has been known since the time of Wollaston, who observed its effect in blackening silver salts; but it is only about twenty years since Stokes made known to us the great length and intensity of the ultra-violet spectrum of the electric spark. Stokes used his own invention, a fluorescent screen, for observing the rays; and at the very time when Stokes published his discovery, W. A. Miller published photographs of the spectra of sparks taken between various metallic electrodes. Both these methods, that of fluorescent screens and that of photography, have been used by Professor Dewar and me in our researches. For the method of fluorescence we have used a modification of Soret's eye-piece, substituting for the uranium glass-plate a wedge-shaped vessel full of a solution of æsculine, placed with its edge horizontal so that we look down on the fluorescent liquid. The wedge form of the vessel has the advantage of refracting out of the line of vision all the rays except those which produce fluorescence, a matter of no small importance when faint light is to be observed.

Now, although the intensity of the sun's rays falls away rapidly beyond the Fraunhofer line H, and comes to nothing about as far above H as F is below it, it is far otherwise with the radiation of our terrestrial elements when heated up in the electric spark or arc, or even in some cases in flames; some of those elements which we know to be abundant in the sun, such as iron and magnesium, exhibit their most intense radiation, their strongest and most persistent rays, in the ultra-violet region, in waves which succeed one another at the shortest intervals. Indeed those metals so readily take up certain ultra-violet vibrations, that when there is much metal in the arc, and it is confined in a crucible of lime or magnesia, they often give their characteristic lines strongly reversed, dark absorption-bands being produced by the slightly cooled vapour which is outside the arc. The spectrum of iron is of all metals the most complicated, and those of the other elements which are most closely related to iron in chemical characters come next to it in the number and complication of their ultra-violet lines. Manganese and chromium are especially remarkable for showing many groups of closely-set lines. It is probably not without significance that this group of elements which exhibit the greatest variety in their chemical relations, and produce combinations of the greatest number of types and the most complicated spectra, are also those which produce the most highly-coloured compounds. In marked contrast to the thick-set ranks of iron, manganese, and chromium lines, are the few scattered rays exhibited by those metals which form their combinations each chiefly on a single type, such as aluminium, and the alkali and alkaline earth metals. These spectra are probably even simpler than at first sight they seem to be. That of lithium is the simplest: a series of single lines succeeding one another at decreasing intervals, and with diminishing intensity, closely resembling in these respects the spectrum of hydrogen. In the case of hydrogen, we know that the oscillation frequencies of some of its rays are related in a simple harmonic ratio. We are not able to say that the relation is so simple in the case of lithium; but still the whole series are probably overtones of a fundamental vibration, not so simply related as the harmonics of a uniform stretched string, but, like the overtones of a string which is not of uniform thickness, or is loaded at different points, similarly related in origin, though not exact harmonics. That the different rays are in many cases so related as overtones of a fundamental vibration appears more plainly, perhaps, when not single lines but groups of two, three, or four lines recur. Potassium shows a series of pairs to which the well-known violet pair, and perhaps that in the red also, belong. Calcium, magnesium, and zinc, each show a series of triplets, which are alternately sharply defined and diffuse. In other cases the same characters may be traced, though less readily, because there is sometimes more than one such series of lines or groups. The alkali metals have each one such series in the visible spectrum, and another in the ultra-violet. It may happen in other cases that two or more such series overlap, and it may then be very difficult to distinguish and separate them.

In some cases elements show at a lower temperature a far more complicated spectrum than they do at higher temperatures further removed from their points of liquefaction. This has been observed by Roscoe and Schuster in the case of the alkali metals potassium and sodium, which give at temperatures only a little above their boiling-points absorption spectra which consist of closely-set fine lines, producing an appearance of shaded bands quite unlike their emission spectra at higher temperatures. In some few cases we have observed similar "fluted" or "venetian blind" spectra, as they have been called, in the ultra-violet, as, for example, one produced by tin; but in general the temperature of the arc, which we have chiefly used in our observations on metals, is high enough to carry the metals beyond the stage in which their vibrations are constrained by the state approaching to liquefaction.

But though metals do not often show spectra of this class at the high temperature of the arc, it is otherwise with metalloids and with compounds. Nitrogen gives in the arc as well as in the spark a channelled spectrum of singular beauty, extending with but short breaks almost to the extremity of the ultra-violet region which we have examined. These multitudinous lines of nitrogen constantly present in the arc taken in air, help to make the problem of unravelling the spectrum of the arc, and assigning each line to its proper source, far more difficult than it might at first sight be supposed. Carbon, which in the arc frequently gives a channelled spectrum in the visible region, gives only a limited number of lines in the ultra-violet; but cyanogen gives one set of flutings near the line L, and another near N, which are so brilliant in the arc as to obscure the metallic lines in their neighbourhood. To the same class we may refer the spectrum of water.

The series of lines produced by the same element, which, I have spoken of as overtones of a fundamental vibration, have been likened to these channellings, but in reality they are very different. In the series, which I have supposed to have a sort of harmonic relation, the successive lines or groups of lines invariably become nearer to one another as the wave-lengths become shorter, and at the same time they diminish in strength and sharpness; whereas in the channelled spectra the strongest lines are at the end where they are most closely set, and they generally diminish in strength as they get further apart. Also increase of distance between the lines of channelled spectra is sometimes towards the less, sometimes towards the more, refrangible end of the spectrum.

I have before observed that a great part of the ultra-violet spectra of the elements which we have observed lies entirely beyond the limit of the solar spectrum; that limit is the line U at wave-length 2947. But though this is the limit of the solar radiation which reaches us on the earth, we can hardly suppose that the sun itself, or the photosphere, emits no radiation of shorter wave-length. We know there is plenty of iron and magnesium in the sun, and the strongest radiations at high temperatures of these elements are of shorter wave-length than U. Moreover, the continuous spectra of incandescent solids in many cases extend far beyond U. The continuous spectrum of burning magnesium reaches quite up to the wave-length 2380, that of the flame of carbon disulphide mixed with hydrogen and fed with oxygen reaches even further, that of lime heated with an oxyhydrogen blowpipe, though feeble beyond the limit of the solar spectrum, extends up to wave-length 2680. The temperature of the sun cannot be less than that of any of these sources of heat, so that we are forced to suppose that the radiation, more refrangible than U, which leaves the body of the sun, is stopped somewhere either in our atmosphere, or in planetary space, or in the atmosphere of the sun himself. Now Cornu has found that when the thickness of our atmosphere traversed by the sun's rays is diminished as much as possible by taking the sun at its greatest altitude, and making the observation from an elevated station (the Riffelberg), the solar spectrum only reaches to wave length 2932, that is, only a very trifle beyond U. We must therefore suppose that the absorbent substance, whatever it be, is not in our atmosphere. The same reason will lead us to reject the notion that the absorption can be due to matter in planetary space, for it is not easy to suppose that the gases which pervade that space in extreme tenuity can differ much from those in our atmosphere, because the earth in its annual course must pick them up whatever they are, and they must then diffuse into our atmosphere, and we must in time have them in a more condensed state in our atmosphere than in planetary space. The absorbent is therefore probably neither in our atmosphere nor in planetary space, and we must look for it in the solar atmosphere. When we notice how much of the radiation of our terrestrial elements is of shorter wave length than the solar line U, we might almost fancy that the blotting out of the sun's light beyond that point is simply due to an increase in the number and breadth of the Fraunhofer lines. Indeed, we have frequently observed the strong magnesium line, wave length 2852, expanded so that the dark absorption band in its middle reached quite up to U on one side and equally far on the other side, and this, together with such expansion of the strong iron lines beyond as we have occasionally observed, would go a long way towards completely hiding all light above U. But such expansions of iron and magnesium lines, high in the scale of refrangibility, do not occur without a considerable expansion of the lines of the same elements lower in the scale, expansions far exceeding what we actually observe in the Fraunhofer lines. Moreover, the Fraunhofer lines, though dark by comparison with the brightness of the photosphere, are themselves luminous, even bright, when there is no other still brighter light wherewith to contrast them, so that if there were no other absorbent action the solar spectrum would be continued by the emitted rays of the metallic vapours which produce these lines. Probably then the absorbent is something at a lower temperature, higher in the solar atmosphere. A change of temperature may, and in some cases certainly does imply such a change of state that there may be a corresponding change in the particular vibrations which can be most easily taken up.

The metals in the liquid and solid states are so very opaque that we should hardly be able to discern their absorption spectra; nevertheless, in very thin films they are translucent in different degrees. Gold leaf, as is well known, transmits a green light, and we have found that a thin film of gold, chemically deposited on a plate of quartz, is fairly transparent for all the ultra-violet rays, so that its selective absorption is almost wholly of the less refrangible rays. Silver deposited in a similar way produces a very different effect. It is almost wholly opaque, except for one rather narrow band which begins a little below the solar line P, and extends with diminishing transparency to about S. Cornu has before noticed this property of silver, but placed the transparent band at wave length 270 instead of 330. Dr. W. A. Miller has observed that the light reflected by gold is equally distributed all through the ultra-violet, but feebler than that reflected by other metals; while that reflected by silver is characterized by giving a sudden cessation of the photographic image for a certain distance. These characters of the reflected rays he attributed to absorption by the metal.

When we examine the absorption produced by the haloid elements, we find that chlorine absorbs a wide band in the ultra-violet with its centre near the solar line P, extending, when the chlorine is in small quantity, from N to T, increasing in width on both sides when the quantity of chlorine is increased, but still leaving the rays above wave length 2550 unabsorbed.

Bromine vapour shows an absorption band which begins in the visible spectrum, and extends, when the bromine is in small quantity, up to L, and when the bromine is in greater quantity, up to P. From that point, up to about wave-length 2500, the vapour is transparent, but beyond it is again absorbent, the absorption increasing gradually with the refrangibility of the rays.

Iodine vapour, when thin, is transparent for ultra-violet rays, but produces strong absorption in the violet region. With thicker vapour this absorption extends nearly to H, but the vapour is still transparent for rays more refrangible than H.

Lecoq de Boisbaudran has observed that in the spectra of similar elements we may trace a shifting of similar lines, or groups of lines, towards the less refrangible side as the atomic weight is increased. Thus the violet pair of lines given by potassium is represented by an indigo pair in the case of rubidium, and a blue pair in the case of cæsium; and the indigo line of calcium is represented by a blue line in the spectrum of strontium, and by a green line in the spectrum of barium.

We may observe something of the same kind in regard to the haloid elements: the absorption band which in the case of the element of lowest atomic weight, namely chlorine, is altogether ultra-violet, is shifted towards the less refrangible side in the case of bromine, and lies altogether in the visible region in the case of iodine, the element of highest atomic weight.

It is remarkable that bromine in the liquid state and iodine in solution show absorptions quite different from those of their vapours. A thin film of liquid bromine between two quartz plates is transparent for a band which ends just where the transparency of the vapour begins, while the film is opaque for rays both above and below this band. Iodine dissolved in carbon disulphide is also transparent for a certain distance, but the band is shifted to a less refrangible region lying between G and H.

Compound gases and vapours show, as might be expected, various absorptions of ultra-violet rays. The absorbent action of coal gas begins at about the wave-length 2680, and above 2580 it is nearly complete. Sulphurous acid has an absorption band extending from about R (3179) to rays of wave-length 2630, with a weaker absorption extending some way beyond these limits on both sides. Sulphuretted hydrogen produces a pretty complete obliteration of all rays above wave-length 2580. Vapour of carbon disulphide in very small quantity produces an absorption extending from P to T, shading away at each end. With more vapour this band widens, and a second absorption band begins at about the wave-length 2580. Chlorine peroxide gives a succession of nine shaded bands at nearly equal intervals between M and S, while in the highest regions of the spectrum it seems to be quite transparent.

I mentioned at the outset the probable connection between the intensity of the solar radiation and the sensitiveness of our eyes to rays of different colours. The consideration of ultra-violet absorption spectra leads to the mention of another fact connected with vision, or rather with the construction of the eyes of the higher animals. Soret has investigated, and recently Chardonnet has more fully examined, the limits of transparency of the crystalline, cornea, and vitreous humour of the eyes of various animals and man, and found them all more or less transparent for ultra-violet rays. The limit of transparency in many cases approaches, but never exceeds, the limit of the solar spectrum. Chardonnet places the limit of transparency of the crystalline of the human eye as low as M, which is not consistent with the observations of Herschel and Helmholtz before mentioned, but this inconsistency is probably due to alterations which had taken place after death in the eyes experimented on by Chardonnet. That the transparency of the materials of the eye does not extend beyond the solar line U, Chardonnet regards as a provision of nature to protect the retina from the extreme radiations of artificial lights; but I venture to offer a different explanation, which is, that the selection of the materials of the eye has been determined not by what they will absorb, but by what they will transmit. If the materials in question were in any great degree opaque to the ultra-violet solar rays, these rays must be absorbed and must either be used in heating the absorbent, or do work upon it in some form, perhaps alter it chemically, and so impair its efficiency as part of an optical instrument. I see, then, in the selection of these materials for our eyes an instance, one amongst many, of the marvellous adaptation of our organization to the natural, rather than to the artificial surroundings in which we are placed.

Parliamentary and Law Proceedings.

Prosecution of a Chemist under the Sale of Food and Drugs Act.

At the Glasgow Sheriff Summary Court on Friday, June 22, before Sheriff Balfour, William Kennedy, chemist, 59, Trongate, Glasgow, was charged with contravening the 7th section of the Sale of Food and Drugs Act, 1875, through an assistant, for whom he was responsible, dispensing a prescription presented by Robert Inglis, sanitary inspector, on June 4, not in accordance with the specified compounds stated by the prescriber, Dr. Neil Carmichael, 29, South Cumberland Street. The compound was to contain a certain drug, called methyl salicylate, but on an analysis by Dr. Wallace that drug was not found in it.

Mr. Hays, who appeared for the defendant, asked leave to make a statement with the view of inducing the prosecutor to withdraw the charge.

Mr. Ross, who appeared on behalf of the prosecution, said such a course would be irregular before the accused had pleaded to the charge one way or another.

The Sheriff suggested that Mr. Kennedy should plead first.

Mr. Kennedy having pleaded guilty,

Mr. Hays said: Since the complaint was served inquiries have been made and information obtained in regard to the matter complained of. It is understood that the medical prescription referred to in the complaint was prepared by Dr. Carmichael, and the ground of complaint is that the compounded drug contained no methyl salicylate. That statement is substantially correct, and the explanation of the fact is a very simple one. As Dr. Carmichael well knows, the drug methyl salicylate is not to be found in the British Pharmacopœia, and generally speaking is not known in Glasgow; and in point of fact, it is not kept by any chemist in Glasgow. Dr. Carmichael is the only medical man in Glasgow who prescribes it, and it appears to be a drug of American origin, recently discovered; and I find that as late as the month of June last year Dr. Carmichael, at a meeting of the Glasgow Southern Medical Society, called attention to it, and this, I believe, was its first introduction in Glasgow. I also find from Watt's 'Dictionary of Chemistry,' which is a high authority, and also from Dr. Carmichael's paper to the Medical Society referred to, that this methyl salicylate is a volatile oil or essence obtained from the *Gaultheria procumbens*, commonly known as "wintergreen." The plant distilled with water yields an oil consisting of acid salicylate of methyl (90 per cent.), and a terebine (10 per cent.), separable by fractional distillation. When this medical prescription was presented at Mr. Kennedy's place of business Mr. Kennedy was absent. It was handed to his principal assistant, Mr. Slogie, a gentleman of much experience and a most careful and accurate dispenser, and who has been admitted by the Pharmaceutical Society as a competent dispenser of drugs. Mr. Slogie had never heard before of methyl salicylate, and after examining the other ingredients of the prescription, he came to the conclusion that what was really wanted was salicylate of soda. and this he supplied instead of methyl salicylate, which is not kept in stock by Mr. Kennedy, or, it is believed, by any other chemist in Glasgow. Mr. Slogie was assisted in coming to the conclusion at which he arrived by reason of the fact that salicylate of soda, which is a drug extensively used in the treatment of rheumatism, was in complete keeping with the other ingredients of the prescription, which, on the face of it, appeared to him to be intended for the treatment of rheumatism. It will not be denied that this salicylate of soda is quite in harmony with the other ingredients of the prescription. I would call your lordship's special attention to this important point in the case. Keeping in mind what I have already mentioned that methyl salicylate is extracted to the extent of 90 per cent. from oil of gaultheria, had Dr. Carmichael, in making up his prescription, inserted *oil of gaultheria* instead of methyl salicylate, no mistake would have been made, because that is a well-known drug, and is kept in stock by all chemists, and he would have got practically what he prescribed. It had been ascertained that Dr. Carmichael had accepted this oil of gaultheria instead of methyl salicylate, and it had been further ascertained that Dr. Carmichael recently applied to a well-known apothecary establishment in Glasgow for this methyl salicylate, and none being kept there, a small quantity was obtained from the makers of it, who are, it is understood, in Germany; but finding the price too expensive, Dr. Carmichael set to preparing it himself by fractional distillation—as described in his paper read to the Medical Society. No similar prescription by Dr. Carmichael had ever been presented at Mr. Kennedy's place of business. The only fault which his assistant committed was in not asking an explanation of what was meant by methyl salicylate. But it is a well-known fact that chemists were constantly in the habit of spelling out prescriptions by medical men, and I suppose, acting on this practice, the assistant supplied the one thing for the other. He did supply a salicylate, but not that of methyl. There was not the slightest suspicion of fraud in the case and no injury could possibly have been done to any one by the substitution of the salicylate of soda. It may be that according to the strict letter of Section 7 of the Sale of Food and Drugs Act, 1875, there was an infringement of the law, but in the very peculiar circumstances of this case, which I have explained, it would be a great hardship to inflict a penalty, and I therefore ask your lordship to deal as leniently as possible with Mr. Kennedy.

Mr. Ross contradicted Mr. Hay's statement that no similar prescription had been presented to Mr. Kennedy before. Dr. Carmichael gave the same prescription to a patient on the Thursday preceding June 4, and it was dispensed in Mr. Kennedy's shop. It was in consequence of the medicine supplied on that occasion being discovered by Dr. Carmichael to be of the wrong sort that the prosecution arose. The colour of the two medicines, however, was quite different. Dr. Carmichael sent the same prescription to the Sanitary Inspector, who sent an officer to get it dispensed by Mr. Kennedy, and subsequently the prescription was presented at the Apothecaries' Company's warehouse, and a correct compounding of the specified ingredients was obtained.

The Sheriff remarked that assuming that Dr. Carmichael thought that the medicine could not be got in Glasgow, it was a curious thing for him to give the prescription. There was some semblance of a trap being laid for the chemists in such a proceeding.

Mr. Ross pointed out that the doctor had got the drug in the city previously.

Mr. Hays said the drug was only to be obtained from the Apothecaries' Company, and it had been specially manufactured by them to the order of Dr. Carmichael.

Sheriff Balfour, in giving his judgment, said he was left in the dark with regard to two particulars of the case which very much affected the gravity of the offence. The first particular was whether Dr. Carmichael, who made out this prescription, ever got this salicylate of methyl dispensed before in Glasgow. It appeared to be a drug of quite recent American origin, and had been introduced into this country about a year ago. Dr. Carmichael appeared to know well enough about it, but whether or not he ever got it dispensed in Glasgow prior to sending out this prescription is a point on which no information had been given. The other point that his lordship was left in doubt about was the real difference between the two ingredients—whether it is an injurious thing to dispense salicylate of soda instead of salicylate of methyl. From the samples of both drugs before his lordship, he saw they were quite difference in appearance. With these two elements of the case left out, he could only deal with the remaining element, which constituted a sufficiently grave offence on the part of the respondent. It appeared that after this prescription was sent to Mr. Kennedy, Dr. Carmichael sent out another prescription to the Glasgow Apothecaries' Company, and he got that prescription properly dispensed. The Glasgow Apothecaries' Company adopted the proper expedient, and in place of being in doubt as to what the salicylate of methyl was, and dispensing another article in its place, they very properly sent to Dr. Carmichael and got the salicylate of methyl from him. That was where the offence of Mr. Kennedy lay, and that was where his agent had very properly admitted that there was an offence. He would have inflicted a heavier penalty if he had been satisfied that this was a drug commonly known in Glasgow and dispensed all over the town; but from the fact of a well-known establishment like the Glasgow Apothecaries' Company not having it in stock, and requiring to send to Dr. Carmichael for it, it seemed that although it had been introduced in Glasgow for a year, its supply was an uncommon thing amongst chemists. It was perfectly clear that Mr. Slogie should have sent to Dr. Carmichael to ascertain what the drug was, and where it was to be had. He had no right to dispense salicylate of soda in its place. He would inflict a penalty of £4, without expenses.—*Glasgow Herald.*

Alleged Supply of Laudanum for Paregoric.

Mr. F. Price, district coroner, held an inquest this week, at Salford, touching the death of George Henry Dodd, an illegitimate child, five months old. According to the evidence, the deceased became unwell about a month ago, and his mother gave him some paregoric, which was purchased at the shop of Mr. Lucas, chemist, Broughton Road. On Friday last the mother sent a little girl for another pennyworth of paregoric, but instead of going to Mr. Lucas's shop, she went to Mr. Peatson's in Broughton Road. She was served by Mrs. Peatson, and a portion of the contents of the bottle was administered to the deceased by its mother. The deceased at once fell asleep, and not awaking, and the mother observing that he breathed heavily, gave him some brandy and water. The child was taken to a medical man, who gave him some medicine, but he died without recovering consciousness.

Mr. James Gray, surgeon, said the deceased was brought to him in a state of complete stupor. The pupils of the eyes were contracted, and the symptoms were those of narcotic poisoning. He applied stimulants without effect. The mother said she had given it something from a small bottle which she produced. In his (Mr. Gray's) opinion, the bottle contained laudanum, pure and simple. The bottle had evidently contained peppermint, and the smell of laudanum was, therefore, not so apparent.

A Juryman: Do you think the child has been poisoned?

Mr. Gray: That is quite evident.

The Coroner, in summing up, said the person who supplied the narcotic might be guilty of manslaughter for supplying laudanum instead of paregoric, but as Mrs. Peatson denied serving the laudanum, no criminal charge could be sustained on the evidence of the little girl.

The Jury returned a verdict "that the deceased died from an overdose of laudanum, inadvertently administered to him by his mother."—*Manchester Evening News.*

Poisoning by Chlorodyne.

On Tuesday morning Sir John Humphreys held an inquest at the Town Hall, Old Street, Shoreditch, on the body of John Berry, aged 33, newspaper reporter. Deceased suffered from heart disease, and was in the habit of taking chlorodyne to ease the pain. On Saturday night he took a dose and went to bed. About thr ee o'clock next morning his wife heard him making a peculiar noise, and discovered that he was in an insensible condition. A doctor was sent for, but deceased expired a few minutes after his arrival. The doctor who made the *post-mortem* said death was caused by prussic acid, and in chlorodyne there was a certain amount of that acid.

The Jury returned a verdict of "Death by misadventure."

***[It is not quite clear upon what ground death in this case was attributed to prussic acid poisoning; at any rate, it is not the only conclusion that would be consistent with the facts as reported.—Ed. Ph. Journ.]

Chemistry in the Law Courts.

THE BADISCHE ANILIN UND SODA FABRIK V. LEVENSTEIN.

In the Chancery Division of the High Court of Justice, on Wednesday last, Mr. Justice Pearson delivered judgment in this case, which was commenced on March 5, and has been thirteen days before the Court.

The plaintiffs were a company incorporated in Germany, and were the owners of a patent taken out by them through their agent in England in the year 1878 for "improvements in the production of colouring matters suitable for dyeing and printing," and their claim was for an injunction to restrain the defendants, Messrs. Levenstein, who are manufacturers of materials for dyeing, from manufacturing, selling, or making any profitable use of any dyes or colouring matters being the same as the "Fast Blackley Red" sold by the plaintiffs, or any dyes or colouring matters made according to the plaintiffs' inventions, or by any process being a colourable imitation thereof. The questions which arose in the case were of great difficulty, and involved a considerable acquaintance with the technical language used in the science of chemistry. A fact of some public interest was stated during the hearing of this case, which was that the manufacture of chemicals used for dyeing purposes is almost entirely in the hands of Germans, who make immense profits by the sale in England of these most necessary articles. The plaintiffs, by their specification, stated that their invention consisted in the production of red and brown colouring matters, in chemical language termed the "sulpho-acids of oxyazo-naphthaline." They then described four simple processes for producing this result, and claimed as their invention the production of the colouring matters by any one of the processes so described. The first process was as follows:—Naphthylamine is converted into its diazo compound by the action of nitric acid and in a manner well known to chemists, and equal molecules of the diazo compound thus obtained and of naphthol, or naphthylic alcohol, are allowed to react upon one another, by preference in an alkaline solution, according to the employment of either of the two isomeric modifications of naphthylic alcohol known as alpha naphthol and beta naphthol; the result of this operation is a precipitate containing either of the two corresponding and isomeric modifications of oxyazo-naphthaline, and which may be termed "alpha and beta oxyazo-naphthaline" respectively. These azo-compounds are further converted into their sulpho-acids by any method now in use for the preparation of organic sulpho-acids, such as, for instance, by heating them with fuming sulphuric acid until the mixture is found to produce a clear solution with water. The excess of sulphuric acid may then be removed by any of the known means for effecting this purpose and the colouring matter may be obtained in a solid state by precipitation or evaporation. In this manner brown colouring matters are obtained from alpha oxyazo-naphthaline, and red colouring matters from beta oxyazo-naphthaline. An example of the manner in which the first process could be carried out was then given:—"About 10 lbs. of naphthylamine are mixed with or dissolved in about 2 gallons of concentrated or strong muriatic acid and about 100 gallons of cold water, and thereto an aqueous solution of nitrate of sodium is added, containing about $4\frac{8}{10}$ lbs. of pure nitrate of sodium, or as much as will be found necessary to convert the naphthylamine into its diazo compound, or into hydrochlorate of diazo-naphthaline. The solution thus obtained is added to an aqueous and strongly alkaline solution of about 10 lb. of either of the two isomeric naphthols, or of a mixture of the same, when a dark-red or brown precipitate will be produced, consisting of oxyazo-naphthaline, which is to be filtered, washed and dried. In order to obtain the sulpho-acids of oxyazo-naphthaline, about 10 lbs. of the oxyazo-naphthaline are dissolved in about 20 lbs. of fuming sulphuric acid, containing about 80 per cent. of anhydrous sulphuric acid, and the mixture is heated at a temperature of about 100° C. for about two hours, or until a sample of the mixture will be found to produce a solution with water. The further treatment consists in removing the free sulphuric acid contained in the mixture by any of the known means for effecting this purpose, such as, for instance, by neutralization with caustic lime, and the colouring matter may be obtained in a solid state, by preference in the state of a sodium salt in a manner well understood by chemists." The three other processes were then described, which in some respects varied from the first process. The objections raised by the defendants was that the specification did not sufficiently describe and ascertain the nature of the alleged invention, or in what manner the same was to be performed, and did not sufficiently distinguish which of the matters and things therein described were claimed to be new, and that the specification was in other respects vague and insufficient. In support of the plaintiffs' case, several witnesses learned in the science of chemistry were examined at considerable length, and in their evidence it was stated that the colouring matters for which the patent had been secured were capable of being produced by the different processes described in the specification. The defence, in support of which many scientific witnesses gave evidence, was principally to this effect—that it would be impossible to carry out the processes by the means stated in the specification, on this account, that if the oxyazo-naphthaline were to be united with the fuming sulphuric acid of the strength therein described, it would be dangerous to human life, and it was proposed that an experiment should be tried on a small scale in the presence of the Judge, for the purpose of explaining and proving the defendants' allegations. Mr. Justice Pearson having consented to this experiment being tried, an arrrangement was made for carrying it out in a separate room, and there could be no doubt that the process, as exhibited by the defendants, supported their theory, while the contention of the plaintiffs was that the experiment was not properly carried out. At the conclusion of the arguments and evidence on both sides, the learned Judge stated that he should not decide the case without having an experiment made by an independent scientific chemist appointed by the Court. In pursuance of this decision, Professor Roscoe was appointed by the Judge, with the sanction of all parties, and a report was made by him. After this report had been made to the Court and communicated to the parties, this further contention was raised. It was said by the defendant that he really and truly carried out his manufacture of the several articles by a totally different process from that described in the plaintiffs' specification, and that he was willing to communicate what he termed his secret process to the plaintiffs if they would undertake not to divulge it. The plaintiffs declined to give the required undertaking, and, after much discussion, it was proposed by the Judge and approved by the counsel on both sides that the secret process should be stated to the Court in private, and accordingly the arguments were continued for three days in the Court with closed doors.

In the course of an elaborate judgment Mr. Justice Pearson said: There could be no doubt that Mr. Levenstein was entitled to great praise for the knowledge and perseverance which had enabled him to carry out his process; he would even assume that the process might be conducted more easily and more cheaply than that adopted by the plaintiffs; but still it was only another method, by using well-known ingredients, of arriving at the same result. There was no dispute that, so far as the materials were concerned, Mr. Levenstein used the same, or he used equivalents for them, and taking all the circumstances into consideration he could not come to any other conclusion than that the plaintiffs were entitled to their injunction. He regretted very much to be obliged to decide against Mr. Levenstein, but the law compelled him to do so. He must, therefore, grant the injunction, and the defendant must pay the costs of the action.

Correspondence.

F. G. Foot.—(1) *Vicia sylvatica*; (2) *Vicia cracca*; (4) *Euphorbia amygdaloides*; (5) *Silene inflata*; (6) *Melittis melissophyllum.*

N. M. Grose.—*Salisburia adiantifolia*, the Japanese "gingko."

R. M. Lewis.—Your letter has been handed to the Secretary, to whom all notices of change of address should be sent.

T. P. Jones.—We believe a cement for fastening india-rubber on bicycle wheels is made by allowing 1 part of shellac to digest in a warm place in 10 parts of strong solution of ammonia until it becomes fluid.

J. Sharp.—The book is published by Messrs. Churchill.

F. W.—We think your object could be best secured under the provisions of the Trade Marks Act, which is printed in the Society's Calendar.

A. Rutter.—See an article in the *Pharm. Journal* for August 12 last, p. 123.

Communications, Letters, etc., have been received from Messrs. Whitby, Kingzett, Kinninmont, Wilkinson, Hay, Senier, Harvie, Wells, Allan, Inquirer, Corniper, B. H. E.

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(*Note.—Books to which * is affixed are not circulated.*)

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